

Winter Tree Identification

Safety

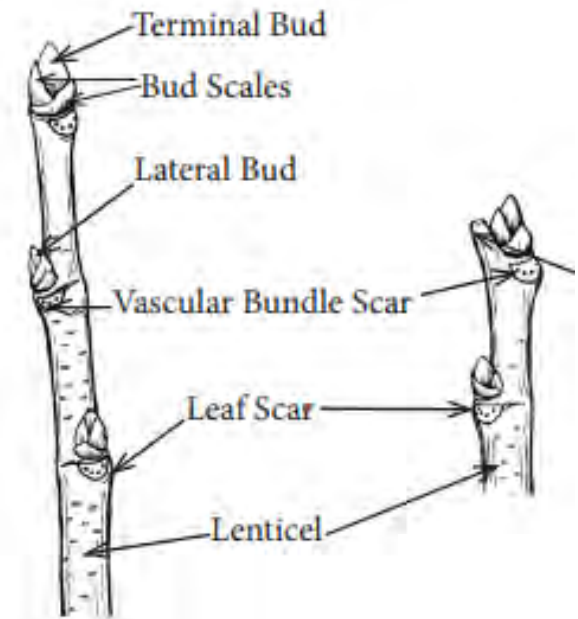
Wear appropriate clothing and footwear when headed to the forest:

- Sturdy boots with good tread
- Long pants of canvas or thick material
- Long sleeves, warm layers with jacket (winter) and gloves
- Water, compass, and snack in a backpack
- Cell phone (note: service could be limited)

Let someone know where you are going. -Look up into forest canopy for hazardous branches, and be aware of tripping hazards (roots, stumps, logs, etc).

Winter Tree Characteristics

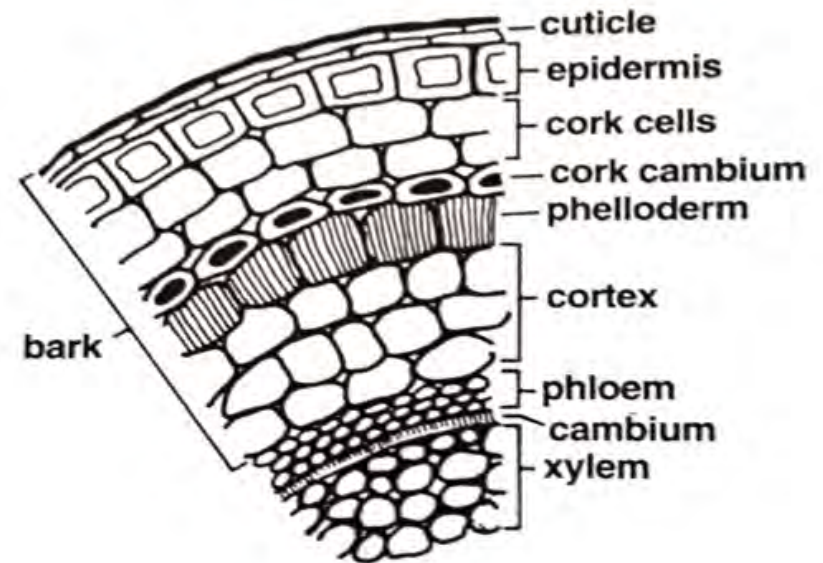
- Know your location:
 - Eastern vs. Western Shore
 - Environment– streambank, lake shore, understory, forest edge, lowlands, creek bed, dry/sandy, etc.
 - Soil & bedrock type
 - Forest vs. Landscape vs. Urban
- Arrangement: Opposite vs. Alternate vs. Whorled
- Fruit: Cones, persistent fruit, pods
- Buds: Dormant, undeveloped young shoots (usually protected by scales)
 - Downy vs. smooth, clustered vs. scattered, size
- Bark: Furrowed, smooth, peeling, etc.
- Twig: The end portion of a branch of a woody plant = one year's growth
 - Includes buds, leaf scar, bundle scar, color, fragrance



