



Unit A: Introduction to Forestry

Lesson 4: Recognizing the Steps to Identifying Tree Species

Terms

- ◆ Angiosperms
- ◆ Dehiscent fruits
- ◆ Dichotomous venation
- ◆ Dioecious
- ◆ Gymnosperms
- ◆ Hardiness
- ◆ Indehiscent fruits
- ◆ Inflorescence
- ◆ Leaf venation
- ◆ Monoecious
- ◆ Palmate
- ◆ Parallel venation
- ◆ Pinnate
- ◆ Polygamodioecious
- ◆ Polygamomonocious
- ◆ Taxonomy

What is tree taxonomy?

- ◆ Common names of trees vary from region to region.
- ◆ The use of scientific names helps avoid confusion in tree identification.

What is tree taxonomy?

- ◆ Taxonomy is the classification of plants according to natural relationships.
- ◆ Trees are members of the plant kingdom and are placed into divisions, classes, subclasses, orders, families, genera, and species.

What is tree taxonomy?

- ◆ a. Carl von Linné (Linnaeus), a Swedish botanist, was the first to use this system of classifying plants and he is referred to as the father of the systematic botany.



What is tree taxonomy?

- ◆ There are two divisions: Pinophyta and Magnoliophyta.
- ◆ The coniferous species make up the Pinophyta and the trees in this division are called gymnosperms.
 - Gymnosperms are plants that bear naked seeds without an ovary.

What is tree taxonomy?

- ◆ The broad-leaved species make up the Magnoliophyta and the trees in this division are called angiosperms.
- ◆ Angiosperms are plants having seeds borne within a pericarp.

Scientific Names

	Loblolly Pine	White Oak
Division	Pinophyta	Magnoliophyta
Class	Pinopsida	Magnoliopsida
Subclass		Magnoliidae
Order	Pinales	Fagales
Family	Pinaceae	Fagaceae
Genus	<i>Pinus</i>	<i>Quercus</i>
Species	<i>taeda</i>	<i>alba</i>

What are hardiness zones and what is their importance?

- ◆ Hardiness is the plants ability to with stand winter stress.
- ◆ Hardiness is measured using a plant hardiness zone map. Each area of the world is assigned a zone numbered from one to thirteen. Hardiness zones are derived from the average coldest temperatures for the year.

The 13 hardiness zones are defined as followed:

Zone 1: below -46 C (below -50 F)

Zone 2: -46 to -40 C (-50 to -40 F)

Zone 3: -40 to -34 C (-40 to -30 F)

Zone 4: -34 to -29 C (-30 to -20 F)

Zone 5: -29 to -23 C (-20 to -10 F)

Zone 6: -23 to -18 C (-10 to 0 F)

Zone 7: -18 to -12 C (0 to 10 F)

Zone 8: -12 to -7 C (10 to 20 F)

Zone 9: -7 to -1 C (20 to 30 F)

Zone 10: -1 to 4 C (30 to 40 F)

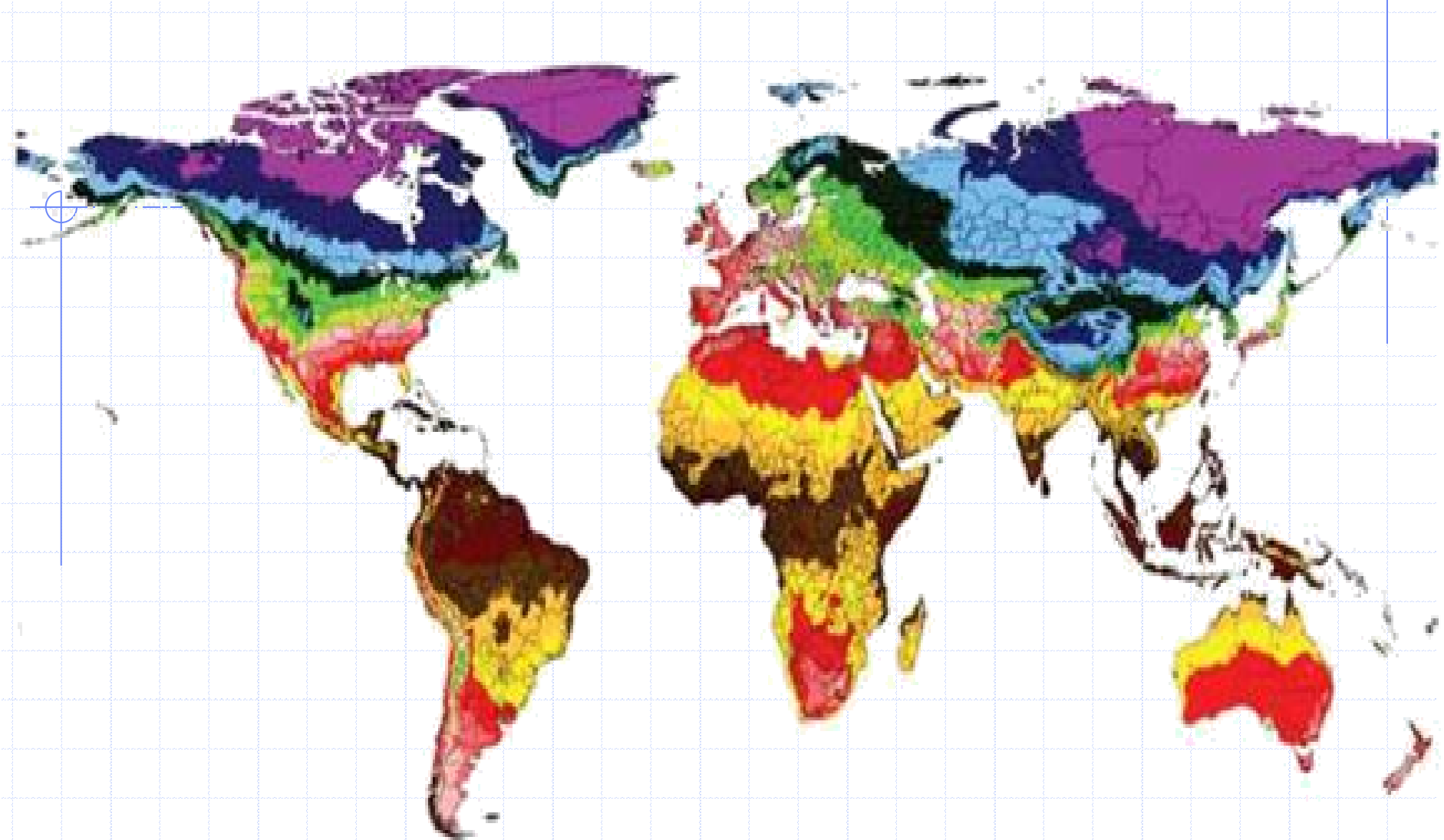
Zone 11: 4 to 10 C (40 to 50 F)

