

LAB 1 - PLANT IDENTIFICATION

Objectives:

1. To introduce plant nomenclature and classification.
2. To become familiar with basic plant morphology.
3. To begin to identify plants using morphological characteristics.

Introduction

Plants can be identified by observing certain distinguishing morphological characteristics. Some plants are closely related, which is shown by the similarity of their flower structures. These plants are placed into a specific plant family. A herbaceous example of a family that is based on similarity of flower parts would be Asteraceae, the aster family, of which marigolds and zinnias are members. An example of a woody plant family would be Aceraceae to which maples belong.

Within each family there are members that are more closely related than others. This relationship is demonstrated by the similarity of basic morphological traits like leaf shape or arrangement. These plants are placed in a group called a Genus. Maples belong to the genus Acer while marigolds are placed in the genus Tagetes.

Members of a plant genus are again subdivided, according to their similar morphological characteristics, into a grouping called a species. For example, each different type of maple belongs to a different species (see list below).

The BINOMIAL PLANT CLASSIFICATION SYSTEM, which we have just described, gives each plant a scientific name using the genus and species.

Examples of scientific names:

<u>Scientific Name</u>	<u>Common Name</u>
<i>Acer saccharinum</i>	Silver Maple
<i>Acer platanoides</i>	Norway Maple
<i>Tagetes erecta</i>	African Marigold
<i>Tagetes patula</i>	French Marigold

When botanists group plants, they use flower parts as their primary guide because the flower is the least affected by growing conditions. In this lab we will be looking at leaf characteristics to help us identify plants because they are more likely to be available to you.

Introductory Lecture Outline

A. Plant Nomenclature

1. Binomial classification system

a. two Latin names

-genus

-species

b. cultivars and varieties

-

-

c. importance

B. Morphological Characteristics

1. Plant type

a. Woody

1. deciduous

2. evergreen

b. Herbaceous

1. annual

2. perennial

3. biennial

2. Leaf type (we will study this in detail in lab)

3. Fruit type

- a. samara
- b. pome
- c. nut-like
- d. cone
- e. acorn (nut)

4. Flowers are borne on structures called inflorescences, which are a collection of individual flowers arranged in a specific order or way.

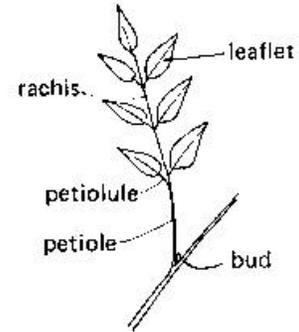
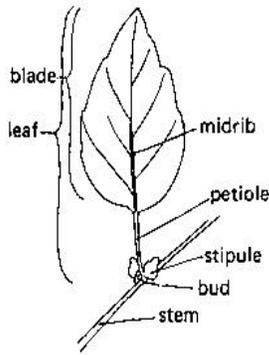
- a. spike (a catkin is a type of spike ex. pussywillow)
- b. raceme
- c. corymb
- d. umbel
- e. cyme
- f. panicle
- g. solitary
- h. head

5. Other characteristics

PLANT MORPHOLOGY

In order to successfully identify woody plants it is necessary for an individual to have a keen awareness (working knowledge) of taxonomic terminology and concise mental pictures of leaf, bud, stem, flower and fruit morphology.

LEAF MORPHOLOGY ANGIOSPERM LEAF TYPES

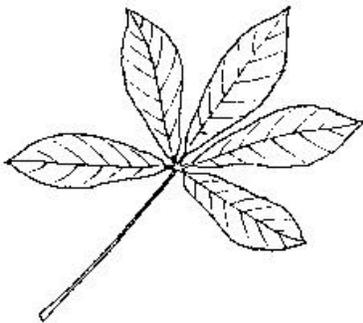


Simple Leaf

Pinnately Compound Leaf

The position of the bud determines whether the leaf is simple or compound. In the case of the single leaf the bud is found in the axil of the leaf and stem. If the bud is located in the axil of a structure containing more than one leaf it is termed compound. Compound leaves may have from three to 1500 leaflets. Ex: *Acer* with three or *Albizia julibrissin* with 400 to 1500 leaflets.