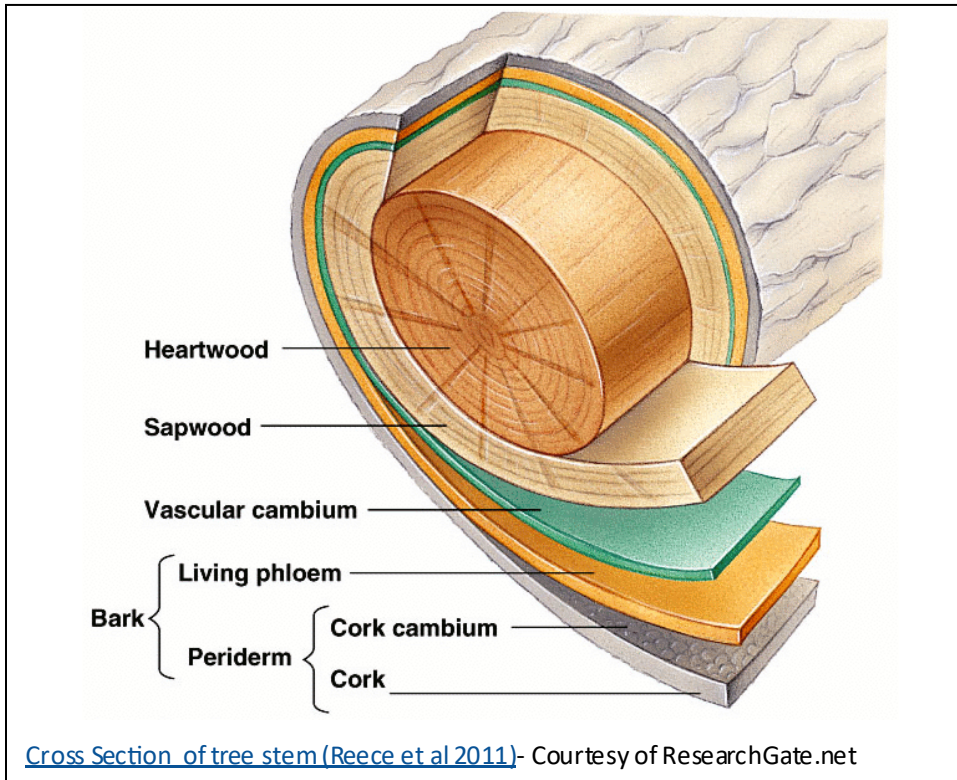
BARK

Rhytidome: The protective outer bark

- Bark layers expand and split
- Phases change with age
 - *Acer rubrum*– smooth, unbroken bark (young) vs. flakey vertical strips (mature)
- Outer bark texture, shape, and thickness is a reaction to the stress of expanding wood beneath; each species responds differently according to number of periderms (cork tissue), type of periderm, and phloem tissue
- Includes entire multilayer shell that can detach from the wood
- Upper trunk is younger and has different characteristics than the older bark below
- Outer bark cells function much like home insulation; warms or cools the inner tissues
- Ridges, scales, and stripes increase surface area to help maintain steady temperature
- Contours hold moisture and slower heat transfer through the outer bark
- Protects tree from moss, lichen, and algae (epiphytes block sunlight)
- Bark chemical and structural defenses fight infection and infestation



Based on Michael Wojtech's Tree Identification book using bark: *BARK: A Field Guide to Trees of the Northwest* Wojtech, M (2011). *Bark: A Field Guide to Trees of the Northeast*. China, University Press of New England



CROSS SECTION ANATOMY

Heartwood: hard central wood of tree trunk

Sapwood: softer part of the wood between the inner bark and the heartwood

Vascular Cambium: A cylindrical layer of cambium that runs through the stem of a plant that undergoes secondary growth. The vascular cambium produces vascular tissues, new xylem on interior side and new phloem on exterior side

Bark: all the layers of outer shell, everything outside vascular cambium

Living phloem: part of a vascular bundle forming the food-conducting tissue of a plant

Periderm: cork-producing tissue

Cork cambium: secondary tissue, formed on the outside of the tissue layer. Cell walls of cork cells contain suberin. Once mature, cork cells die

Cork: aka phellem: Outermost layer of tissue in woody plants, resistant to the passage of water vapor and gases, becomes the bark

Peeling horizontal



Riverbirch— *Betula nigra*

Smooth, unbroken



American beech— *Fagus grandifolia*

Vertical cracks or seams on otherwise smooth bark



Pignut hickory (young)— *Carya glabra*

Ridges & Furrows

Intersecting Ridges



Sassafras-
Sassafras albidum

Ridges broken horizontally



Chestnut oak-
Quercus montana

Uninterrupted Ridges



Tulip poplar-
Liriodendron tulipifera

Scales



Loblolly Pine- *Pinus taeda*

Plates



Sycamore-
Platanus occidentalis

Vertical Strips



Red maple- *Acer rubrum*

Visible Lenticels



Linear- Black Cherry
(*Prunus serotina*)



Diamond- White poplar
(*Populus alba*)

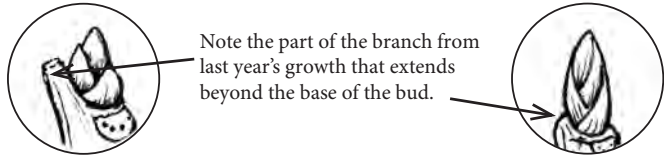


Oval/Round- Pin oak
(*Quercus palustris*)

GLOSSARY

Terminal Bud: The bud formed at the tip of the twig

False Terminal Bud: A lateral bud that assumes the function of the terminal bud. When the growing tip withers or falls away, the closest lateral bud to the twig tip substitutes as a terminal bud



Bud Scales: Small scale-like structures that are modified leaves covering the bud during its winter dormancy

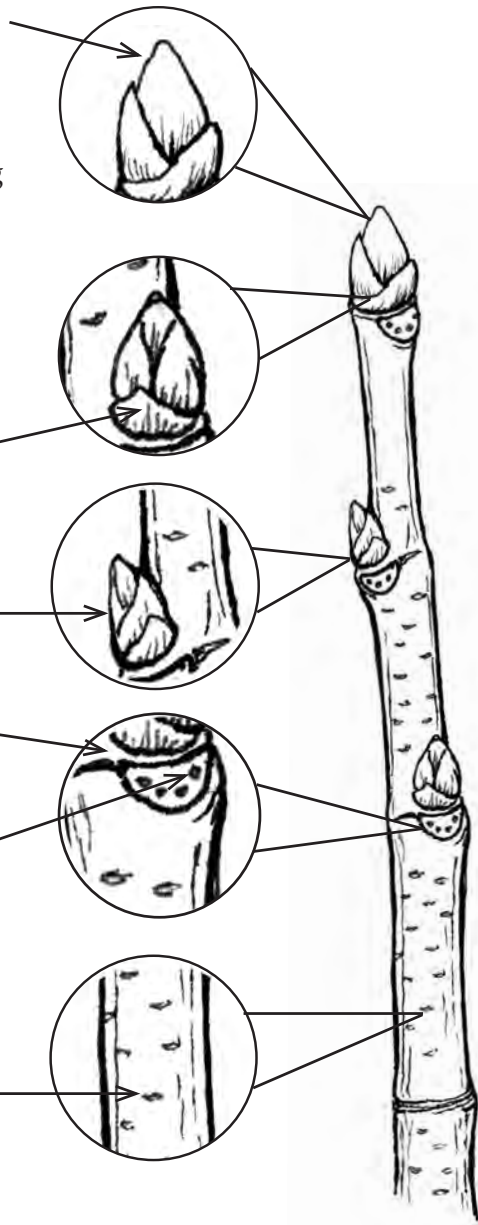
Lateral Bud: The buds formed on the side of a twig, not the bud at the end of the twig