Zone 12: 10 to 15 C (50 to 60 F)

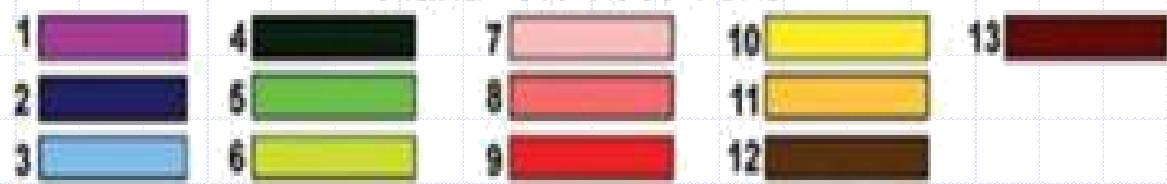
Zone 13: above 15 C (above 60 F).

What are hardiness zones and what is their importance?

- ◆ Hardiness ratings are meant only as a guide and should not be looked upon as a limiting factor in plant use.
 - Large bodies of water, well-drained soil, wind protection, and adequate moisture will help to increase hardiness.
- ◆ Hardiness is a dual-edged sword, for heat, like cold, can limit successful growth of certain plants.



Plant Hardiness Zone



How are trees identified?

- ◆ In order to successfully identify woody plants it is necessary to have a working knowledge of taxonomic terminology and concise mental pictures of leaf, bud, stem, flower and fruit morphology.

How are trees identified?

- ◆ The leaf, twig, bark and fruit are the most commonly used characteristics for tree identification.
- ◆ Each kind of tree, whether broad-leaved or coniferous, has certain characteristics that make it distinctive from another species.

How are trees identified?

- ◆ Most trees can be identified by
 - Type
 - Size
 - Shape
 - Color
 - Texture
 - Arrangement of leaves.

How are trees identified?

- ◆ Trees will have leaves (angiosperms) or needles (gymnosperms).
- ◆ For trees with leaves, the leaves are either simple or compound.
 - Simple leaves have a bud located in the axil of a single leaf and stem.
 - Compound leaves have a bud located in the axil of a structure with more than one leaf.

How are trees identified?

- ◆ Palmately compound leaves have each leaflet attached at a common point.
- ◆ Pinnately compound leaves can have either odd or even number of leaflets.

