

# CTPA Arboriculture 101

## Tree Identification

*Introduction, Conifers and  
Part I Broadleaf Trees*

by Douglas J. Pistawka

Photos by Doug Pistawka, Oscar Stone,

University of Georgia at [www.forestryimages.org](http://www.forestryimages.org), UCONN Plant Database and Vanderbilt bio images

# Objectives

as stated in “DEP Info for Applicants for an Arborist License”

- “Identify all common trees found in the region in their summer and winter condition, including but not limited to” those listed.
  - Any tree on CAES grounds may be on the exam
  - Common names only
- “Know the healthy form of each tree, and its appearance and rate of growth” as well as their strength characteristics
- “Know the suitability of trees to different sites” for soil, moisture and sunlight

# Objectives cont.

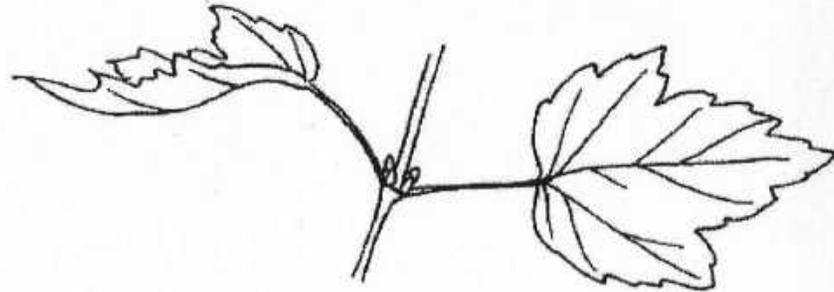
- ID trees using **buds and twigs**, leaves, bark, silhouette, flowers and fruit
- Use common insect damage, disease and physiological disorders to help ID trees
- Learn how to use a key
- Expand your vocabulary to help describe and ID trees

# Leaf and Bud Arrangement



## Alternate

Leaves and buds arranged in alternating sides of stem  
elm, oak, beech, birch



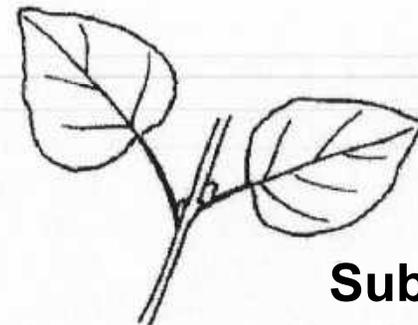
## Opposite

Leaves and buds directly across from each other on stem  
maple, ash



## Whorled

3 or more buds and leaves at a node  
catalpa, paulownia



## Subopposite

Leaves and buds slightly offset from each other on stem  
katsura, buckthorn

# “MAD CAP HORSE”

Mnemonic device to help remember

Trees with opposite branches:

- [M]aple, [A]sh, [D]ogwood
- [Cap]rifoliaceae Family - honeysuckle, lilac and viburnums
- [Horse] chestnut/buckeye
- Also, catalpa and paulownia which may be opposite or whorled and dawn redwood.

# Leaf Types - Broadleaf Trees

## Simple Leaf

Bud is located at the base of a single leaf and the stem

Sinus space between two lobes

Lobe – projected part of leaf

Margin – outer edge

Base – bottom

Stipules – leaf-like organ at base of leaf  
i.e. sycamore, tulip polar

Midrib – central vein

Vein – conductive vessels

Blade – broad flat portion of leaf

Petiole – leaf stalk

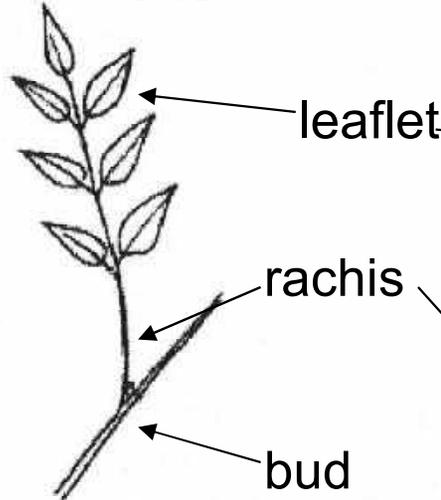
Bud – undeveloped leaf, flower or shoot



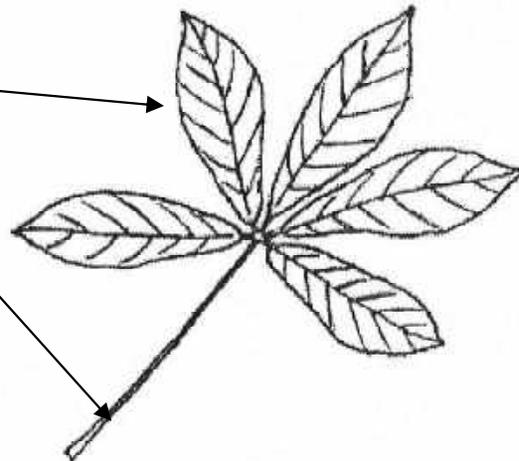
# Compound Leaf

Bud is located at the base of a structure with more than one leaflet

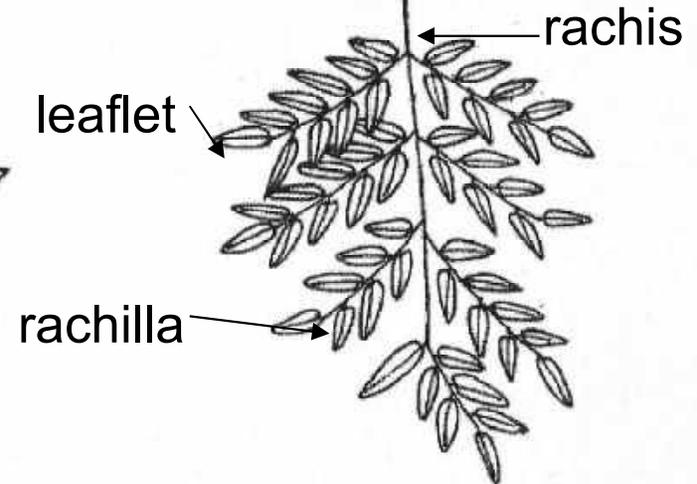
## Pinnate



## Palmate



## Bipinnately



Leaflets attached along a single stem (rachis); most common

i.e. ash, hickory, walnut, ailanthus

Leaflets all attached to a common point like the spokes of a wheel

i.e. Horse chestnut, buckeyes

Leaflets are - attached to multiple stems (rachilla)