Leaf Scar: A scar left on the twig when the leaf falls

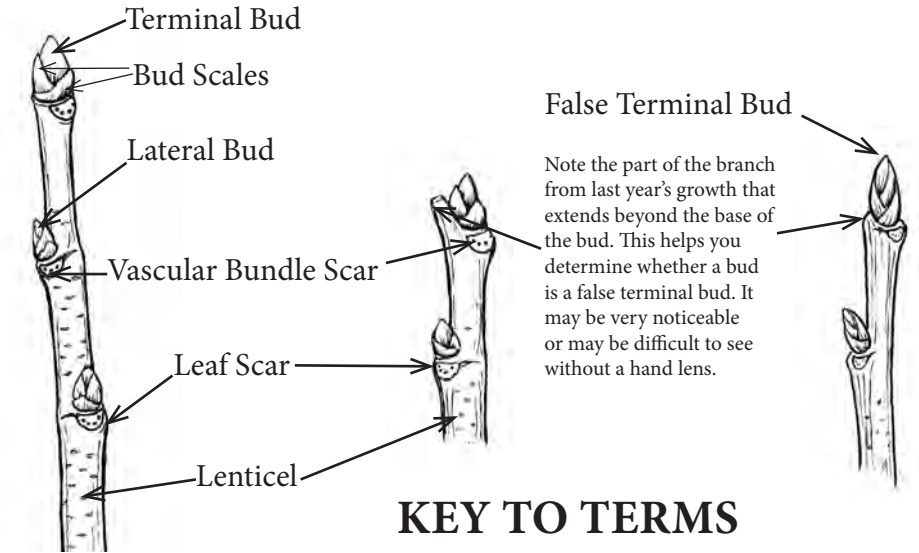
Vascular Bundle Scars: A small mark on a leaf scar indicating a point where a vein from the leaf was once connected with the stem

Lenticel: A small corky area or speck serving as a breathing pore

Catkin: A dense, cylindrical, often drooping cluster of flowers

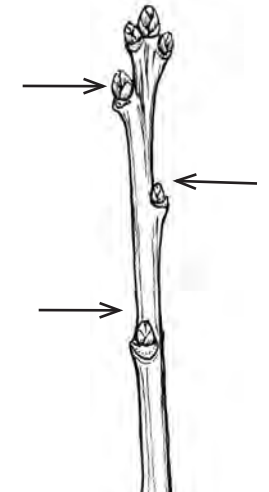
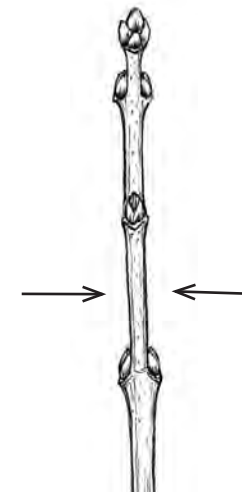


WINTER TREE IDENTIFICATION KEY



1. Leaf scars opposite...Got to 2 OR 1. Leaf scars alternate...Go to 3

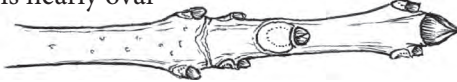

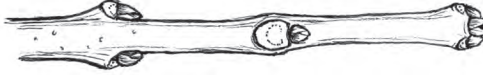
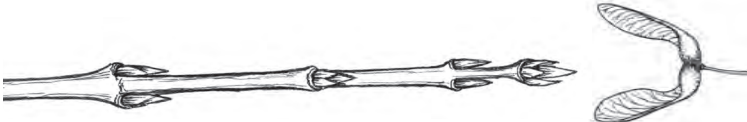
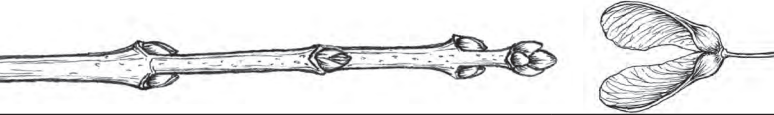
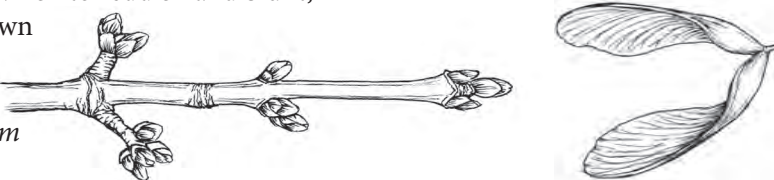
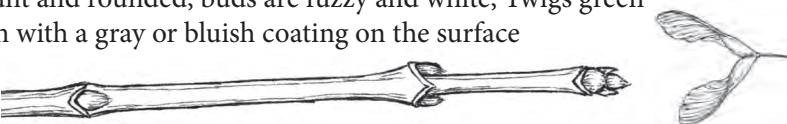
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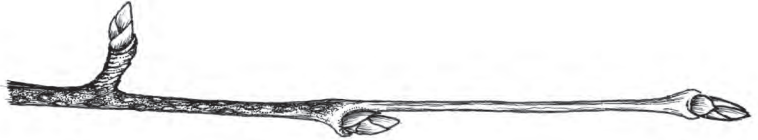
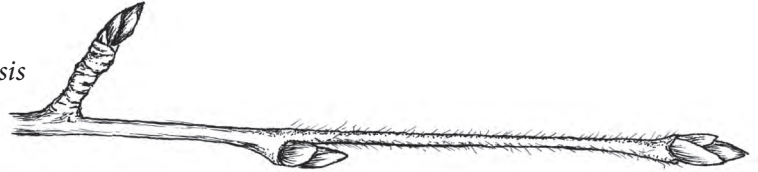