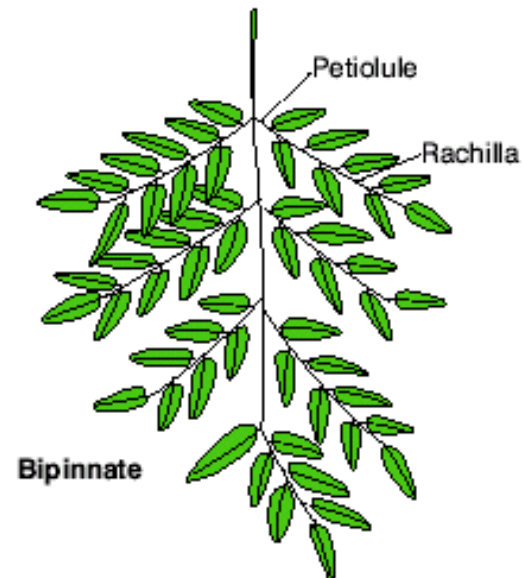
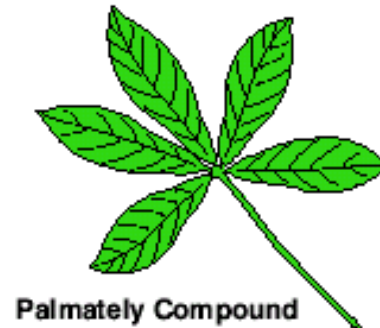
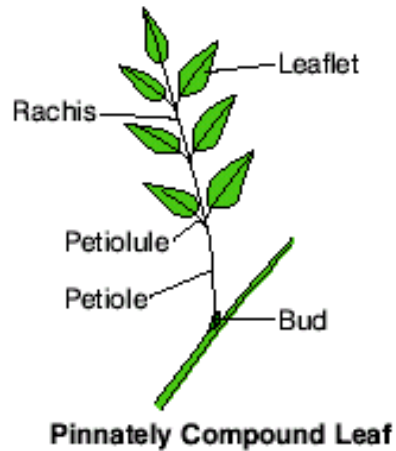
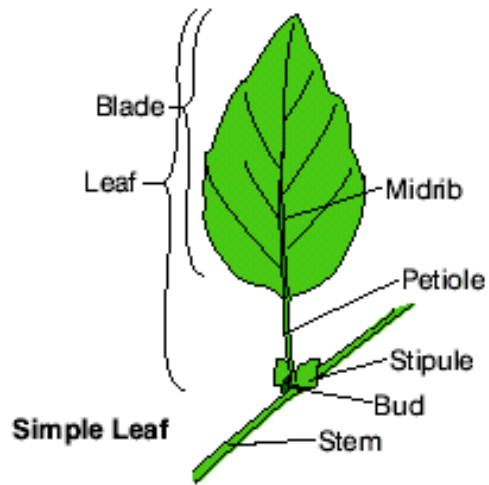
How are trees identified?

- ◆ The arrangement of leaves and buds can be used as a basis for separation.
 - Leaves and buds directly across from each other on the stem are called opposite.
 - Leaves and buds that are spaced in alternating fashion along the axis of the stem and seldom, if ever, are seated directly across from each other are known as alternate.

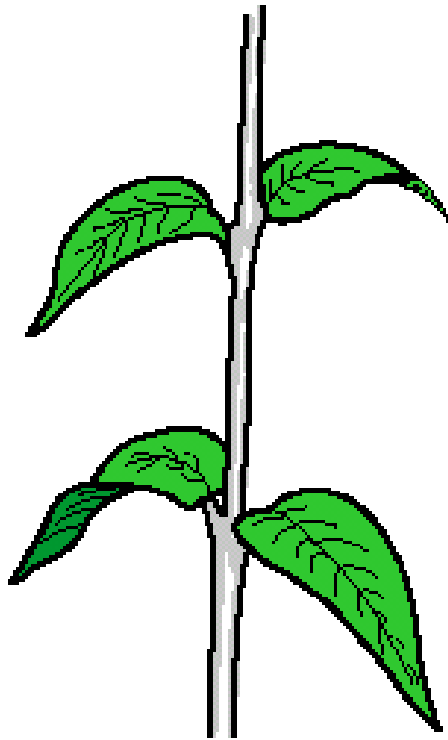
How are trees identified?

- ◆ 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.
- ◆ Whorled refers to a condition when three or more buds and leaves are present at a node.