i.e. silk tree, honey locust, devils walking stick, Kentucky coffee tree

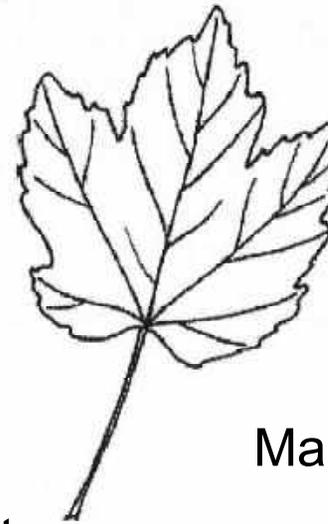
# Leaf Venation – conductive vessels



Elm



Oak



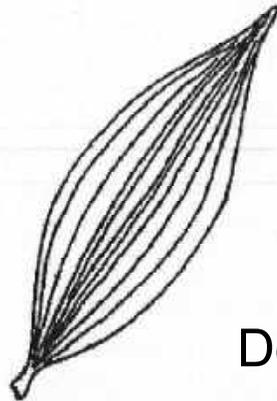
Maple

## Pinnate

Central vein from base to tip like a fishbone

## Palmate

Several veins of similar size from base to tip, all attached to a common point



Dogwoods

## Parallel

Veins run parallel from base to tip



Ginkgo

## Dichotomous

Veins run in a "Y" pattern

**MARGINS**



Entire



Sinuate



Serrate



Dentate



Lobed



Cleft

Smooth

Wavy

Saw-like

Toothed

Rounded

Split

**TIPS**



Acuminate



Acute



Obtuse



Rounded



Truncate



Emarginate

Sharply pointed

Pointed

Blunt

**BASES**

Circular

Cut tip

Notched



Cuneate



Acute



Obtuse



Rounded



Truncate



Auriculate

Wedge

Pointed

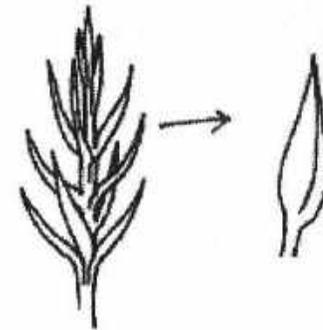
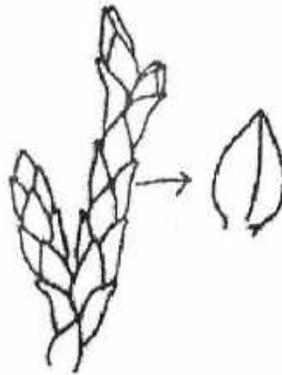
Blunt

Circular

Cut tip

Lobed

# Leaf Types - Conifers



## Needle-like

Needles may be arranged in:

- Bundle of 2, 3 or 5 (Pines)
- Single on stem (Fir, Spruce and Hemlock)
- Clusters on stem (Larch, Blue Atlas Cedar)

## Scale-like

Scales overlap like scales on a fish

- Cedars
- Juniper

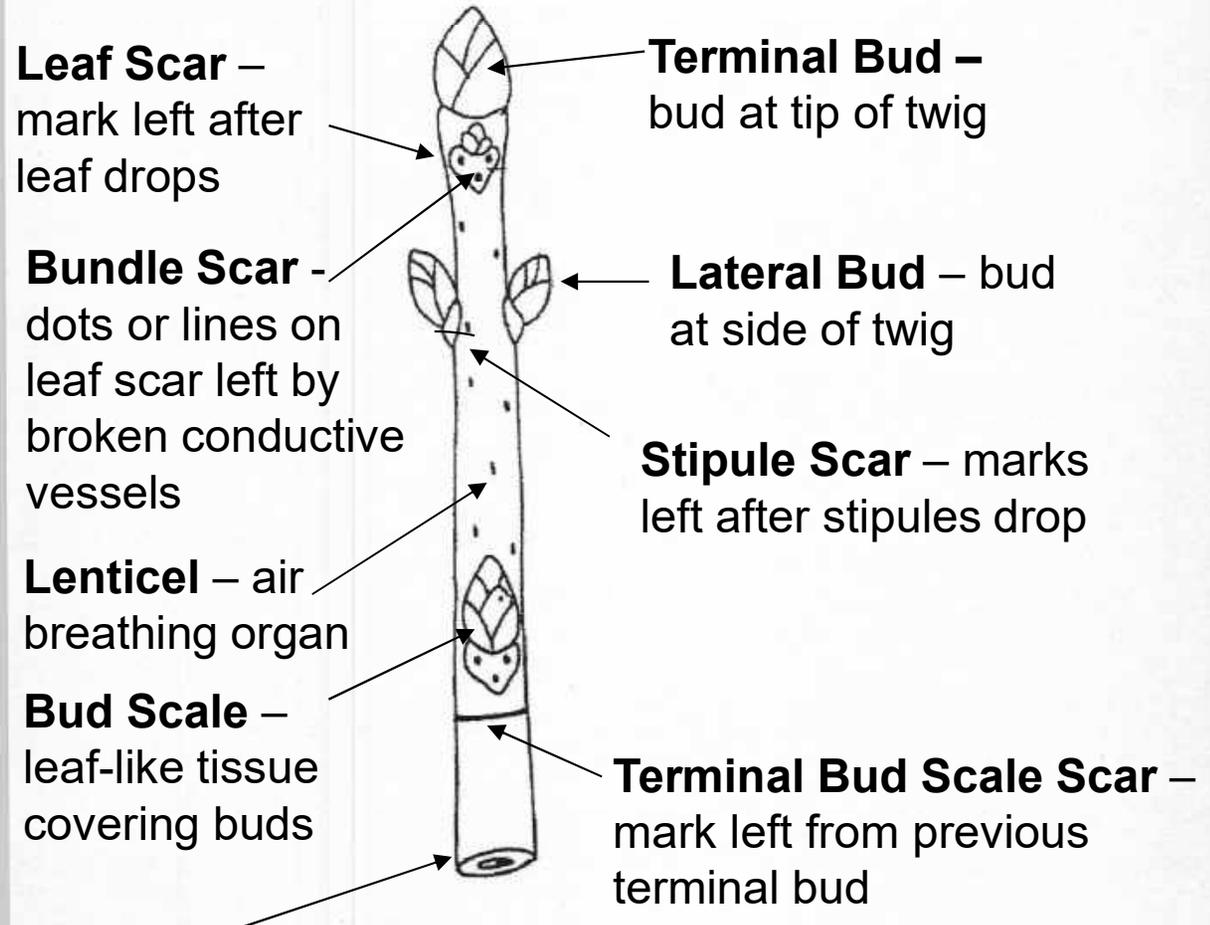
## Awl-like

Needles sharp to the touch

Eastern Red Cedar has both scale-like and awl-like foliage

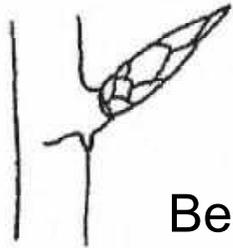
# Stem and Bud Morphology

(Form and Structure)



**Pith** – center of twig functions in transport and storage – solid (most trees), spongy (sumac), chambered (hollow cavities i.e. black walnut, butternut), diaphragmed (soft with dark discs i.e. tupelo, tulip polar)

# Bud Types



Beech

Conical shape

Imbricate (overlapping scales)



White Ash

Rounded



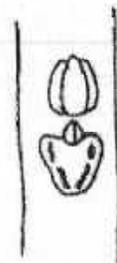
Chestnut

Ovoid "egg shape"



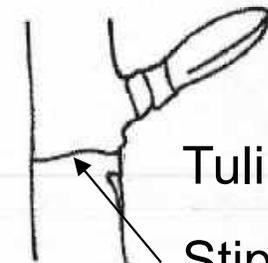
Willow

One-scale



Walnut

Superposed



Tulip Poplar

Stipule scar

Valvate (two-scales not overlapping like praying hands)

