BIO FAX!

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Catalog No. FB0490

Publication No. 10673

Leaf Identification Kit

Introduction

Leaves can be found in a wide variety of sizes, shapes and colors. Each species of tree produces its own variation of leaf. In this activity, thirteen different leaves will be classified and identified.

Concepts

- Identification
- Classification
- Dichotomous key
- Leaf Structures
- Photosynthesis

Background

The leaf has often been called the most wonderful factory on Earth. Leaves capture the Sun's energy and undergo a process known as photosynthesis. Photosynthesis is the chemical process that uses light, carbon dioxide, and water to synthesize food and produce oxygen. Leaf tissues are highly specialized and are composed of cells containing various pigments. The most important pigment is chlorophyll. Chlorophyll is the substance that traps energy from sunlight and gives plants a green pigment. Chlorophyll (and the light energy it traps) is contained in structures called chloroplasts.

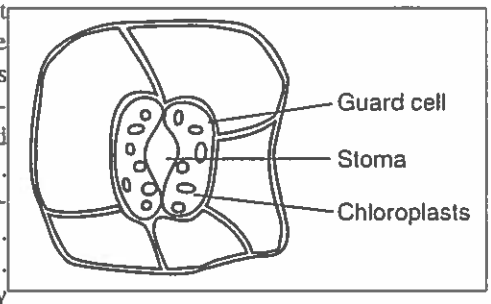

Figure 1. Stomata

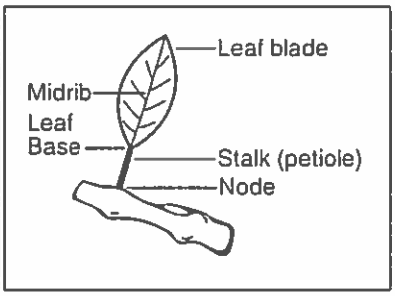

Figure 2.

Besides photosynthesis, leaves also carry out other exchanges with the atmosphere. It is through the leaf that the plant respires (taking in carbon dioxide and expelling oxygen) and transpires (loses water). The tissues of leaves contain specialized structures called stomata. Stomata are kidney-shaped structures that form microscopic openings in the leaf (see Figure 1). These openings work like valves that will open and close depending on the amount of water pressure, or turgor, in the leaves. The amount of water in the leaves determines if the stomata will open or close, permitting or preventing transpiration or water loss through the leaves. In nearly all plants, stomata are primarily located on the undersurface of the leaves and will vary in number depending on the environment surrounding the plant. The cuticle is a waxy protective barrier on the outermost surface of the leaf. It not only prevents excessive transpiration but it also allows water to run off the surface of a leaf.

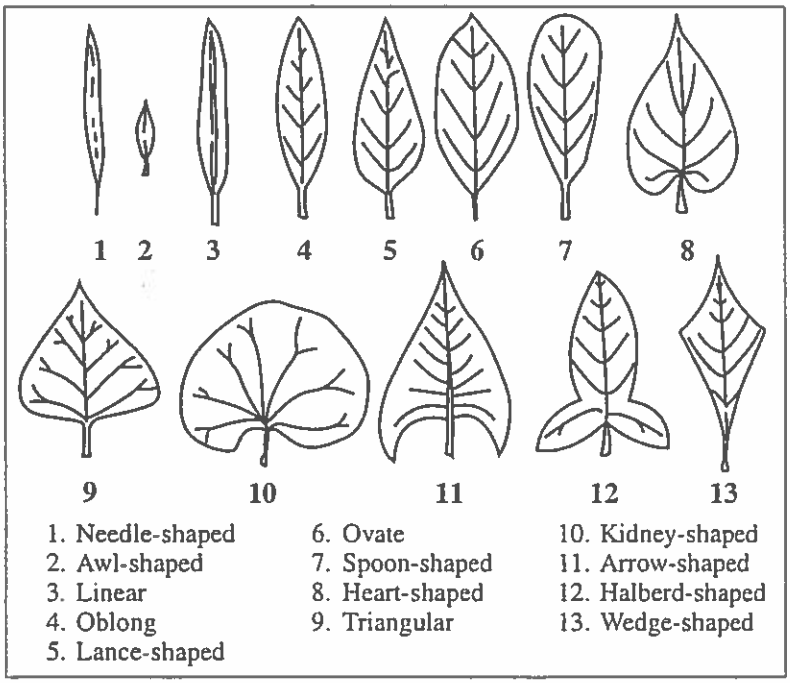

Figure 3a. Leaf Shapes

Most leaves have a flattened, generally broad portion called a blade and a slender stalk known as a petiole. Petioles generally run into the base of the leaf blade and form the mid-rib or main vein of the leaf. The place where the petiole or leaf stalk attaches to a stem is known as a node. See Figure 2 on page 1.