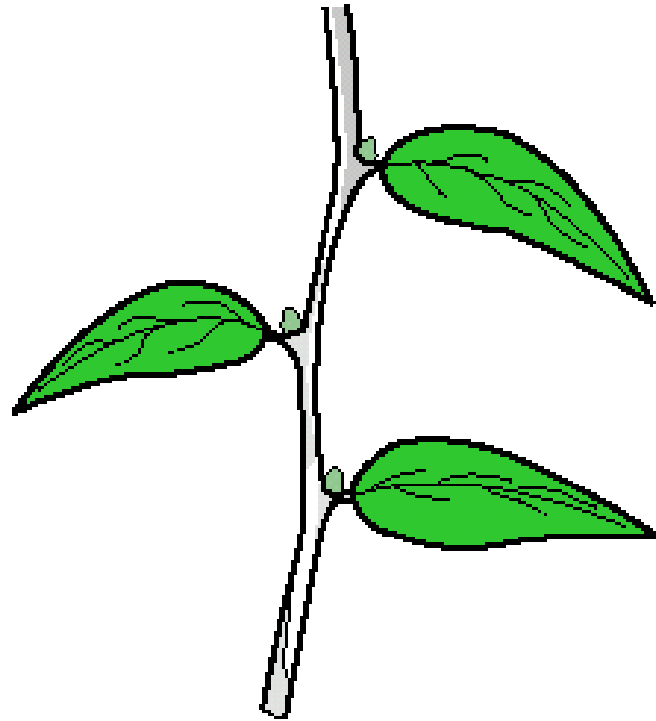
ANGIOSPERM LEAF TYPES



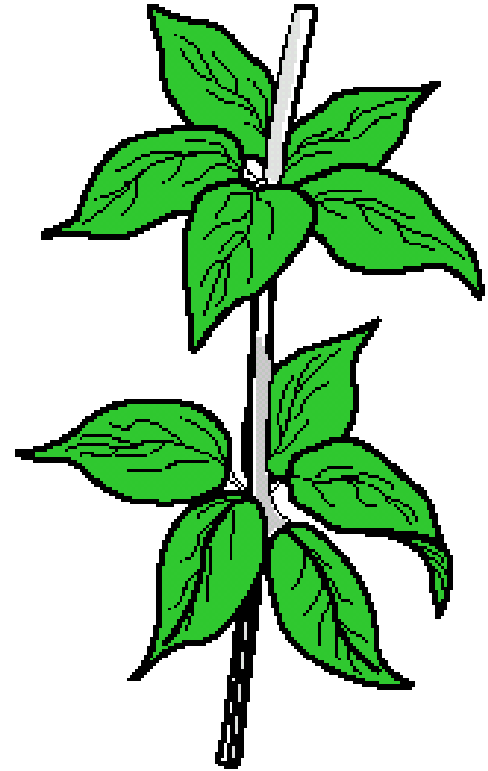
LEAF ARRANGEMENT



Opposite



Alternate



Whorled

How are trees identified?

- ◆ The arrangement of veins in a leaf is known as leaf venation.
- ◆ If the leaf has a prominent central vein or midrib that extends from the base, where the petiole attaches to the blade, to the apex of the leaf it is known as pinnate.

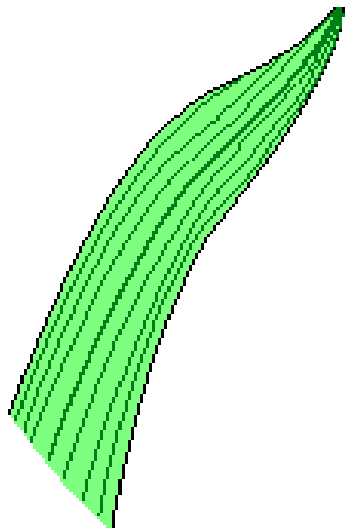
How are trees identified?

- ◆ If there are several main veins all of approximately equal size that extend from the base of the leaf to the apex of the lobe or margin of leaf it is known as palmate.

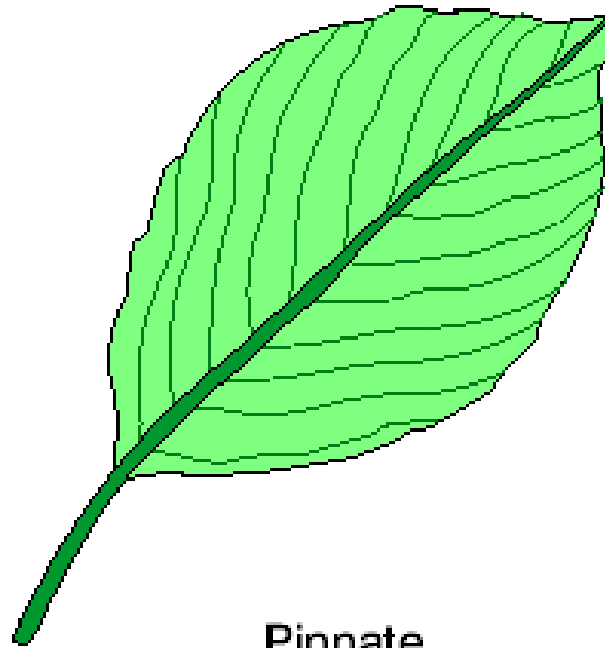
How are trees identified?

- ◆ Dichotomous venation is when the basal veins extend for a distance and then branch forming a “Y” type pattern.
- ◆ When the veins run essentially parallel to each other along the long axis of the leaf it is called parallel venation.

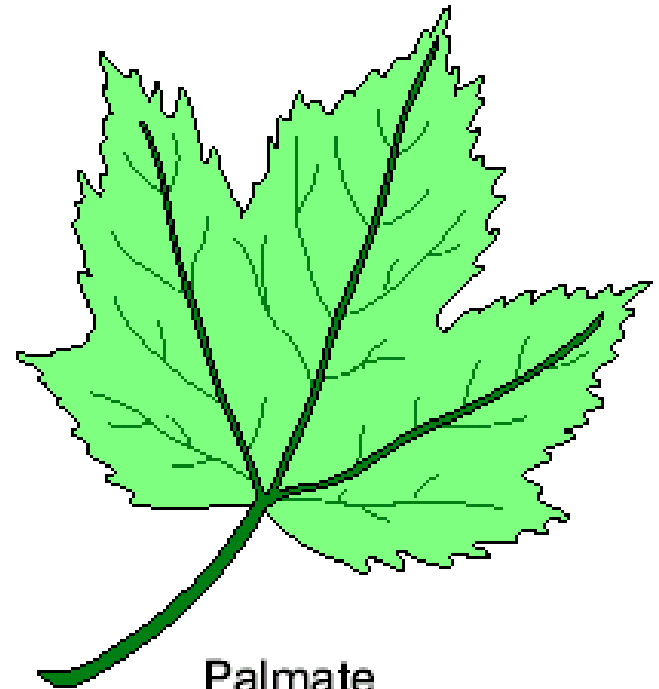
LEAF VENATION



Parallel
Venation



Pinnate
Venation



Palmate
Venation

How are trees identified?