# Tree Shapes

Conical - Arborvitae

Columnar – Lombardy Poplar

Pyramidal – Blue Spruce

Fountain - Palm

Oval – Shagbark Hickory

Multi-stem - Birch

Spreading - Cottonwood

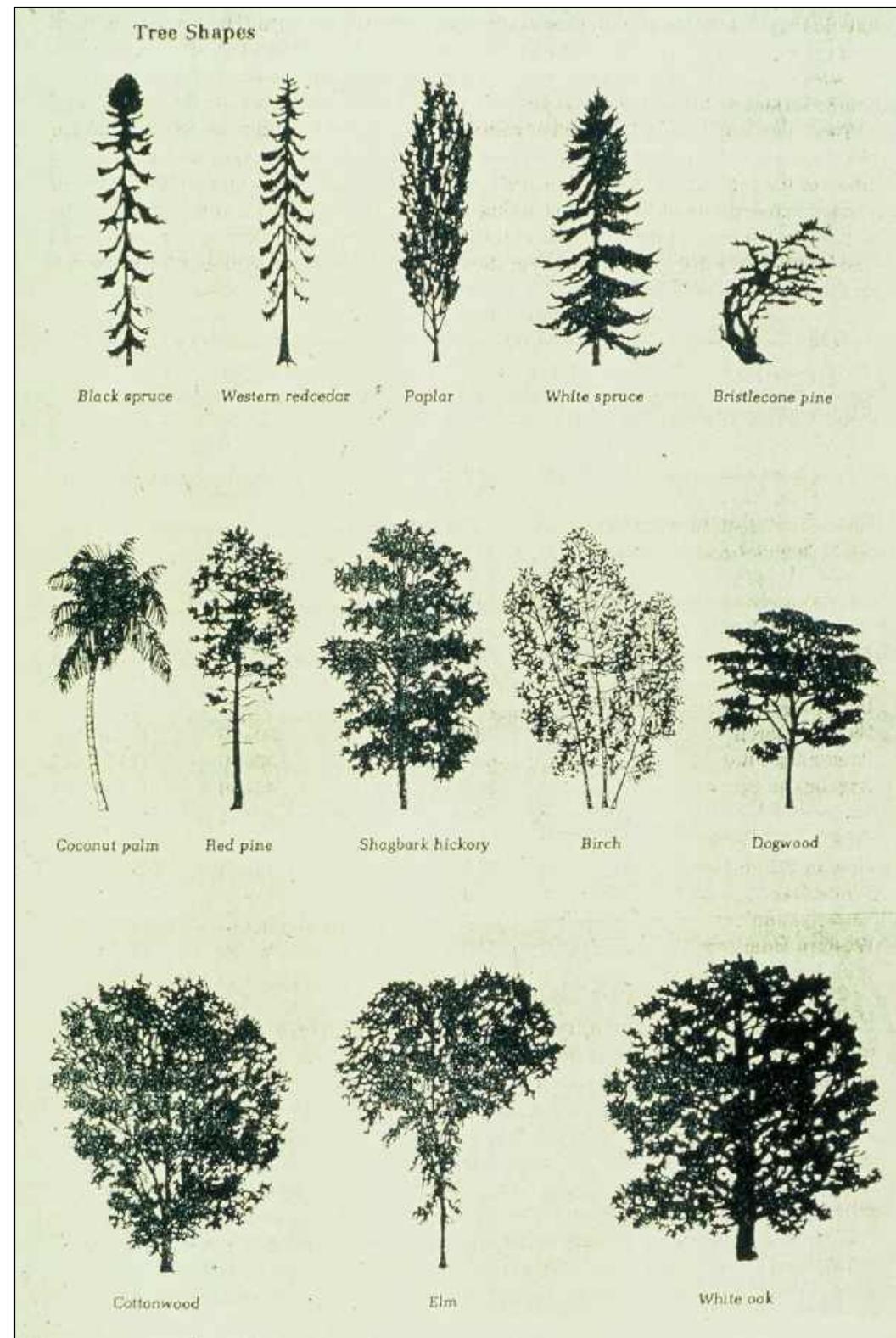
Vase-shaped - Elm

Rounded – White Oak

## Growth Habit

Excurrent – Single main stem i.e. pine, spruce, pin oak

Decurrent – Spreading habit i.e. cottonwood, white oak, elm



# Conifers

Photos are organized following Peterson's Field Guide into five categories

- Needles in Clusters
- Needles on Woody Pegs
- Flat Needles
- Scale or Awl-like Needles
- Fan-shaped Leaves
- Pines, Larch, [Blue Atlas Cedar, Umbrella Pine]
- Spruces
- Firs, Hemlocks, [Dawn Redwood]
- Cedars, Junipers
- [Gingko]

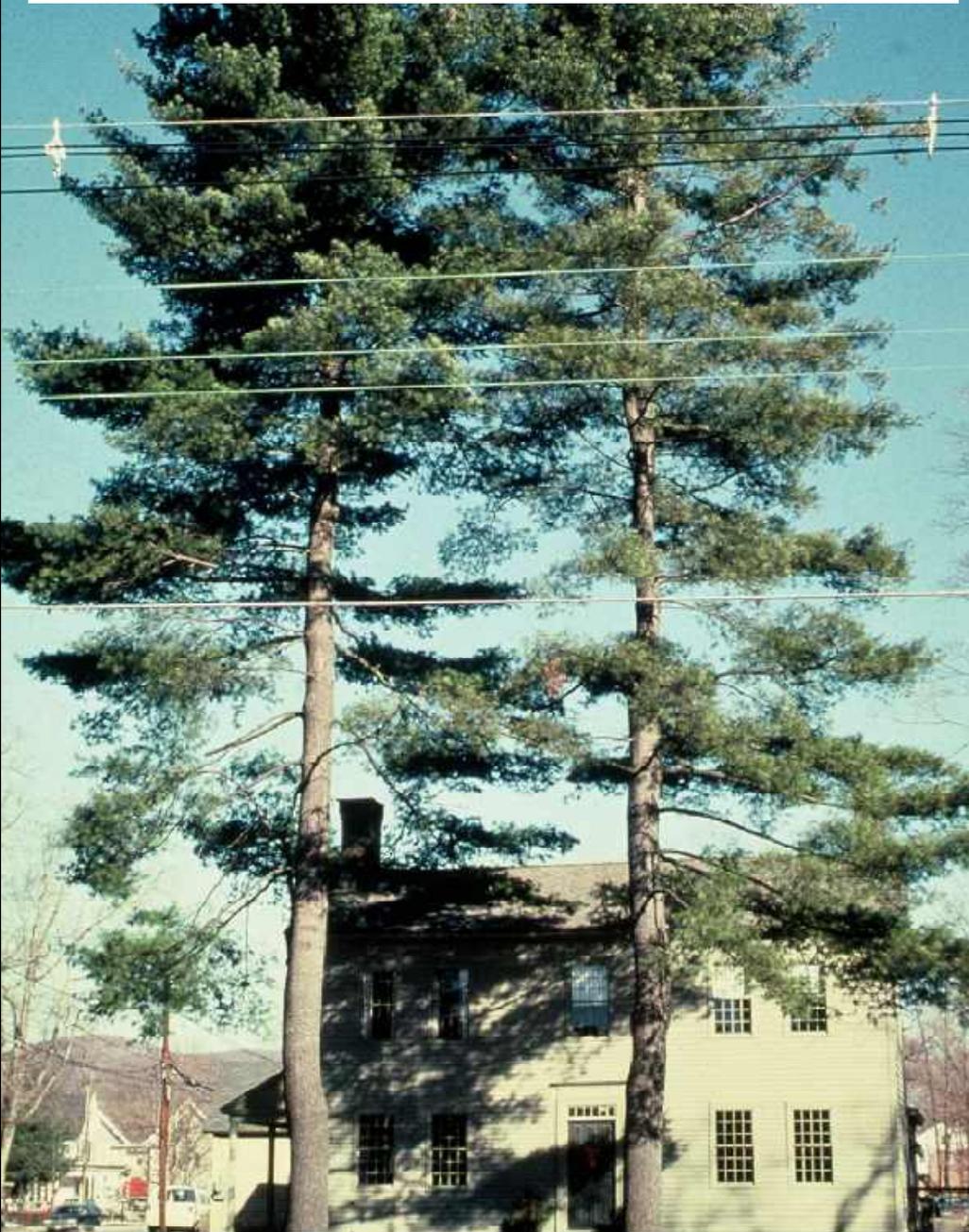
Those in [ ] not in Peterson's,  
see Smithsonian guide