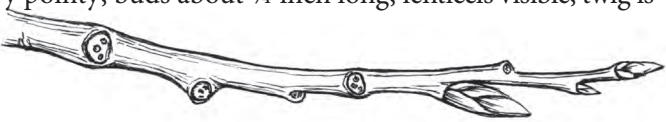

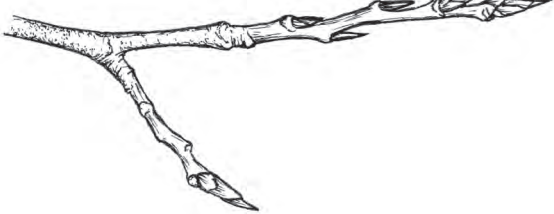




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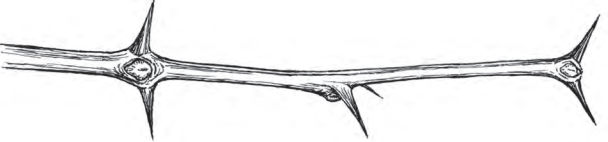
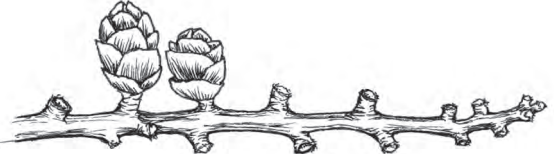
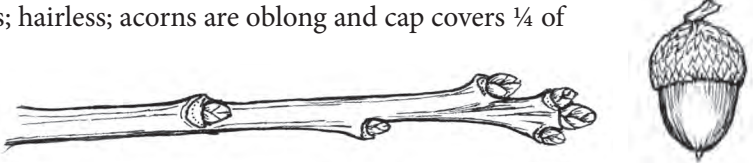
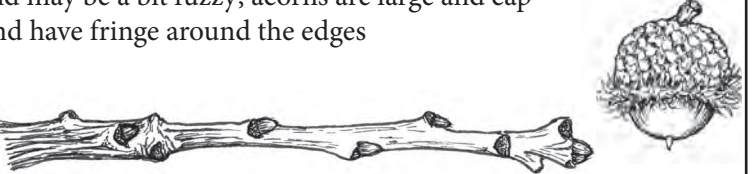
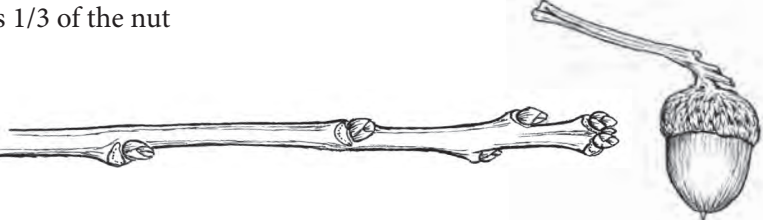


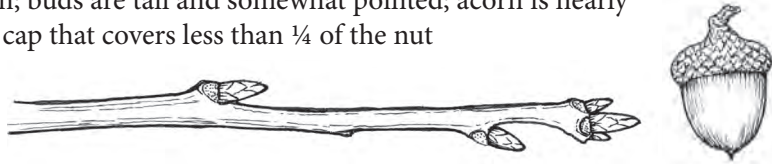

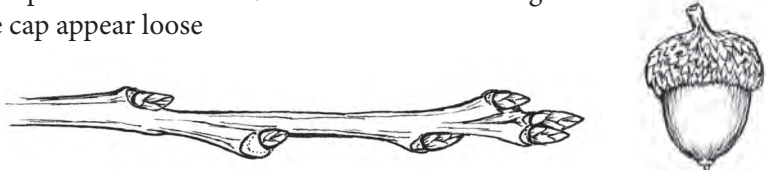


















LEAF-Wisconsin's K-12 Forestry Education Program
Wisconsin Center for Environmental Education
College of Natural Resources
University of Wisconsin-Stevens Point



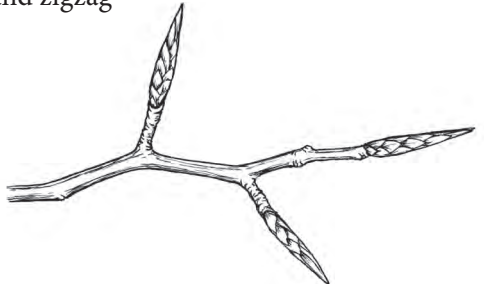


2	Vascular bundle scars are very numerous and joined in a line; buds are broadly rounded; twigs are fairly stout	Fraxinus Ash see 2a-c below
	2a. Terminal bud cone-shaped; first pair of lateral buds below the terminal bud are slightly below it on the branch; leaf scar is nearly oval <i>Fraxinus nigra</i> black ash	
	2b. Terminal bud is slightly cone-shaped; first pair of lateral buds below the terminal bud touch the bottom of the terminal bud; leaf scar is U-shaped and the lateral bud sits in the "notch" of the leaf scar <i>Fraxinus americana</i> white ash	
2c. Terminal bud is rounded; first pair of lateral buds below the terminal bud touch the bottom of the terminal bud; the leaf scar is oval <i>Fraxinus pennsylvanica</i> green ash		
2	Vascular bundle scars 3-7, separate and distinct; Leaf scars narrow and crescent-shaped; twigs fairly slender	Acer Maple see 2d-g below
	2d. Terminal bud quite pointy and brown; twigs gray or brown, slender and shiny with lighter lenticels <i>Acer saccharum</i> sugar maple	
	2e. Terminal bud reddish and blunt; leaf scars V-shaped; Twigs dark red with small lenticels <i>Acer rubrum</i> red maple	
	2f. Terminal bud brownish to reddish and blunt; Twigs reddish brown <i>Acer saccharinum</i> silver maple	
	2g. Terminal bud blunt and rounded; buds are fuzzy and white; Twigs green to purplish, often with a gray or bluish coating on the surface <i>Acer negundo</i> boxelder	