- ◆ There is a tremendous quantity of terminology related to leaf shapes, bases, margins and apices.

How are trees identified?

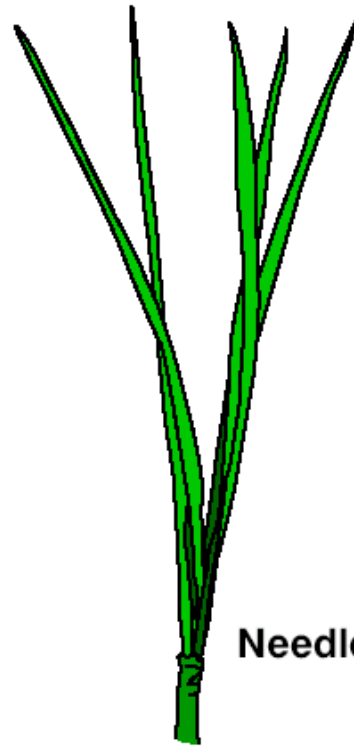
- ◆ Trees with needles can be awl-like, scale-like or needle-like.
 - Needles that are shaped like an awl are usually very sharp to the touch.
 - Scale-like foliage overlaps like the shingles on a roof or the scales on a fish. This type of foliage is relatively soft to the touch.

How are trees identified?

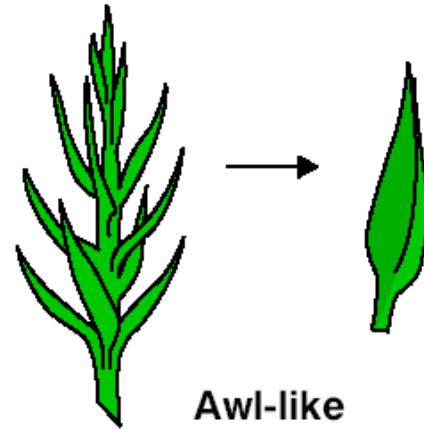
- ◆ Needle-like foliage can be born singly or in clusters along the stem.
- ◆ The needles may be relatively flat (2-sided) or angular in cross-section.



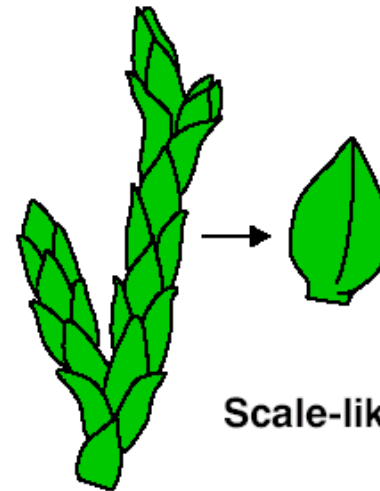
GYMNOSPERM LEAF TYPES



Needle-like



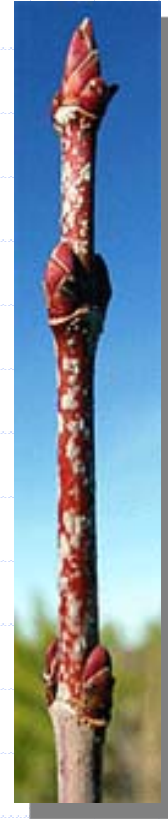
Awl-like



Scale-like

How are trees identified?

- ◆ During the autumn and winter season tree identification must be based on stem, bud and bark characters.
- ◆ Buds and stems offer the principal means of identification.

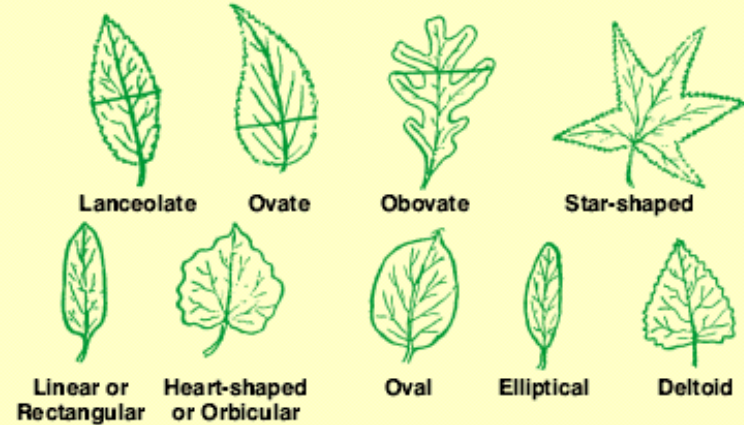


How are trees identified?

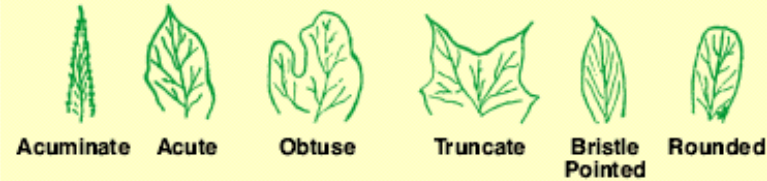
- ◆ The shape, size, color and texture of buds offer interesting identification characters.
- ◆ Leaf scars often provide distinguishing identification characters.
- ◆ Both the shape and vascular bundle arrangement are often used to separate plants.