# Conifers

## Gymnosperms vs Angiosperms

- **Conifers** are Gymnosperms which means “naked seeds”. They do not have flowers in the common sense of the word. Instead of producing seeds in an ovary, they produce seeds usually on the scale of a cone.
- **Broadleaved Trees** are Angiosperms meaning “hidden seeds”. These are true flowering plants which produce seeds in an ovary.

***Conifers with Needles  
in Clusters - White Pine***



- Tall trunk with horizontal spreading limbs
- Delicate spray-like foliage

# White Pine

- Five needles per bundle (fascicle)
- Soft needles 2 to 4 inches in length
- Pointed orange buds





## **White Pine cone**

Long (3" – 6") tapering cones  
without prickles



## **White Pine**

- Dark bark becoming deeply furrowed with age.
- Not scaly like red or Scotch pines
- Prized by British navy for ship masts during Colonial days

# Witches Broom White Pine

Dr. Sidney Waxman Collection  
Bartlett Arboretum – UCONN Prof of  
Plant Sciences named and introduced  
34 cultivars of semi-dwarf conifers



## Scotch Pine

- Native of Scottish Highlands
- Bright orange bark on upper trunk and branches

A close-up photograph of a Scotch Pine cone and its needles. The cone is green and covered in small, white, resinous droplets. The needles are long, thin, and green, arranged in bundles. The background is a blurred, reddish-brown color, likely the bark of the tree.

Cones 1 ½" – 2 ½"  
without prickles

- 
- A close-up photograph of the bark of a Scotch Pine tree. The bark is bright orange and has a rough, flaking texture. Two green needles are shown in the foreground, one pointing upwards and one pointing downwards, both attached to a small stem. The background is a blurred, reddish-brown color, likely the bark of the tree.
- Two needles per bundle
  - Needles 2" – 3" in length