15	3 bud scales	Betula Birch See 15 a-c below
	15a. Not hairy twig, lenticels prominent; Buds brownish, acute; twigs straight; catkins often present; bark is reddish-brown with light lenticels on younger stems, later turning chalky to creamy white peeling in horizontal papery strips <i>Betula papyrifera</i> white birch	
	15b. Young twigs are hairy, older twigs smooth, shiny; catkins often present; bark often with wintergreen smell; bark is shiny bronze on younger stems peeling into thin papery strips <i>Betula alleghaniensis</i> yellow birch	
15c. Twig is slender and orangish-brown; bark is salmon to rust-colored on young stems, developing papery scales peeling with several colors visible <i>Betula nigra</i> river birch		
15	Many bud scales	Go to 16
16	Bud scales in two vertical rows; floral buds distinctly larger and rounder than foliage buds; no catkins <i>Ulmus sp.</i> elm species	
	Bud scales not in two rows; buds fairly uniform in size; bud tips point away from the twig; catkin usually present; seeds hang in clusters from branches and often stay on through winter <i>Ostrya virginiana</i> ironwood (hop hornbeam)	

	<p>11a. Gummy buds that are very pointy; buds about ¾ inch long; lenticels visible; twig is somewhat yellowish</p> <p><i>Populus deltoides</i> cottonwood</p> 
	<p>11b. Not gummy buds and they may be somewhat fuzzy; no lenticels noticeable, bud scales are hairy; leaf scars are heart-shaped; twigs are gray-brown</p> <p><i>Populus grandidentata</i> big-toothed aspen</p> 
	<p>11c. Buds may or may not be gummy and are reddish-brown; twigs are reddish-brown and may have gray waxy film</p> <p><i>Populus tremuloides</i> trembling aspen</p> 
	<p>11d. Gummy buds that are 1 inch long; reddish-brown twigs; lenticels visible and somewhat orange in color; buds have fragrant odor</p> <p><i>Populus balsamifera</i> balsam poplar</p> 
12	<p>Bud tips pressed against twig; twig light red-brown, zigzag, and have numerous light lenticels</p> <p><i>Celtis occidentalis</i> hackberry</p> 
12	<p>Bud tips not pressed against the twig</p> <p>Go to 13</p>
13	<p>1 or 2 visible bud scales</p> <p>Go to 14</p>
13	<p>3 or more visible bud scales</p> <p>Go to 15</p>
14	<p>2 visible bud scales; buds smooth, rounded, reddish; twigs smooth, reddish or greenish gray, and zigzag</p> <p><i>Tilia americana</i> American basswood</p> 
14	<p>One hood-like bud scale; twigs often slender and flexible</p> <p><i>Salix sp.</i> willow species</p> 

3	<p>Twigs zigzag, red-brown, and armed with paired spines near the leaf scar</p> <p><i>Robinia pseudoacacia</i> black locust</p> 
3	<p>Twigs without spines</p> <p>Go to 4</p>
4	<p>Leaf scars are densely clustered on very short peg-like spur branches; twigs slender and light brown</p> <p><i>Larix laricina</i> tamarack</p> 
4	<p>Leaf scars scattered along more or less elongate twigs</p> <p>Go to 5</p>
5	<p>Terminal bud present</p> <p>Go to 6</p>
5	<p>Terminal bud absent (false terminal bud)</p> <p>Go to 12</p>
6	<p>Buds crowded near tip of twig</p> <p>Quercus Oak See 6a-f</p>
6a.	<p>Short rounded buds; hairless; acorns are oblong and cap covers ¼ of the nut</p> <p><i>Quercus alba</i> white oak</p> 
6b.	<p>Twig is quite stout, yellow-brown and may have corky ridges; buds are small and rounded and may be a bit fuzzy; acorns are large and cap covers ½ of the nut and have fringe around the edges</p> <p><i>Quercus macrocarpa</i> bur oak</p> 
6c.	<p>Twig is light brown; buds are short and rounded; acorn is 1 inch long and cap covers 1/3 of the nut</p> <p><i>Quercus bicolor</i> swamp white oak</p> 

<p>6d. Twig is red-brown; buds are tall and somewhat pointed; acorn is nearly round with a flat cap that covers less than ¼ of the nut</p> <p><i>Quercus rubra</i> red oak</p> 												
<p>6e. Twigs slender red-brown and shiny; buds are pointed; acorns have caps that enclose 1/3 to ½ of the nut</p> <p><i>Quercus ellipsoidalis</i> northern pin oak</p> 												
<p>6f. Twig is stout and red-brown to grey-green; buds are large, buff-colored, pointed and fuzzy; acorns have cap that covers ½ to 1/3 of the nut and the edges of the scales on the cap appear loose</p> <p><i>Quercus velutina</i> black oak</p> 												
<table border="0"> <tr> <td data-bbox="196 818 344 1349">6a. </td> <td data-bbox="352 818 499 1349">6b. </td> <td data-bbox="508 818 655 1349">6c. </td> <td data-bbox="663 818 811 1349">6d. </td> <td data-bbox="819 818 967 1349">6e. </td> <td data-bbox="975 818 1123 1349">6f. </td> </tr> <tr> <td data-bbox="196 1386 344 1458">white oak <i>Quercus alba</i></td> <td data-bbox="352 1354 499 1458">bur oak <i>Quercus macrocarpa</i></td> <td data-bbox="508 1354 655 1458">swamp white oak <i>Quercus bicolor</i></td> <td data-bbox="663 1354 811 1458">red oak <i>Quercus rubra</i></td> <td data-bbox="819 1354 967 1458">n. pin oak <i>Quercus ellipsoidalis</i></td> <td data-bbox="975 1354 1123 1458">black oak <i>Quercus velutina</i></td> </tr> </table>	6a. 	6b. 	6c. 	6d. 	6e. 	6f. 	white oak <i>Quercus alba</i>	bur oak <i>Quercus macrocarpa</i>	swamp white oak <i>Quercus bicolor</i>	red oak <i>Quercus rubra</i>	n. pin oak <i>Quercus ellipsoidalis</i>	black oak <i>Quercus velutina</i>
6a. 	6b. 	6c. 	6d. 	6e. 	6f. 							
white oak <i>Quercus alba</i>	bur oak <i>Quercus macrocarpa</i>	swamp white oak <i>Quercus bicolor</i>	red oak <i>Quercus rubra</i>	n. pin oak <i>Quercus ellipsoidalis</i>	black oak <i>Quercus velutina</i>							
<p>6 Buds not crowded near tip of twig</p>	<p>Go to 7</p>											