LEAF BASES, MARGINS, AND APICES

LEAF FORMS



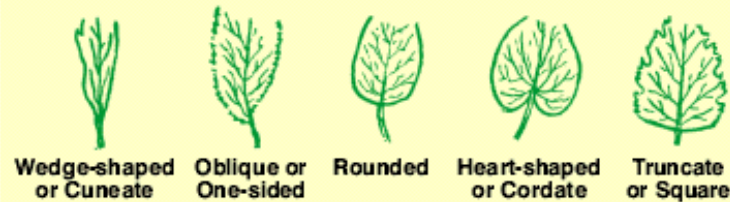
LEAF APEXES



LEAF MARGINS



LEAF BASES



How are trees identified?

- ◆ Lenticels, lip-shaped structures composed of corky cells, are produced through the action of a cork cambium.
 - They are beneficial for identification due to their different colors and sizes.
- ◆ Bud scales by their size, color, shape or markings offer good characters for identification.

How are trees identified?

- ◆ Terminal bud scale scar is the place where the previous year's bud scales were attached.
 - As the buds open and expand in spring the scales abscise and leave a distinct scar around the stem.
 - This scar can be useful for gauging the amount of linear growth in a particular season or over a number of seasons.

How are trees identified?

- ◆ Pith is a very valuable plant tissue for separating closely related plants.
 - Pith is derived from a primary meristem and is usually vestigial.
 - The color and texture of pith can often be used for separating similar plant types.

How are trees identified?

- ◆ On deciduous trees, bark is the most important identification feature in the dormant winter period.
 - Bark varies in thickness, roughness, type of fissures, and color.



How are trees identified?

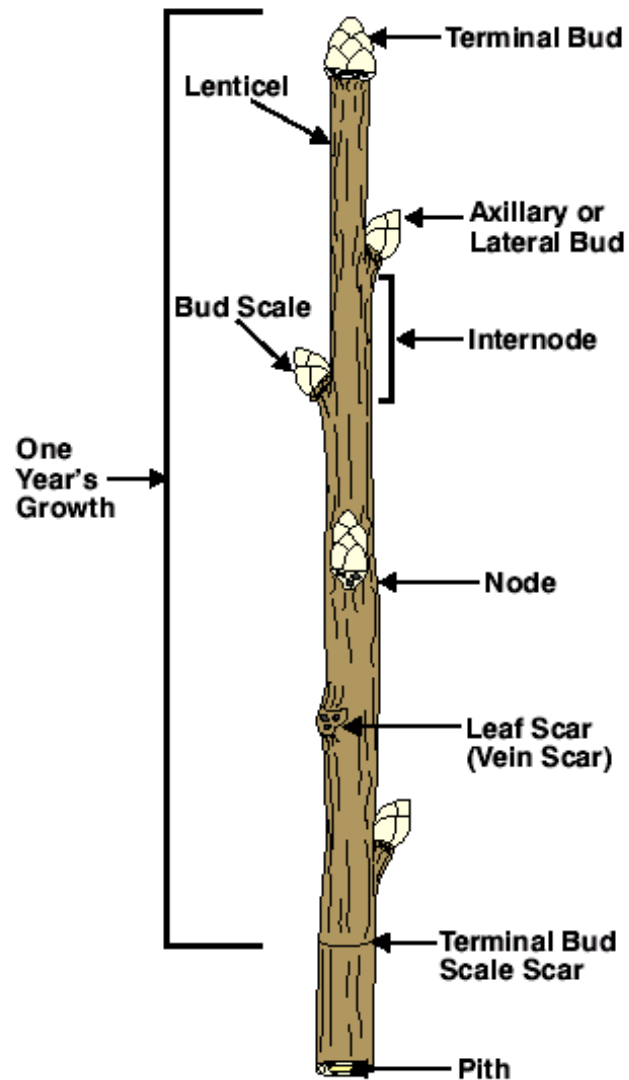
- ◆ Each year the cambium lays down an annual ring of new cork cells (bark), forcing the old bark outward.

How are trees identified?

- ◆ Since the outer bark cannot stretch, it fissures or cracks into plates, ridges, and scales, forming the bark characteristic of each species.



STEM AND BUD MORPHOLOGY AND TYPES OF PITH



How are trees identified?

- ◆ Flowers are important components to positive tree identification.
- ◆ The flowering periods of most woody plants average seven to fourteen days.
 - There are numerous variations in flower shape but the reproductive parts, stamens and pistils are essentially similar.

How are trees identified?

- ◆ Flower that has all the parts (sepals, petals, stamens, and a pistil or pistils) is called complete.
- ◆ Incomplete flowers lack one or more whorls of floral parts.
- ◆ Imperfect flowers lack either stamens or pistils.
- ◆ Perfect flowers have both stamens and pistils.