Leaves have many different shapes, sizes and margins (or edges). Some common leaf shapes and margins are shown in Figures 3a and 3b.

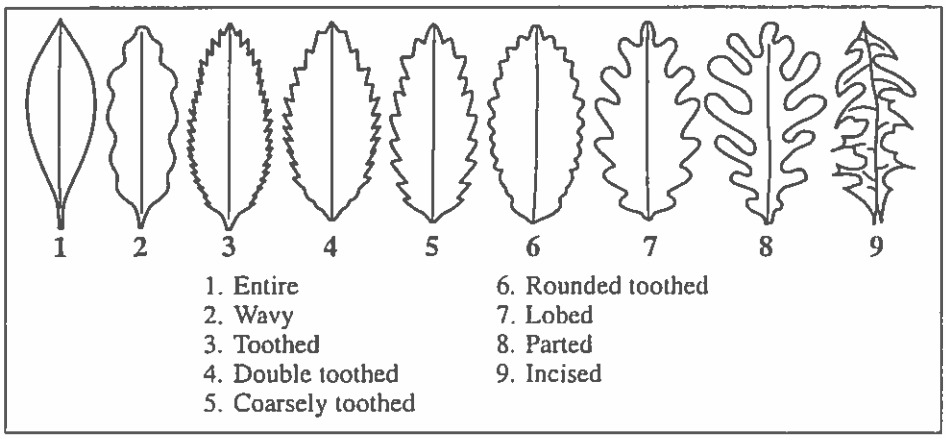

Figure 3b. Leaf Margins

Most leaves are arranged on the stem in three different ways—alternate, opposite, and whorled (see Figure 4). Alternate leaves are positioned on the stem one per node and will first form on one side of a stem and then on another. Opposite leaves are positioned two per node and grow at an angle of 180 degrees from each other. Whorled leaves are found three or more per node.

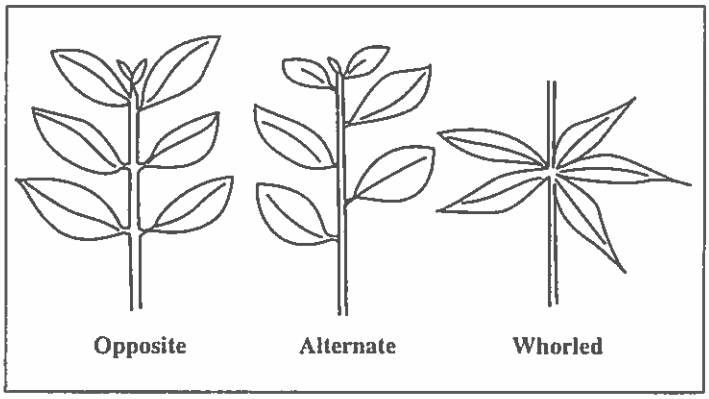

Figure 4. Leaf Position

Leaves are primarily divided into simple and compound groupings (see Figure 5). Simple leaves usually have one leaflet, a stalk and a bud at the base of the stalk. Compound leaves have a stalk that branches into a number of leaflets. Leaves may also be classified by their parallel or pinnate vein structures (see Figure 6).

Leaves come from either deciduous or coniferous (evergreens) trees. Deciduous trees have flat broad leaves that are lost every year to ensure a rest period where metabolic functions are greatly reduced. Deciduous trees produce flowers that develop into seeds after they are pollinated. Oaks and maples are examples of deciduous trees. Conifers keep their leaves and remain green year round. They can withstand very cold temperatures and heavy snow. Coniferous trees produce cones instead of the flowers seen on deciduous trees. Examples of conifers are pines and spruces.

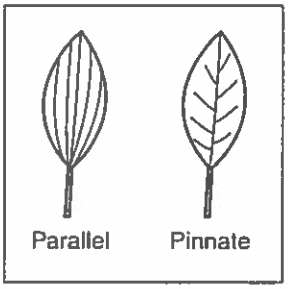

Figure 6.