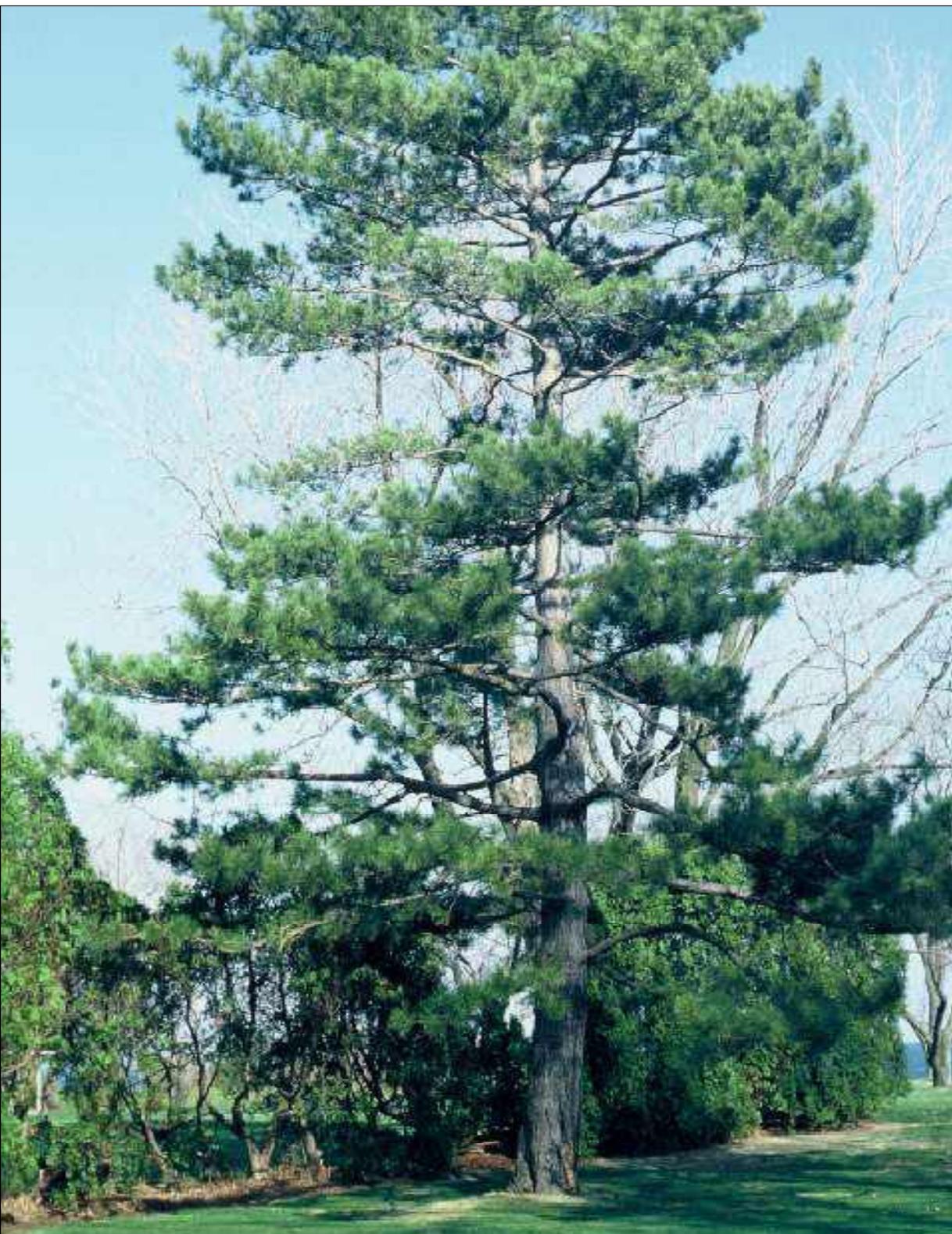


Crown often irregular or scraggly



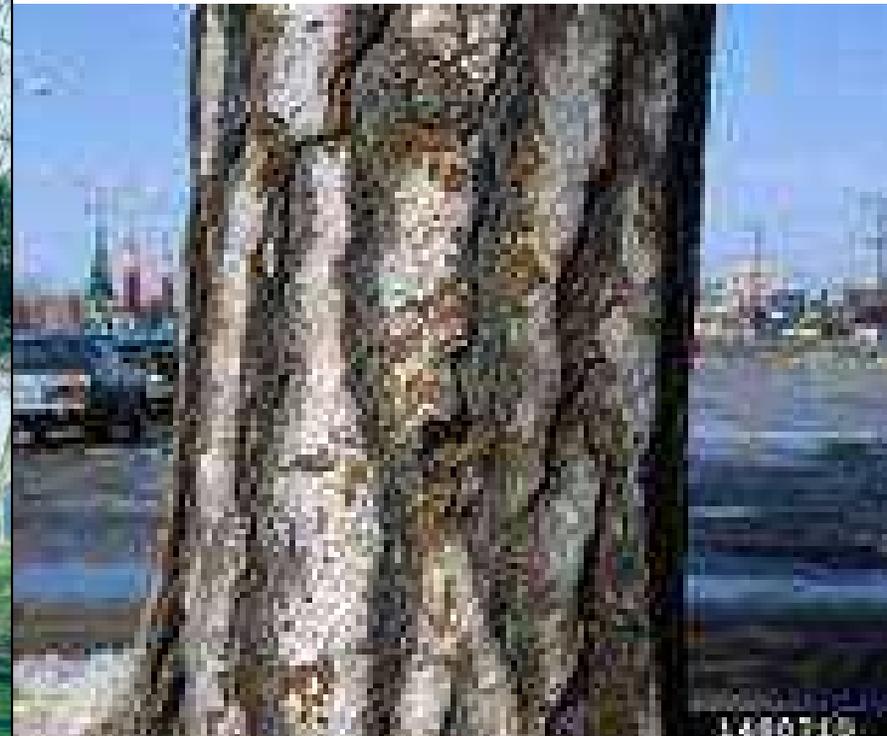
## Scotch Pine

- Orange flaky bark, not checkered like mature red or Austrian pine
- Most widely distributed pine in the world and most important European timber tree



## Austrian Pine

- Commonly planted in landscapes and along Connecticut highways
- Tolerant of dry soil, dust and city smoke
- Mature bark with distinctive vertical gray-yellow plates



# Austrian Pine

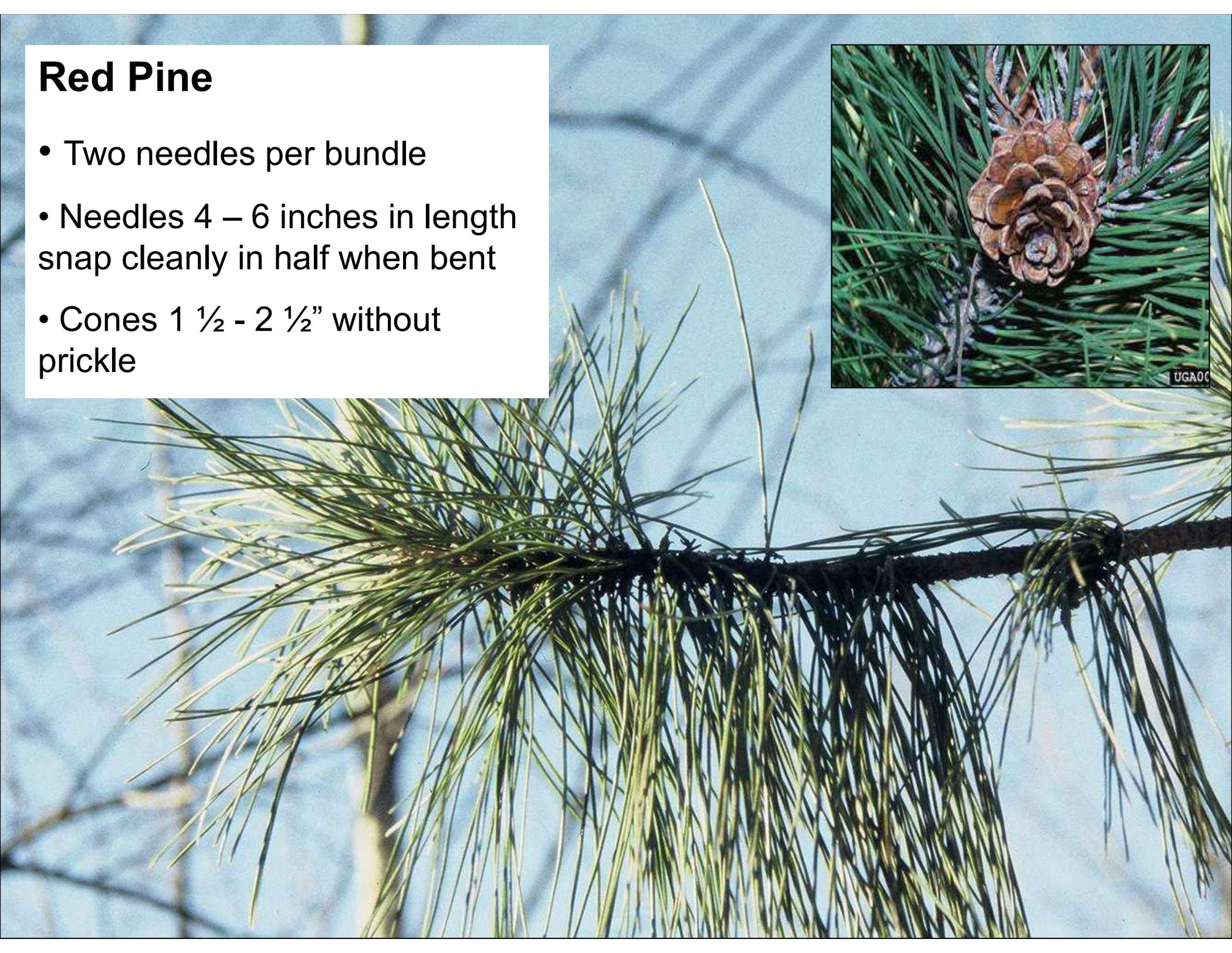
- Two needles per bundle
- Dark green stiff 3" – 6" needles
- Large white resinous buds
- 2" to 3" cone with faint brown border and sharp prickle



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# Red Pine

- Two needles per bundle
- Needles 4 – 6 inches in length snap cleanly in half when bent
- Cones 1 ½ - 2 ½” without prickle





- Reddish scaly bark when young becoming platy with age
- Tall straight trunk with stout right-angle branches and symmetrical crown
- Red pine scale significantly reduced red pine plantations

- Used for poles, pilings and log cabins



## **Conifers with Clusters of Needles on Spurs**

- American Larch short 3 sided needles ( $\frac{3}{4}$  to 1") shown here
- European Larch longer flat needles of unequal length (1" to 1  $\frac{1}{2}$ ") and often twisted



## **European Larch (left)**

- Cones 7/8" to 1 1/2" long
- Mostly an upland species

## **American Larch (right)**

- Cones 1/2" to 7/8" long
- Tree of northern wet soils
- Indians used roots to sew birch bark into canoes