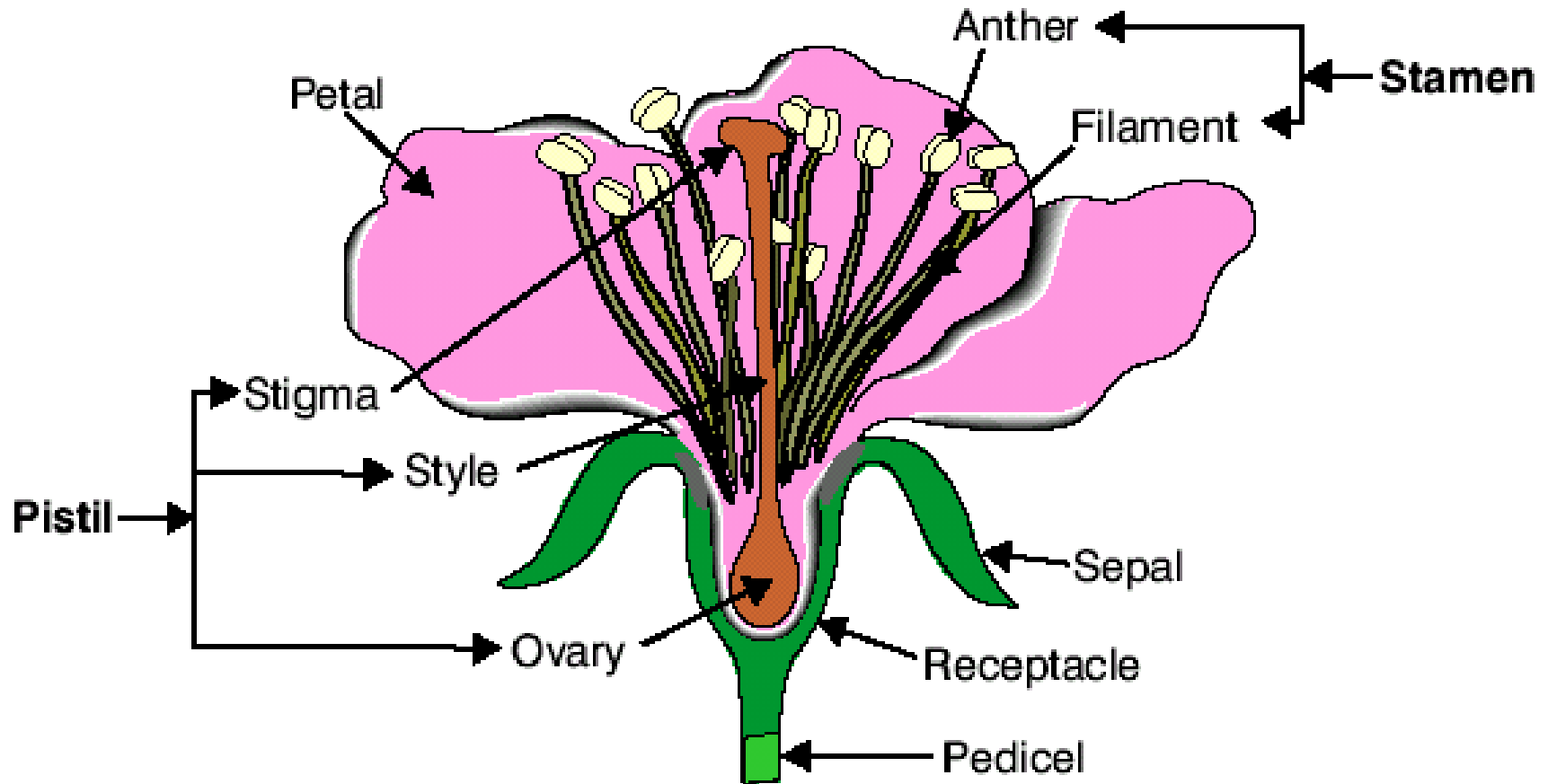
How are trees identified?

- ◆ Monoecious means that staminate and pistillate flowers are present on the same plant but in different structures.
- ◆ Dioecious means the staminate and pistillate flowers are borne on different plants.

How are trees identified?

- ◆ Polygamo-monoecious refers to a condition where perfect, pistillate and staminate flowers occur on the same tree.
- ◆ Polygamo-dioecious implies perfect and pistillate flowers on the same plant or perfect and staminate flowers.

FLOWER STRUCTURE



How are trees identified?

- ◆ Flowers are borne on structures that are referred to as inflorescences.
- ◆ An inflorescence is a collection of individual flowers arranged in some specific fashion.

How are trees identified?

- ◆ There are several types of inflorescence.
 - Spike has individual flowers that are sessile on the elongated axis (peduncle).
 - Raceme is a modification of a spike with the individual flowers stalked on a pedicel.

How are trees identified?

- ◆ Corymb is an indeterminate inflorescence in which the individual flowers are attached at different points along the peduncle.
- ◆ The outer flowers open first.



How are trees identified?

- ◆ Umbel is an indeterminate inflorescence in which the pedicels of the individual flowers radiate from about the same place at the top of the peduncle.
- ◆ Flowers open from outside in.

How are trees identified?

- ◆ Cyme is a determinate, flat or convex inflorescence, the central or inner flowers opening first.
- ◆ Panicle is an indeterminate inflorescence with repeated branching.
- ◆ Panicles can be made up of many racemes, spikes, corymbs, cymes or umbels.