<p>7 Leaf scars heart shaped</p>	<p>Go to 8</p>
<p>7 Leaf scars other than heart-shaped or are inconspicuous</p>	<p>Go to 9</p>
<p>8 Twigs stout with numerous light lenticels; buds large, conspicuous; large terminal bud slightly hairy; fruit has a tan husk that is distinctly 4-ribbed; bark “shaggy”</p> <p><i>Carya ovata</i> shagbark hickory</p> 	
<p>8 Twigs stout and light brown; Buds gray and fuzzy; leaf scar described as “monkey face”; Pith chambered; fruit has green husk that contains a round, black nut</p> <p><i>Juglans nigra</i> black walnut</p> 	
<p>9 Leaf scar inconspicuous, buds narrow, acute, ¾ to 1 inch long, lance-shaped; Many bud scales and they overlap; twigs slender and zigzag</p> <p><i>Fagus grandifolia</i> beech</p> 	
<p>9 Leaf scars visible although not all large</p>	<p>Go to 10</p>
<p>10 More than 3 vascular bundle scars; Buds dark red and sticky</p> <p><i>Sorbus americana</i> American mountain-ash</p> 	
<p>10 3 vascular bundle scars or scars not distinct</p>	<p>Go to 11</p>
<p>11 Vascular bundle scars often not distinct; leaf scars small and semi-circular; buds are small with glossy scales; twigs reddish brown to gray usually with short spur shoots on older growth; twigs sometimes bitter-almond taste</p> <p><i>Prunus serotina</i> black cherry</p> 	
<p>11 Vascular bundle scars 3 distinct dots; Leaf scars nearly semi-circular; Bud scales finely hairy, buds sometimes sticky; twigs without flavor</p>	<p>Populus see 11a-d Next Page</p>

Winter Tree I.D.

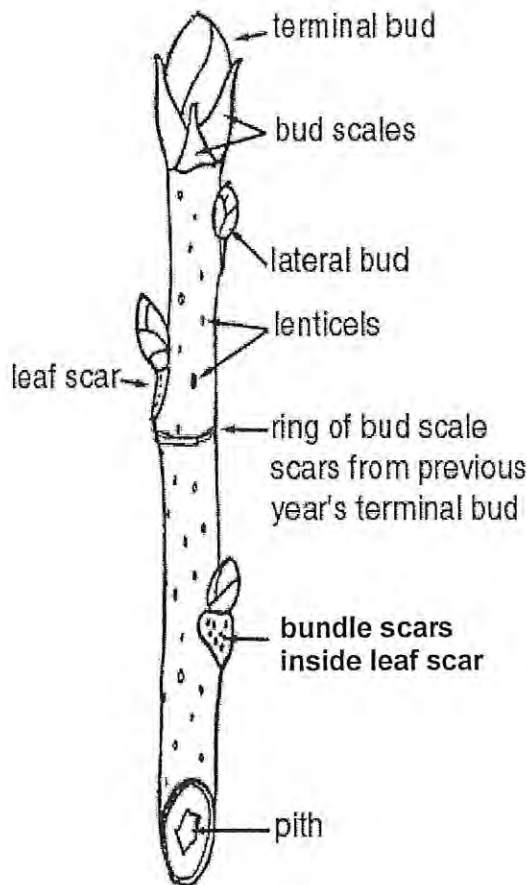
Twig and bud features can be used to identify trees in winter

In winter, trees and shrubs can be identified by their distinctive **twig** and **bud** characteristics. Twigs and buds have features that offer a reliable means of identification.

Twigs, which may be defined as the end portion of the branch on a woody plant, represent the current year's growth. Twigs have distinguishing features such as **buds, leaf scars, bundle scars, color, and fragrance.**

Twigs from one branch of a tree may differ from twigs from another branch of the same tree because of frost or animal damage. Differences in twig growth also occur due to variations in the amount of shade. Twigs selected for identification should be uninjured and representative of the normal growth pattern of the tree or shrub.

twig anatomy



Terminal bud (or end bud)

Bud located at the tip of the twig

Lateral bud (or side bud)

Bud located along the side of the twig

Pseudoterminal bud

In some species, a terminal bud is not formed and twig growth continues until stopped by bad weather. In this case the tip of the twig dies back close to the nearest mature lateral bud. A **pseudoterminal bud** can be differentiated from a true terminal bud because it usually has both a leaf scar immediately below it **and a small twig scar behind it.**

Bud scales

Scales covering the buds. Buds may have no scales, a single scale, a valvate scale, or imbricate scales

Lenticels

Small, wart-like bumps or lines that are irregularly scattered over the surface of twigs. They admit oxygen and other gases needed in respiration and other physiological processes. Most lenticels are round or oval, but they can be other shapes as well.

Leaf scar

After a leaf has fallen from a twig, a scar remains. There is great variation in the shape and size of leaf scars.

Bundle scars

Small dots or line on the surface of the leaf scar that mark the point where plant nutrients passed from the twig into the leaf.

Pith

The innermost, central part of the twig, different from the wood or xylem surrounding it.

Winter buds of most deciduous trees and shrubs are usually sufficiently formed for identification purposes by early August, and these winter characteristics can be used for identification purposes for most of the year, except for about four months in late spring and early summer when most of the year's current growth is occurring.

Winter Tree I.D.

Twig and bud features that can be used to identify trees in winter

Twig size and shape

Species such as tree-of-heaven and staghorn sumac have stout twigs. Beech and birch have slender twigs. Sycamore twigs are zigzag in shape.

Twig color and scent

These are distinctive aspects of some twigs. Box elder has green twigs. Sassafras twigs are also green. Some twigs, when freshly cut, have distinctive aromas. Spicebush has a spicy fragrance. Sassafras and black birch are quite fragrant, while black cherry is foul-smelling.