# American Larch



Gold colored deciduous needles  
American Larch has upright  
branchlets, European Larch droop

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Dark bark flaking off in  
small scales



## **Blue Atlas Cedar**

Clusters of sharp steel blue needles arising from spurs with upright female cones



## Blue Atlas Cedar

- Native of the Blue Atlas Mts. of Morocco and Algeria
- Pyramidal when young, spreads to a magnificent open crown
- Legend in Arboriculture – Oscar Stone

## **Japanese Umbrella Pine**

Unusual and attractive umbrella shaped whorls of 3" – 5" long needles at nodes along branches





## Japanese Umbrella Pine

- Not a true pine but related to the redwoods
- Hardy and slow growing with dense green foliage
- Pyramidal in form
- Largest in CT Gwyn Careg Inn, Pomfret





## ***Needles on Woody Pegs - Spruces***

- Evergreen tree with pointed buds and sharp, stiff needles attached singly to twigs
- Pendent cones (hang down from the branches)

### **Norway Spruce**

Strongly drooping lateral branches and long cones



## White Spruce

- Blue-green needles with short drooping cones
- Needles are square in cross section with skunk-like odor



**Blue Spruce**

**White Spruce** (top) short cones 1" – 2" in length

**Norway Spruce** (bottom) long cones 4" – 6" in length



## White Spruce



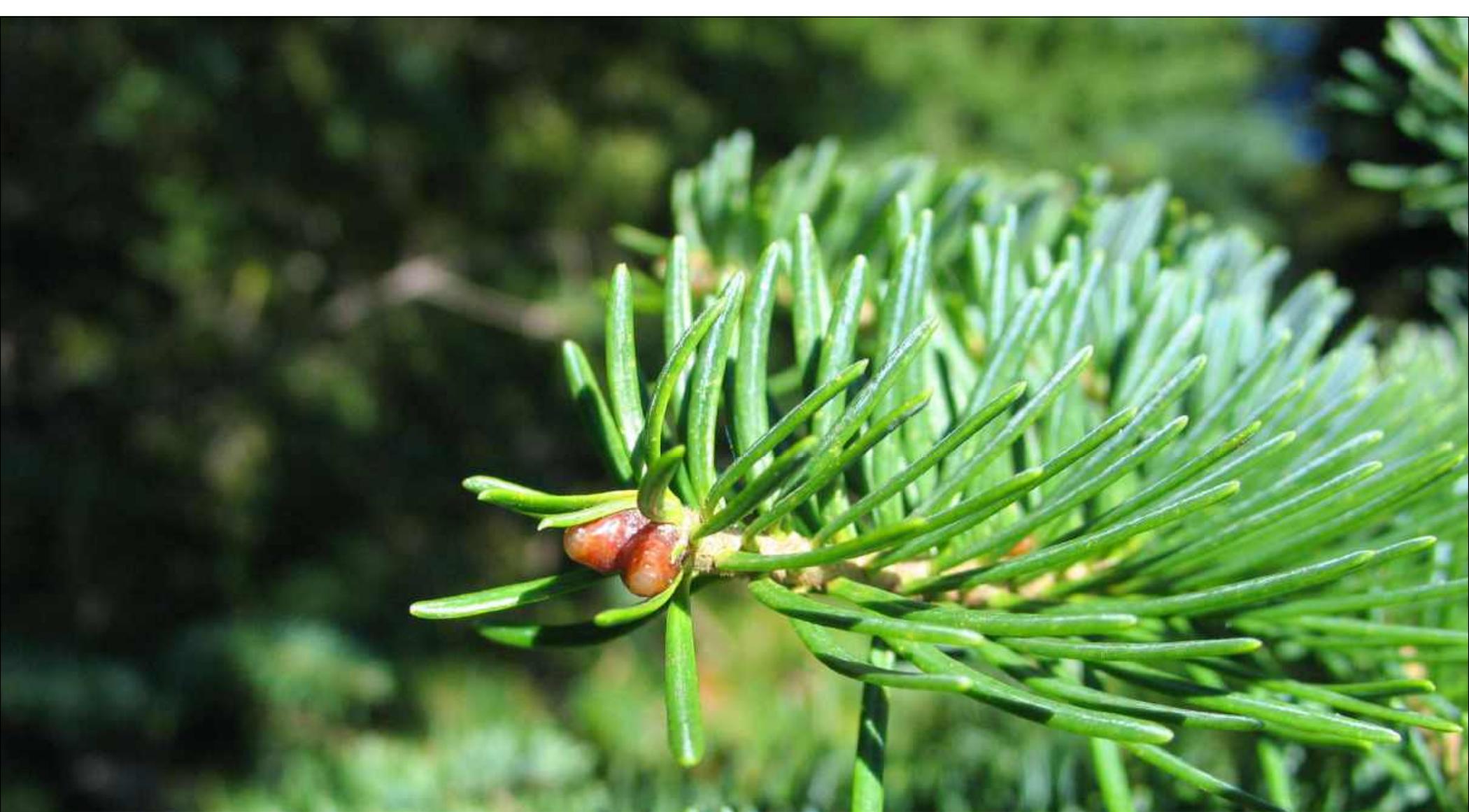
Susceptible to cytospora, foremost pulpwood tree, most important commercial tree in Canada used for lumber and X-mas trees

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## Blue Spruce



Pyramidal form upper branches ascending, lower branches nearly horizontal



## ***Conifers with Flat Needles***

### **Balsam Fir**

- Round buds
- Needles attached singly to twigs with a round needle scar

## Balsam Fir

- Upright purple-green cones (1"- 3")
- Cones fall apart in late autumn leaving upright central core





## Balsam Fir

- “Pitch pockets” - resin blisters on gray bark
- Conical form, branches ascending



**Douglas Fir *Pseudotsuga meniesii* (not a true fir)**

- Pointed buds
- Flat needles on a short petiole (base of needle is constricted)
- Rows of white stoma on bottom of needle

# Douglas Fir

- Cones hang down (unlike upright cones of true firs)
- 3-pointed bracts stick out from cone like a snakes tongue



# Douglas Fir



Conical crown with drooping  
lower side branches  
Smooth gray bark on young trees

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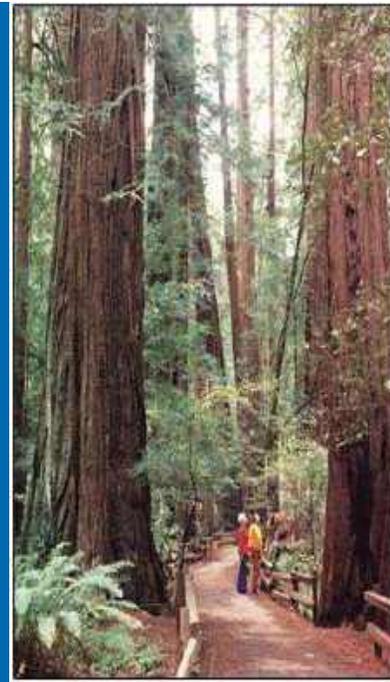