How are trees identified?

- ◆ Solitary indicates a single flower with a pedicel attached to the stem.
- ◆ Head is made up of ray (sterile) and disk (fertile) flowers which are arranged on a flattened receptacle.

How are trees identified?

- ◆ A spadix is a specialized type of inflorescence typical of many tropical plants.
- ◆ The showy part is the bract or spathe while the spike-like structure which is partially surrounded by the spathe bears the fertile flowers.

TYPES OF INFLORESCENCES



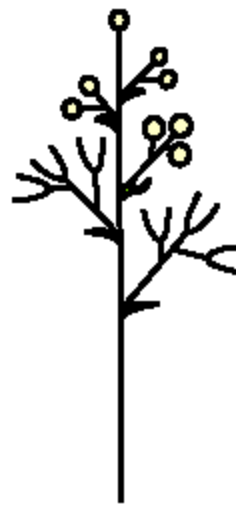
Solitary



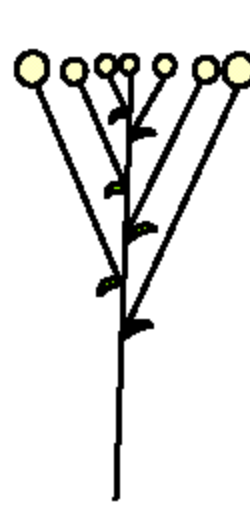
Spike



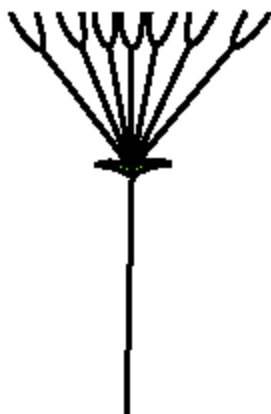
Raceme



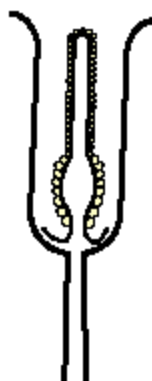
Panicle



Corymb



Umbel



Spadix



Catkin



Head

(Interstate Publishers, Inc.)

How are trees identified?

- ◆ Fruits are very important considerations in woody landscape plants for they offer good ornamental assets and positive identification features.
- ◆ The longitudinal section of the typical flower offers representative view of the ovary. The ovary is the forerunner of the fruit and is defined as an unripened fruit.

How are trees identified?

- ◆ The longitudinal section of the typical flower offers representative view of the ovary. The ovary is the forerunner of the fruit and is defined as an unripened fruit.
- ◆ The ovary is composed of carpel(s) which are highly modified leaflike structures, which enclose ovules (forerunner of seeds).
 - Simple fruits consist of a single enlarged ovary composed of one carpel.

How are trees identified?

- ◆ Simple fruits can be divided into two major groups: dry and fleshy.
 - Dry fruits can be divided into indehiscent and dehiscent.
 - ***Indehiscent fruits*** are those that do not split open at maturity.
 - There are several types.

How are trees identified?

- Achene is a one-seeded fruit with seed attached at only one place to the pericarp. The pericarp is very close fitting and does not split open, at least along regular established lines.
- Caryopsis is similar to an achene but the pericarp is adherent to the seed, the two often being indistinguishable.

How are trees identified?

- Samara is usually one seeded with a membranous wing, which develops from the pericarp.
- Nut is a bony, hard, one-seeded fruit. The pericarp is bony throughout.

How are trees identified?

- Utricle is similar to an achene but the ovary wall is relatively thin and inflated so it fits only loosely around the seed.
- Nutlet is diminutive of nut.

How are trees identified?

- ***Dehiscent fruits*** split open when mature. There are several types.
 - Legume (pod) is composed on one carpel and opens along two sutures
 - Follicle is composed of one carpel but splits open at maturity along one suture exposing several seeds.

How are trees identified?

- Capsule is many-seeded fruits formed from more than one carpel. The carpels are united.
- Silique is composed on two carpels, which separate at maturity, leaving a thin partition.
- Sillicle is a short, broad silique.
- Pyxis is a type of capsule, which opens around a horizontal ring, the top of fruit falling away like a lid.

How are trees identified?

- There are several types of fleshy fruits.
 - When the entire pericarp is fleshy it is called berry. There are two types of berry fruits.
 - Hesperidium has a berry with a leathery rind.
 - Pepo is a berry with a hard rind and a fleshy inner matrix.

How are trees identified?

- **Drupe is when the pericarp is clearly differentiated into three layers.**
 - Exocarp is the epidermis.
 - Mesocarp is the middle, fleshy layer.
 - Endocarp is the stony, inner layer.

How are trees identified?

- Pome is when the pericarp is surrounded by the floral tube that becomes fleshy and tasty.
- Aggregate fruits consist of two or more carpels. Develop from a single flower which contains many pistils. Several fruitlets are massed on one receptacle.
- Multiple fruits consist of several flowers which are more or less united into one mass.

Summary / Review

- ◆ 1. Explain tree taxonomy.
- ◆ 2. Describe hardiness zones and their importance.
- ◆ 3. Explain tree identification.