Stout



Slender



Zigzag



Alternate



Opposite

Arrangement of buds on the twig

The arrangement of buds (which later become leaves) on the twig is described as **OPPOSITE**, **ALTERNATE**, or **WHORLED**.

There are only four trees with buds that are opposite: Maple, Ash, Buckeye, and most Dogwoods. Among the shrubs, viburnum and honeysuckle tend to have opposite buds.

Most trees and shrubs have alternate bud arrangements.

A few trees have whorled bud arrangements.

Terminal buds

There may be a **single** terminal bud, such as in the maples.

Multiple terminal buds may be clustered on the end of the twig, such as in the oaks.

The end bud can also be **pseudoterminal**.

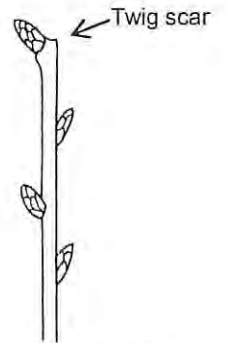
The distance from the end bud (or buds) on a twig to the first set of bud scale scars indicates the current season's growth.



Single Terminal Bud



Multiple Terminal Buds



Pseudoterminal Bud

Leaf scars

There is great variation in the shape and size of leaf scars. They can be horseshoe-shaped, V-shaped, half-round, shield-shaped, etc.

There are small dots or lines on the leaf scar called **bundle scars** which mark the point where plant nutrients passed from the twig into the leaf. The number, arrangement, and shape of these bundle scars can sometimes help in identification.

Common numbers of bundle scars are one to three, but more can occur. Some bundle scars are scattered throughout the leaf scar, as in oaks, but others have a distinct arrangement such as the U-shape of the bundle scars in ash.



Leaf Scar of Ash



Leaf Scar of Maple



Leaf Scar of Oak

Buds and bud scales

Buds are like tiny cocoons. They are the dormant, undeveloped young shoots usually protected by hard flaps called **bud scales**. The majority of buds, especially lateral buds, never form shoots unless induced to do so by growth regulators or injury.

Some buds do not have scales and are called **naked buds**. Lilac and black walnut buds are examples. Some buds are covered with a **single scale**, such as willow buds. Some bud scales do not overlap but fit together edge to edge. This arrangement is called **valvate**, and is present on the tulip poplar.

Bud scales may be numerous and overlap each other. This arrangement is called **imbricate**. Bud scales of maples are an example.

Buds can be **stalked** or **unstaked**. Witch-hazel and striped maple have stalked buds.



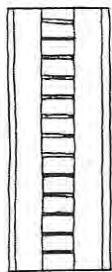
Single Caplike Bud Scale



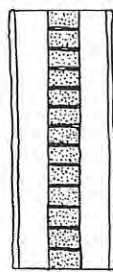
Valvate Scales



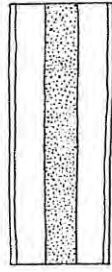
Imbricate Scales



Chambered pith, hollow between walls



Diaphragmed pith, solid between walls



Continuous pith, solid with no walls

Pith

Most pith is circular in cross-section, but it may also be star-shaped as in oaks (see below) or triangular as in alders. Pith color is usually white but may be brown, yellow, pink, or green.

When cut longitudinally, most pith is **continuous** and **homogeneous** in composition. It may also be **diaphragmed**, which means there are walls that divide the solid pith at regular intervals. Diaphragmed pith is found in tulip tree and black-gum.

Rarely, the pith is **chambered**, which means the pith is a series of empty chambers divided by walls. Chambered pith is found in butternut and black walnut.

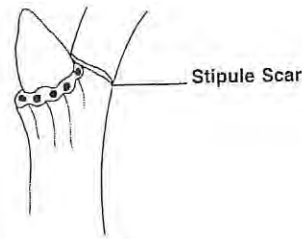


Pith 5-pointed

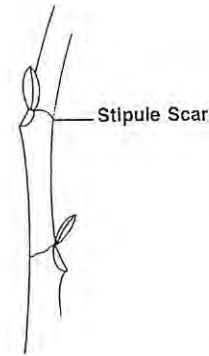
Oak has a pith in the form of a five-pointed star.

Stipule scars

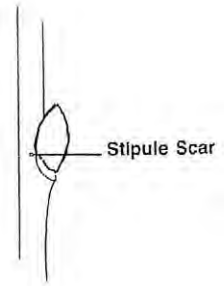
Stipules are outgrowths at the base of leaves that sometimes are leafy and occur in pairs on the twig near where the leaf attaches. When they fall off, they leave tiny scars called stipule scars. They are not present in all species and when present usually appear as small, inconspicuous lines or dots. Sycamore, willow, and tulip poplar have conspicuous stipule scars. In winter, lines on the twig mark the point where the stipules were attached. In sycamore and tulip poplar, the stipule scars encircle the twig.



Sycamore



Tuliptree



Willow

Glossary of common terms used in winter twig identification keys

Accessory bud

Bud at or near the nodes but not in the axil. Of two kinds, collateral and superposed.

Acute

With sides forming an angle of less than 90°

Appressed bud

Bud that lies flattened against the twig

Axil

The angle formed at the upper side of the attachment of the leaf to the stem

Axillary bud

The first bud above the leaf or leaf scar

Divergent bud

Bud that points away from the twig

Collateral buds

Accessory buds at the side of the axillary bud, as in the red maple

Flower bud

A bud containing an undeveloped flower or flower cluster

Glabrous

Smooth

Glaucous

Covered with a white or bluish bloom which can usually be rubbed off easily

Mucronate

Ending in a fine, slender tip

Node

The place on the twig at which one or more leaves were produced

Obovate

Inverted egg shape, with the broadest part above the middle

Obtuse

With sides forming an angle of more than 90°

Ovate or Ovoid

Egg-shaped, with the broadest part below the middle

Pubescent

Hairy

Scurfy

Scaly rather than hairy

Spur-shoots

Short stubby branches with very crowded leaf scars and very slow growth

Sub-opposite

Said of paired leaf scars which are not at exactly the same height on the twig (staggered)

Superposed buds

Accessory buds above the axillary bud, as in the butternut

Tomentose

With short matted hairs; wooly

Wooly

Covered with tangled or matted hairs resembling wool

12:02:21 From Judith Rosenthal to Panelists : Will this be recorded and available later?