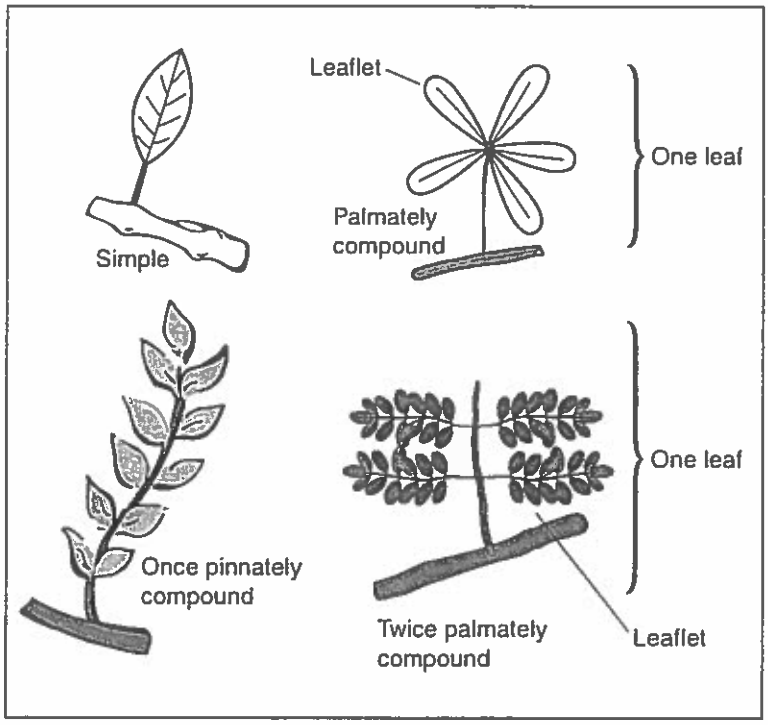

Figure 5. Simple vs. Compound Leaves

Materials

Leaf samples, unknown, 13

Leaf Identification Key

Leaf Identification Worksheet

Procedures

Part I — Leaf Identification

1. Obtain a copy of the Leaf Identification Key.
2. Obtain one of the unknown leaf samples. Use the Leaf Identification Key to classify the unknown sample.
3. When looking at the key, there are several options at each step. For example:

   1a. Leaves are scalelike or needlelike. 2

   1b. Leaves are not scalelike or needlelike. 3

   Choose an option at each step (i.e., continue on to step 2 or step 3). Work your way through the key until all of the samples have been identified. Record the identities of the samples in the Leaf Identification Worksheet.
4. Obtain another unknown leaf and repeat steps 2 and 3.
5. Continue classifying until all of the unknown samples have been identified.
6. Answer the questions in the Post-Lab section.

Name: _____

Leaf Identification Worksheet

Unknown Leaf #	Leaf Name
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

Post-Lab Questions

1. What are some identifiable features that are used to classify the unknown samples?

2. What are the main functions of a leaf? Describe.

3. What types of leaves are found in your area? Describe each type of leaf in detail using the terms learned from this activity.

IN10673

Leaf Identification Key

1a.	Leaves are scalelike or needlelike	2
1b.	Leaves are not scalelike or needlelike	3
2a.	Leaves are ½" long or shorter and have a narrow base.	Eastern Hemlock
2b.	Leaves are long and narrow, and needles are united at base to form bundles	Scotch Pine
3a.	Leaves are finely serrated	4
3b.	Leaves are not finely serrated	6
4a.	Leaf has a single main vein with smaller side veins	5
4b.	Leaf has main veins radiating from one point and the base is not symmetrical.	Little Leaf Linden
5a.	Leaf has a wide mid-vein	Eastern Cottonwood
5b.	Leaf has straight, parallel, seldom branched veins.	Siberian Elm
6a.	Leaves are lobed	7
6b.	Leaves are not lobed	10
7a.	Leaf has one main vein.	Northern Red Oak
7b.	Leaf has 3 to 7 main veins radiating from one point at or near the base	8
8a.	Leaf has 3 distinct main veins	American Sycamore
8b.	Leaf has more than 3 distinct main veins	9
9a.	Notches between lobes are deep and the under-surface is white downy	Silver Maple
9b.	Leaf is usually wider than long and base of leaf is not curved	Norway Maple
10a.	Compound leaflets are present	Honey Locust
10b.	Compound leaflets are not present	11
11a.	Leaf is fan-shaped	Ginko
11b.	Leaf is not fan-shaped	12
12a.	Leaf is heart-shaped with veins branching from the base	Eastern Redbud
12b.	Leaf is not heart-shaped	Osage Orange

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