MONOCOTS & DICOTS

INTRODUCTION

The flowering plants (**ANGIOSPERMS**) (AN-jee-uh-spurmz) are the most advanced plants on earth. They are characterized by reproductive organs called **FLOWERS**. Inside the flower is a closed structure called the **OVARY** where **SEEDS** are produced.

Each seed consists of an **EMBRYO** (young plant) plus stored food neatly packaged inside some tough protective seed coats. The embryo comes complete with a primitive root-like structure and one or two **SEED LEAVES** called **COTYLEDONS** (KOT-uh-LEE-duhnz).

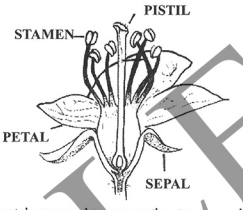
Thus, flowering plants divide naturally into two large sub-classes:

1. **MONOCOTS** (orchids, lilies, grasses, palms) where the embryo has one cotyledon.
2. **DICOTS** (oaks, clover, tomatoes, petunias) where the embryo has two cotyledons.

This lesson proposes to show you some ways in which dicot flowering plants differ from monocot flowering plants. The magnifications given, for example, slide 1 - (20x), means that the microscope lenses were set at that power when the photograph was taken.

THE FLOWER

Angiosperm plants all have reproductive structures called flowers. The typical flower consists of four sets of modified leaves. In the middle is the **PISTIL**, which includes the closed ovary where seeds are produced. Around that is a ring of **STAMENS**, each with a hair-like filament supporting pollen boxes (**ANTHERS**) where the pollen grains are produced. These essential reproductive organs are shielded by a ring of petals plus an outer ring of **SEPALS**.



The diagram illustrates a flower with some sepals and petals removed to expose the stamens and pistils inside.

1 A MONOCOT SEED - l.s. (20x)

For this slide, a seed of a monocot plant called **SAGITTARIA** (**ARROWHEAD**) was sliced the long way. It shows a mature **EMBRYO** curled up inside the seed coats (S). The embryo is shaped like the letter J. The short arm of the J is a young root (R). The long arm of the J is the single **COTYLEDON** (C).

2 A DICOT SEED - l.s. (40x)

Here we see a slice taken from a seed of a dicot plant called **CAPSELLA** (**SHEPHERD'S PURSE**). *How does the embryo on this slide compare with the one on slide 1?* The young root (R) on slide 2 is a bit longer, but otherwise the two embryos are quite similar. However, there is one big difference. This one is from a dicot plant, so the embryo has two cotyledons instead of one. Focus sharply, and you can see a thin crack that gives evidence of separation into two cotyledons (C-C). *Can you identify the structure labeled (S)?*

8 MONOCOT FLOWER - x.s. (6x)

This slide shows what you would see if you were looking down at a thin slice cut from a monocot flower. The knife cut through each of the four sets of structures described above, leaving a sort of "fingerprint" of this particular flower.

Count the sepals (S) and the petals (P). *What do you find?* In monocot flowers, the parts always seem to come in threes or multiples of three. *What evidence do you see in the central ovary of this "magic" number three?* It is a little harder to count the stamens which are also seen cut in section. However, if you do manage to count them properly, you will find that there are six (3 x 2).

By contrast, in dicot flowers, the "magic number" is four or five. The parts of some dicot flowers come in fours, while others have their parts in fives.

DICOT

PARTS IN MULTIPLES OF 5 (OR 4)

MONOCOT

PARTS IN MULTIPLES OF 3

Photomicrographs: Slides 1, 2, 3, 4, 5, and 8 Dr. J. Metzner, John Jay College (CUNY)

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