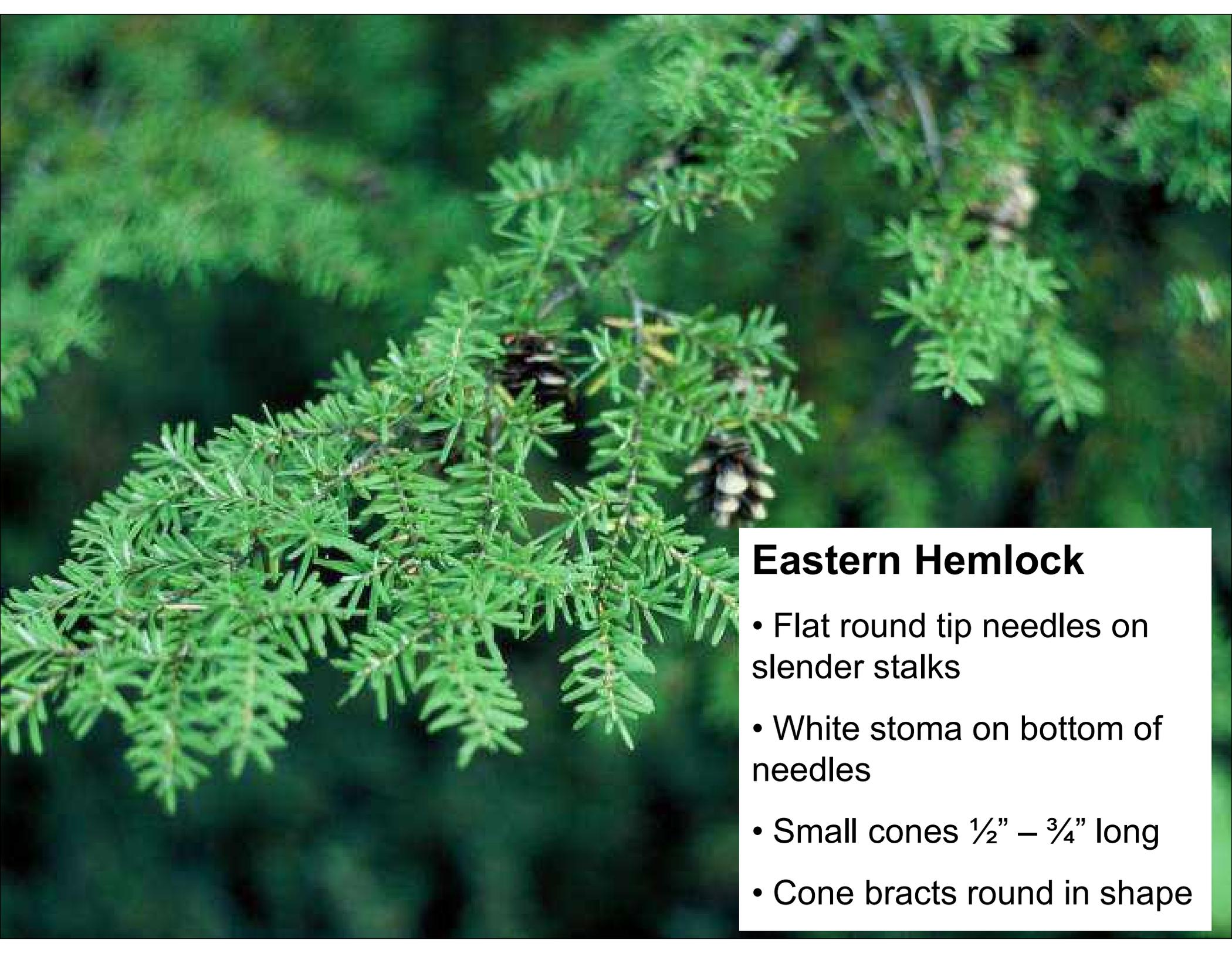
Mature bark is thick and furrowed  
Grows 8' in diameter and 250' tall  
along the moist Pacific Coast.

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# What is the Largest Tree?

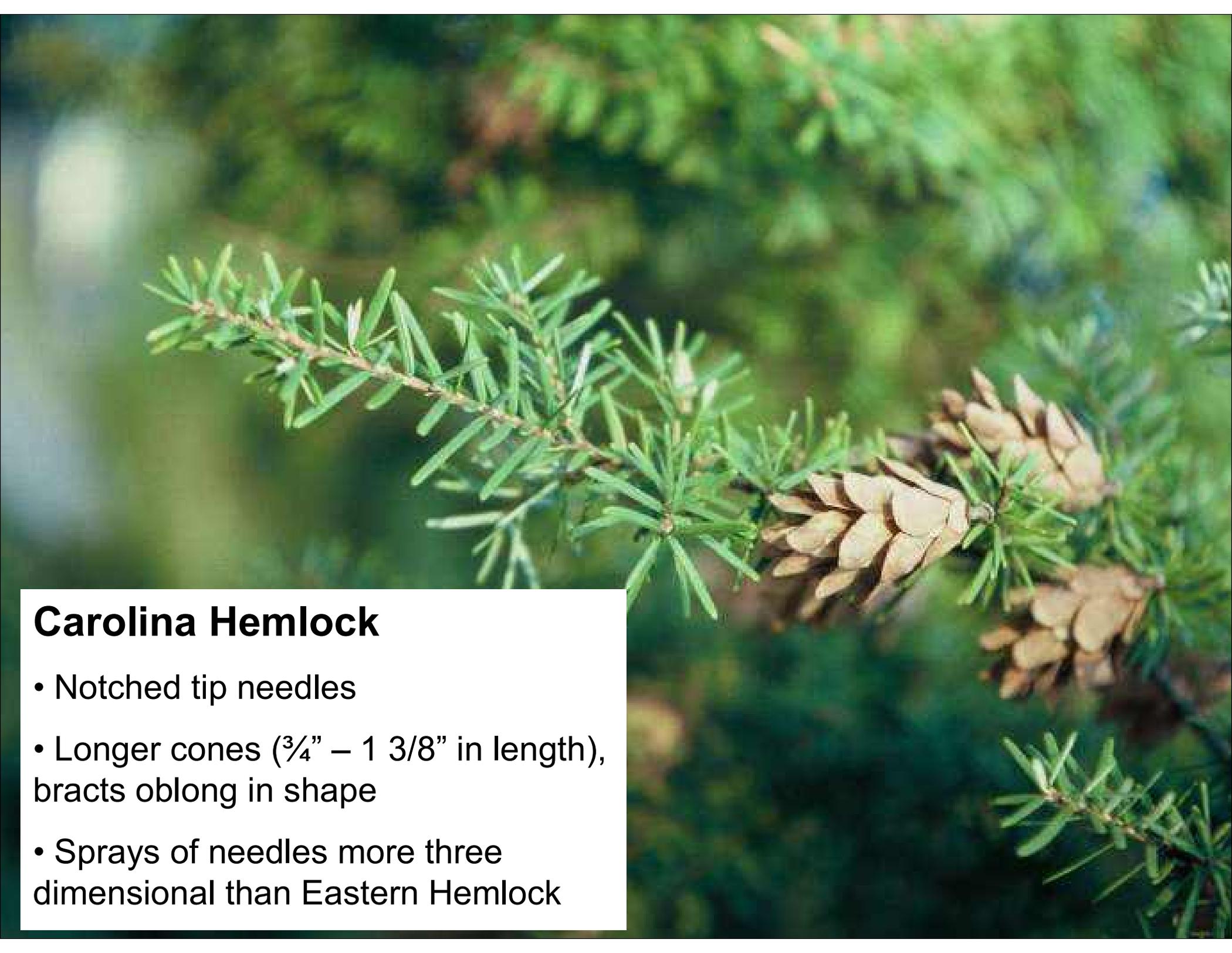
- **Largest Volume**  
Giant Sequoia, General Sherman 34' dia, 274' tall
- **Tallest**  
Coastal Redwood, Hyperion 379' tall
- **Largest Diameter**  
Montezuma Cypress – 52' diameter
- **CT's Largest**  
Pinchot Sycamore – 9' dia, 95' tall and 146.5' spread in Simsbury
- **Oldest**
  - Bristlecone Pine – Methuselah - 4,800 years old