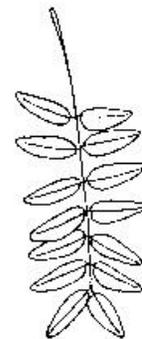
OTHER TYPES OF COMPOUND LEAVES



Palmately Compound
Ex: *Acanthopanax*, *Parthenocissus*



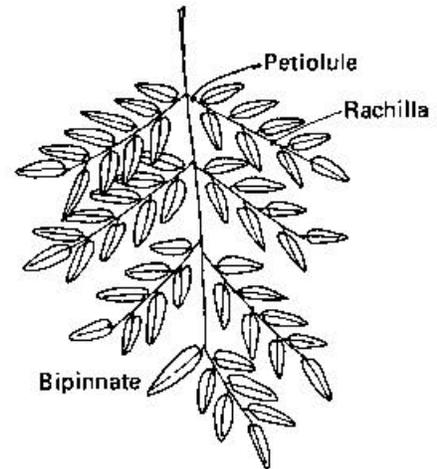
Odd Pinnate
Ex: *Acer negundo*, *Fraxinus*



Even Pinnate
Ex: *Gleditsia*

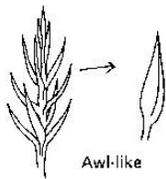
Bipinnately Compound

Bipinnately compound leaves are twice divided. What was considered the leaflet of the pinnately compound leaf is now another leaf-bearing axis to which additional leaflets are attached. The new leaf bearing axes are referred to as pinnae. Each pinna has a certain number of leaflets. Ex: *Gymnocladus*, *Albizia*, *Gleditsia* (in certain instances).

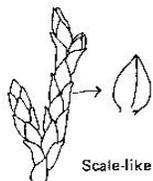


GYMNOSPERM LEAF TYPES

Cone-bearing or naked seeded plants often display different leaf types than those associated with angiosperm plants. Not all conifers (or cone-bearers) have evergreen foliage (exceptions include *Taxodium*, *Metasequoia*, *Larix*, and *Pseudolarix*).

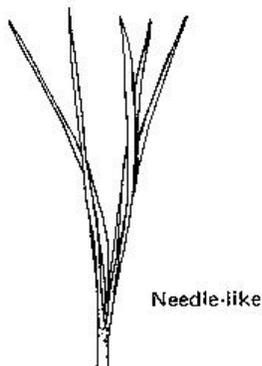


The needles (leaves) are shaped like an awl. They are usually very sharp to the touch. Many *Juniperus* (Junipers) exhibit awl-shaped foliage. This character is manifested in juvenile forms of juniper, however, there are many species and cultivars (*Juniperus communis*, *J. Procumbens*, *J. chinensis* 'Pyramidalis' to name a few) which possess the awl-like of needle foliage in youth and old age.



Scale-like foliage overlaps like the shingles on a roof or the scales on a fish. This type of foliage is relatively soft to the touch. *Thuja*, *Chamaecyparis*, *Cupressus*, *Calocedrus* and many *Juniperus* species exhibit this type of foliage.

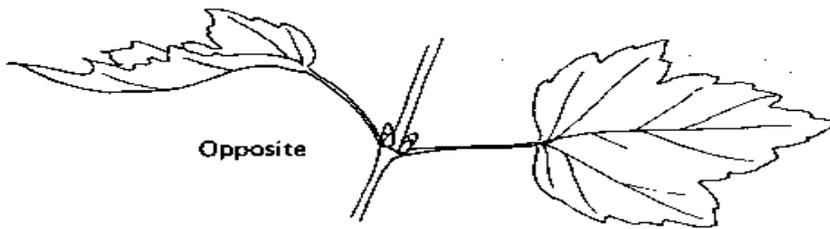
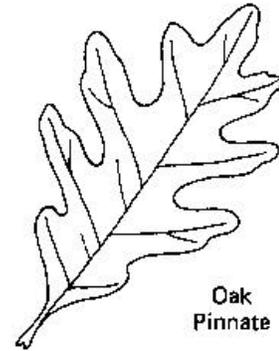
Needle-like foliage is typical of several evergreen genera and species. The drawing depicts the foliage of a 5-needled pine. In the genus *Pinus* the leaves (needles) are usually contained in fascicles of 2, 3, 2



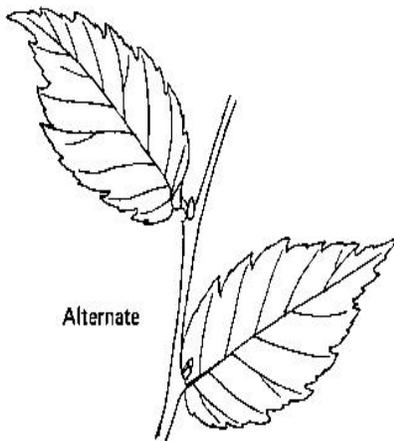
and 3, or 5. Other species such as *Abies*, *Picea*, *Cedrus*, *Pseudotsuga*, and *Taxus* have the needles borne singly or in clusters along the stem. The needles may be relatively flat (2-sided) or angular (often quadrangular) in cross-section.

