

THE LEAF OF A FLOWERING PLANT

INTRODUCTION

A flowering plant carries on its life activities with the aid of specialized organs called roots, stems, leaves and reproductive parts. This set deals with LEAVES.

Leaves perform at least five general functions in the life of the plant:

1. *Photosynthesis* - Green leaves manufacture food.
2. *Respiration* - Leaves permit gas exchange between the plant and the outside air.
3. *Transpiration* - Leaves excrete excess water.
4. *Food Storage* - Certain cells of the leaf store food.
5. *Reproduction* - In some plants the leaves can reproduce the plant.

Leaves may also be modified for special

purposes: tendrils for climbing (sweet pea), thorns for protection (barberry), traps for catching insects (Venus flytrap), spines to conserve water (cactus).

A leaf consists of a thin, flattened green part (*blade*) and a stalk (*petiole*) that attaches it to the stem. The blade is usually stiffened by a framework of veins continuous with the veins of the stem.

In the leaves of a dicot plant the veins fan out into a branching network. In the veins of a monocot plant the veins are more or less parallel.

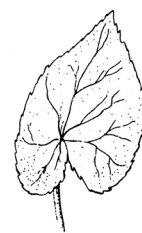
The magnification given, for example Microslide 1 – (60x), means that the microscope was set at that power when the photograph was taken.

MONOCOT LEAF



Parallel Vein

DICOT LEAF



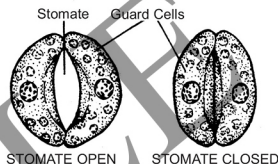
Net Veined

6 STOMATE - Surface view - Stained (430x)

If we observe a stomate under greater magnification, we can see more clearly the two sausage-shaped guard cells which regulate the size of the opening. Wide open stomates allow water, oxygen and carbon dioxide to move freely into and out of the leaf. Closed stomates cut off the exchange of gases.

Can you explain how this mechanism might: 1. Control the rate of photosynthesis?

2. Regulate water loss (transpiration)?



7 AIR SPACE AND SPONGY LAYER - x.s. - Stained (400x)

The stomate (S) seen here is wide open. It leads directly into a large air space (A) surrounded by chlorophyll-containing cells. How does this arrangement assure the working cells of a constant supply of CO₂ for photosynthesis? How does it provide a way for eliminating the excess O₂ produced by the cells during photosynthesis?

For eliminating the excess water in the cells?

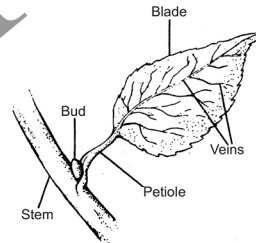
The water *needed* for photosynthesis is delivered to the working cells by the veins (V) seen in Microslide 1. Do you see any evidence that a vein provides two-way passage for fluids? (Hint- review the terms xylem and phloem.)

8 ABSCISSION LAYER - l.s. - Stained (12x)

Leaves are not permanent structures. They start as tiny buds that open in the spring, and grow to mature size. Towards the end of the season, a special ABSCISSION LAYER forms at (X). The mature leaf breaks off at this point and falls from the plant. Note that a new bud (B) has already formed before the old leaf's falls off. How does the abscission layer affect the veins (V) that deliver fluids

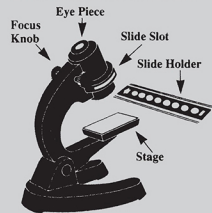
to and from the leaf during its life?

Here is a list of structures found in leaves. Which of them can you find in Microslide 1? Epidermis, palisade layer, spongy layer, air space, stomate, vein, guard cell, abscission layer, chloroplast.



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MICRO-SLIDE-VIEWER™



Face the Micro-Slide-Viewer so that as much light as possible falls on the white Stage.

Insert the numbered end of the Slide Holder into the Slide Slot of your Viewer, moving it from your right to left.

View with your eye close to the Eye Piece.

With Slide No. 1 in place, focus by turning the Focus Knob.

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