12:02:38 From Jean Margaret Burchfield to Everyone : Hi Judith, yes the will be recorded

12:03:29 From Jean Margaret Burchfield to Everyone : Our Cont. Ed recordings are posted on HGIC's YouTube channel here <https://www.youtube.com/user/UMDHGIC>

12:06:34 From Stephanie Ann Pully to Everyone : Here is the link to the resources Jonathan provided:

https://extension.umd.edu/sites/extension.umd.edu/files/_images/programs/master_gardener/StateMG/WinterTreeIDResources.pdf

12:12:36 From Melanie Crowder to Panelists : could you please list the books noted on the prior slides? thanks,

12:13:40 From Sandra Hudspeth to Panelists : In "Bark" book, how do you know what age (in years) is considered young, mature and old.

12:15:30 From Stephanie Ann Pully to Everyone : Common Native Trees of Virginia:

https://www.dof.virginia.gov/infopubs/Native-Tree-ID_2020.pdf

12:16:29 From Stephanie Ann Pully to Everyone : Leaf Key for Common Broadleaf Trees in Maryland (MD DNR) https://dnr.maryland.gov/wildlife/Documents/TreeGuide_Common-Broadleaf.pdf

12:18:15 From Stephanie Ann Pully to Everyone : The last book he mentioned was the Peterson field guide to trees, there are lots of options for that one online

12:20:37 From Melanie Crowder to Panelists : thank you!

12:28:34 From Jean Margaret Burchfield to Everyone : This key is included in his resources here https://extension.umd.edu/sites/extension.umd.edu/files/_images/programs/master_gardener/StateMG/WinterTreeIDResources.pdf

12:40:42 From Barb Shuster to Panelists : Can you kindly explain why Black Walnut trees make it difficult to plant some other trees or plants near it?

12:42:42 From Stephanie Ann Pully to Barb Shuster, All Panelists : Hi Barb, HGIC put out an update on this in 2019: <https://extension.umd.edu/hgic/topics/walnut-toxicity-juglone>

12:47:24 From Sandra Hudspeth to Panelists : american is #1

12:47:48 From Robin Hessey to Everyone : I was always taught in my MG classes that it's "one if by land, or two if by sea" - which means that the 2 balls signify the London Plane tree.

12:50:46 From Stephanie Ann Pully to Barbara Waite-Jaques, All Panelists : Hi Barbara, we'll share the links after the class!

12:50:58 From Jean Margaret Burchfield to Everyone : Hi Barbara, we can download the chat along with the recording. We keep all of our links here on the website:

<https://extension.umd.edu/mg/volunteer-resources/horticulture-webinars-online-classes-and-other-events>

13:01:41 From Mariayne Brodnicki to Panelists : Thank you Jonathan. Interesting and jam-packed!

13:02:23 From Catherine Salam to Panelists : That's the one we used for the NCS/Longwood Tree ID Course

13:02:35 From Cheryl Davis to Panelists : Thank you. Very informative presentation.

13:02:49 From Jean Margaret Burchfield to Everyone : Winter tree finder

<https://www.amazon.com/Winter-Tree-Finder-Identifying-Deciduous/dp/0912550031>

13:03:11 From LORA WONG to Panelists : This was fun & interesting. Thank you.

13:03:24 From Renee Padmore-Baccus to Panelists : Thanks! Great Presentation!!

13:03:24 From Carolyn Richardson to Panelists : Why do the leaves stay so long on the American Beech tree? Thanks!

13:11:06 From Ennise Bloom to Everyone : Should all ghost fruit be removed during winter dormancy?

13:14:12 From Terry Thir to Panelists : sugar maples grow great in Charles county, I have 4 that are huge and beautiful, They did get black fungus on the bark

13:14:20 From Lisa Ghezzi to Everyone : UME Team — you are all very organized! Thank you. Well done. Speaker was terrific.

13:14:29 From Bonnie Legro to Panelists : Thank you very much.

13:14:44 From Ennise Bloom to Everyone : Thanks

13:14:50 From Jennifer Taubert to Everyone : Thank you so much! great presentation! Now to get outside and check out the trees!!!

13:15:00 From Elaine Lea to Panelists : Thank you, fascinating presentation. very helpful!

13:15:04 From Elena Wisler to Everyone : thank you!

13:15:06 From betty walke to Panelists : Awesome, thank you!

13:15:07 From Holly Stover to Panelists : I learned a lot thank you,

13:15:08 From Kathy Plitt to Panelists : Thank you very much! Excellent presentation!

13:15:14 From Barb Shuster to Panelists : Thank you

13:15:18 From Erica Smith to Panelists : thanks! great talk!

13:15:19 From Cheryl Belitsos to Panelists : thank you!!

13:15:19 From Debra Gair to Panelists : Thank you!

13:15:20 From Anne Hilliard to Panelists : thanks

13:15:23 From Joan Schrauth to Panelists : thank you - well done!

13:15:24 From PHYLLIS KELLEY to Panelists : thank you!

13:15:25 From Layton Ana María to Panelists : Fabulous, thank you!!

13:15:28 From William Allen to Panelists : great presentation.....

13:15:36 From Sally Matts to Panelists : Thank you. This info will help when I'm hiking

13:15:39 From Margaret Eby to Panelists : Thanks! Great presentation!

13:16:43 From Peggy Cook to Panelists : thank you!

13:16:49 From Jessica Howard to Panelists : Thank you so much!

13:17:03 From Jennifer Newburger to Panelists : thank you!

13:17:25 From patricia parker to Panelists : Thank you very much