ARRANGEMENT OF LEAVES

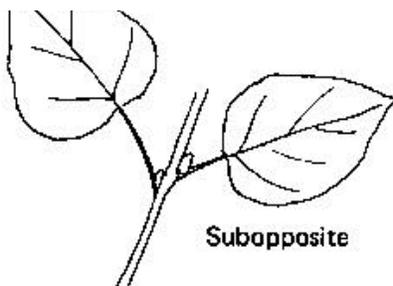
Many vegetative keys employ the arrangement of leaves and buds as a basis for separation. The use of the four categories by the student allows him/her to categorize plants into groups and assists in eliminating many plants from consideration in the process of positive identification.



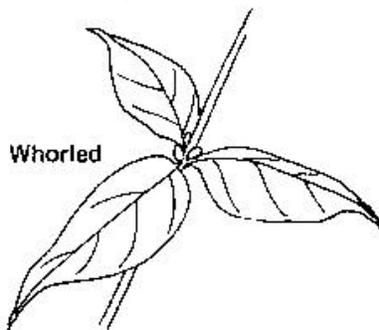
Leaves and buds directly across from each other on the stem. Ex: *Acer*, *Lonicera*, *Deutzia*, *Viburnum*.



Leaves and buds are spaced in alternating fashion along the axis of the stem and seldom, if ever, are seated directly across from each other. Ex: *Betula*, *Fagus*, *Quercus*, *Celtis*, *Ulmus*, *Carya*, *Juglans*.



Subopposite refers to a condition where the leaves and buds are not spaced sufficiently far apart to be considered alternate nor are they perfectly opposite, hence, the term subopposite. Ex: *Rhamnus cathartica*, *Cercidiphyllum japonicum*, *Chionanthus virginicus*.

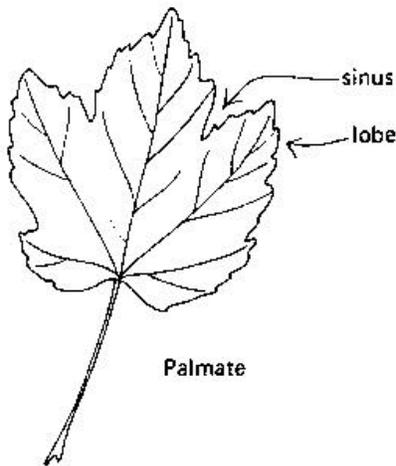


Whorled refers to a condition when three buds and leaves (or more) are present at a node. Ex: *Catalpa*, *Hydrangea paniculata* 'Grandiflora', *Cephalanthus occidentalis*.

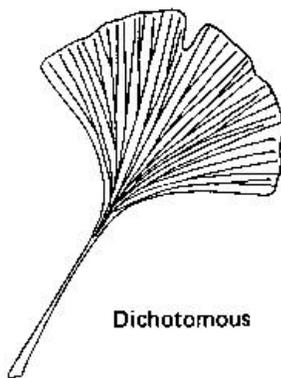
TYPES OF VENATION



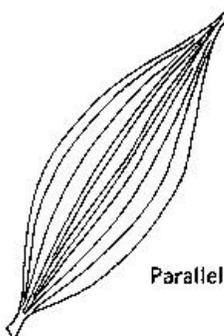
Pinnate. The leaf has a prominent central vein (often termed the midrib) which extends from the base, where the petiole attaches to the blade, to the apex of the leaf. If the interveinal areas were removed the overall effect would be that of a fishbone. Pinnate venation occurs in the leaves of many plant types. The elm (*Ulmus*) and oak (*Quercus*) are classic examples.



Palmate. There are several main veins all of approximately equal size which extend from the base of the leaf to the apex of the lobe or margin of leaf. Ex: *Acer*, *Platanus*, *Cercis*.



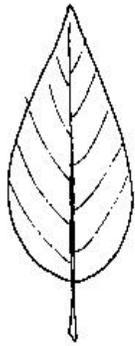
Dichotomous. A very limited type of venation, the most familiar representative of which is *Ginkgo biloba*. The basal veins extend for a distance and then branch forming a "Y" type pattern.



Parallel. Typical of many monocotyledonous plants. The veins run essentially parallel to each other along the long axis of the leaf. Ex: *Zea* (corn), *Ruscus*, *Danae*.

LEAF SHAPES

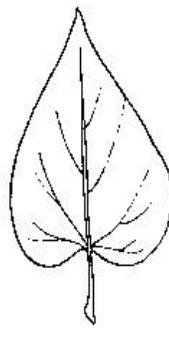
The tremendous quantity of terminology related to leaf shapes can be confusing. Association of the following pictures with the terms will help to alleviate the burden of strict terminology. This also applies to leaf bases, margins, and apices.



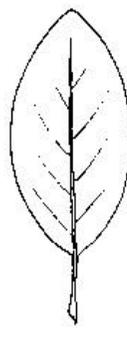
Ovate



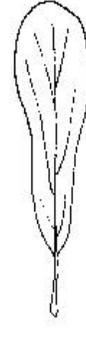
Lanceolate



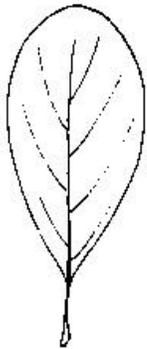
Cordate



Elliptical



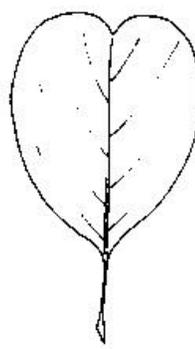
Spatulate



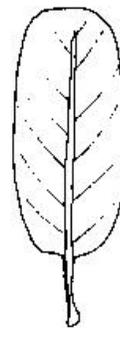
Obovate



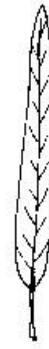
Oblanceolate



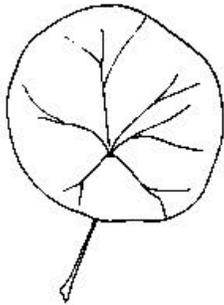
Obcordate



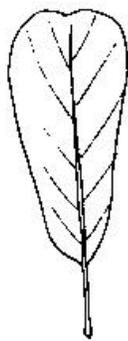
Oblong



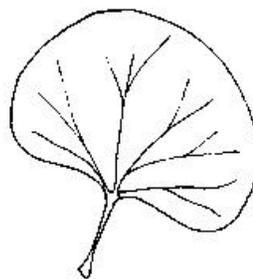
Linear



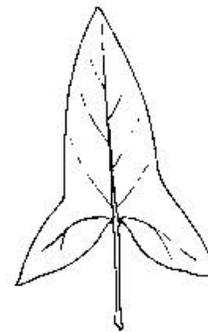
Peltate



Cuneate

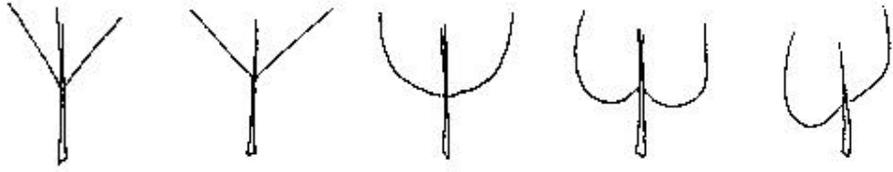


Reniform



Hastate

LEAF BASES

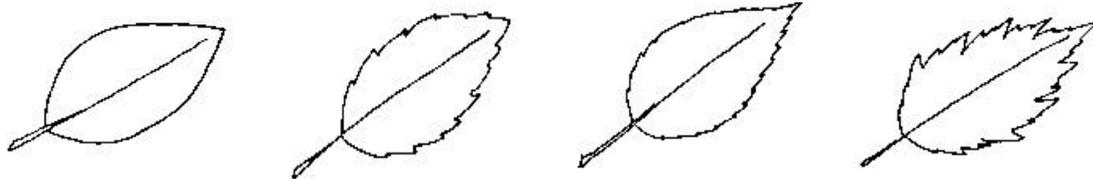


Cuneate Acute Rounded Cordate Oblique

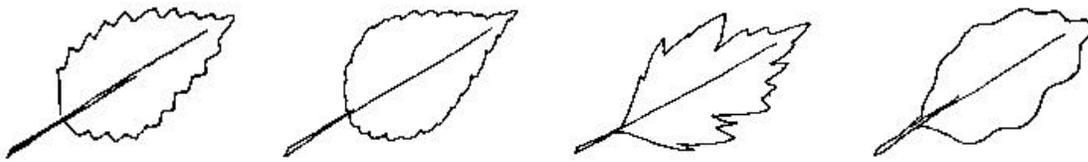


Sagittate Hastate Truncate Auriculate

LEAF MARGINS



Entire Serrate Serrulate Doubly-Serrate



Dentate Crenate Incised Sinuate

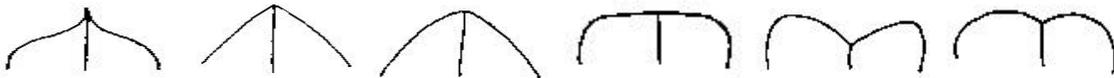


Undulate Lobed

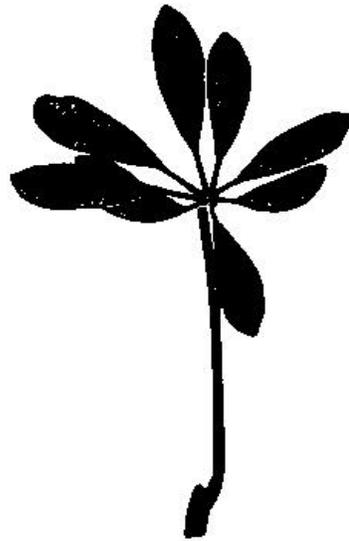
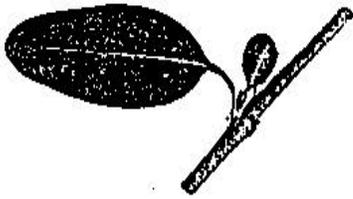
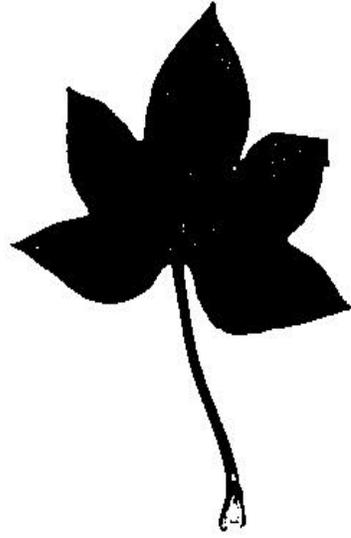
LEAF APICES



Mucronate Cuspidate



Acuminate Acute Obtuse Truncate Emarginate Obcordate



Using the information on the previous pages describe each of these leaves.

IDENTIFICATION LIST

This list is representative of the plants commonly found in landscapes. You will be responsible for identifying some or all of them on the exam.

Woody Plants:

1. American Elm *Ulmus americana*
2. Green Ash *Fraxinus pennsylvanica*
3. Flowering Crabapple *Malus sp.*
4. Bur Oak *Quercus macrocarpa*
5. Colorado Spruce *Picea pungens*
6. Ponderosa Pine *Pinus ponderosa*
7. American Linden *Tilia americana*
8. Creeping Juniper *Juniperus horizontalis*
9. Silver Maple *Acer saccharinum*

Herbaceous Plants:

1. Petunia *Petunia × hybrida*
2. Zinnia *Zinnia elegans*
3. Geranium *Pelargonium x hortorum*
4. African Marigold *Tagetes erecta*
5. French Marigold *Tagetes patula*

PLANT IDENTIFICATION KEY

A. Woody Plants

#1 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#2 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#3 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#4 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#5 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#6 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#7 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#8 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

#9 Name

Plant type _____ Leaf arrangement _____ Leaf type _____

Leaf margin _____ tip _____ shape _____ Fruit type _____

Other characteristics:

B. Herbaceous Plants

#1 Name

Plant type_____ Leaf arrangement_____

Leaf margin_____ tip_____ shape_____

Flower characteristics:

Other characteristics:

#2 Name

Plant type_____ Leaf arrangement_____

Leaf margin_____ tip_____ shape_____

Flower characteristics:

Other characteristics:

#3 Name

Plant type_____ Leaf arrangement_____

Leaf margin_____ tip_____ shape_____

Flower characteristics:

Other characteristics:

#4 Name

Plant type_____ Leaf arrangement_____

Leaf margin_____ tip_____ shape_____

Flower characteristics:

Other characteristics:

#5 Name

Plant type_____ Leaf arrangement_____

Leaf margin_____ tip_____ shape_____

Flower characteristics:

Other characteristics:

LAB 1 WORKSHEET

Name _____

1. What are three identifying characteristics of a dicot? **Give an example.**
2. What are three identifying characteristics of a monocot? **Give an example.**
3. What are the differences between annual and perennial plants? **Give an example of each.**
4. Why are scientific nomenclature and plant classification important?
5. Explain the differences between deciduous and evergreen trees.