## **Eastern Hemlock**

- Flat round tip needles on slender stalks
- White stoma on bottom of needles
- Small cones  $\frac{1}{2}$ " –  $\frac{3}{4}$ " long
- Cone bracts round in shape



## **Carolina Hemlock**

- Notched tip needles
- Longer cones ( $\frac{3}{4}$ " – 1  $\frac{3}{8}$ " in length), bracts oblong in shape
- Sprays of needles more three dimensional than Eastern Hemlock

# Eastern Hemlock

- Loose, irregular and feathery crown
- Branch tips hang down and droop
- Dark rough outer bark with red/purple inner bark
- Susceptible to hemlock woolly adelgid



# Dawn Redwood

- A living fossil, present for the past 50 million years
- One of the most important arboreal discoveries of the 20<sup>th</sup> century. Was thought to be extinct until found in China in 1941.
- Botanists from Arnold Arboretum collected seed in China and brought to U.S. in 1948. Now widely planted in landscapes over 100' tall in U.S. and over 160' tall in China
- Deciduous tree with opposite pairs of needles and buds
- Ball shaped cones 1" in diameter





- Reddish-brown fibrous bark and buttressing trunk
- Fast growing tree with conical shape and soft, lacey appearance, gold fall color

## Dawn Redwood





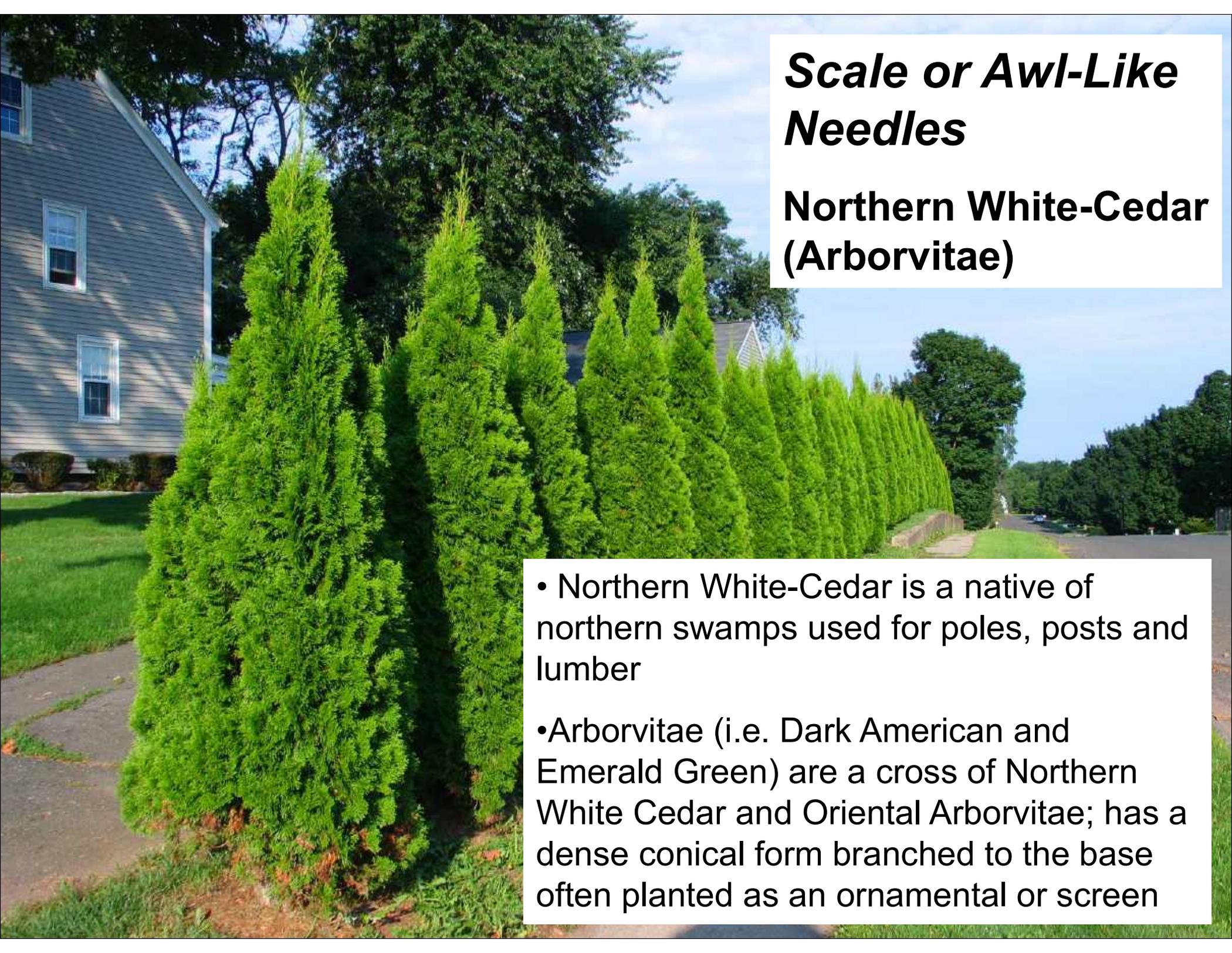
## **Bald Cypress**

- Soft, feathery needles (like Dawn Redwood) but twigs are alternate.
- Native to Southeastern U.S. wetlands but adaptable to both wet and dry sites.

## Bald Cypress

- Deciduous conifer with sage green needles changing to orange brown in autumn.
- Red-brown fibrous bark and buttress trunk (similar to Dawn Redwood)



A photograph showing a long, dense row of Northern White-Cedar trees planted in a residential area. The trees are tall, conical, and have a vibrant green color. In the background, there is a white house with several windows and a paved road. The sky is blue with some light clouds.

## ***Scale or Awl-Like Needles***

## **Northern White-Cedar (Arborvitae)**

- Northern White-Cedar is a native of northern swamps used for poles, posts and lumber
- Arborvitae (i.e. Dark American and Emerald Green) are a cross of Northern White Cedar and Oriental Arborvitae; has a dense conical form branched to the base often planted as an ornamental or screen

## Northern White Cedar

- Flattened sprays of needles
- Zipper or scale-like foliage (similar to overlapping scales on a fish)
- Tea made of leaves and bark high in Vitamin C said to have saved Jacque Cartier from scurvy in 1535.



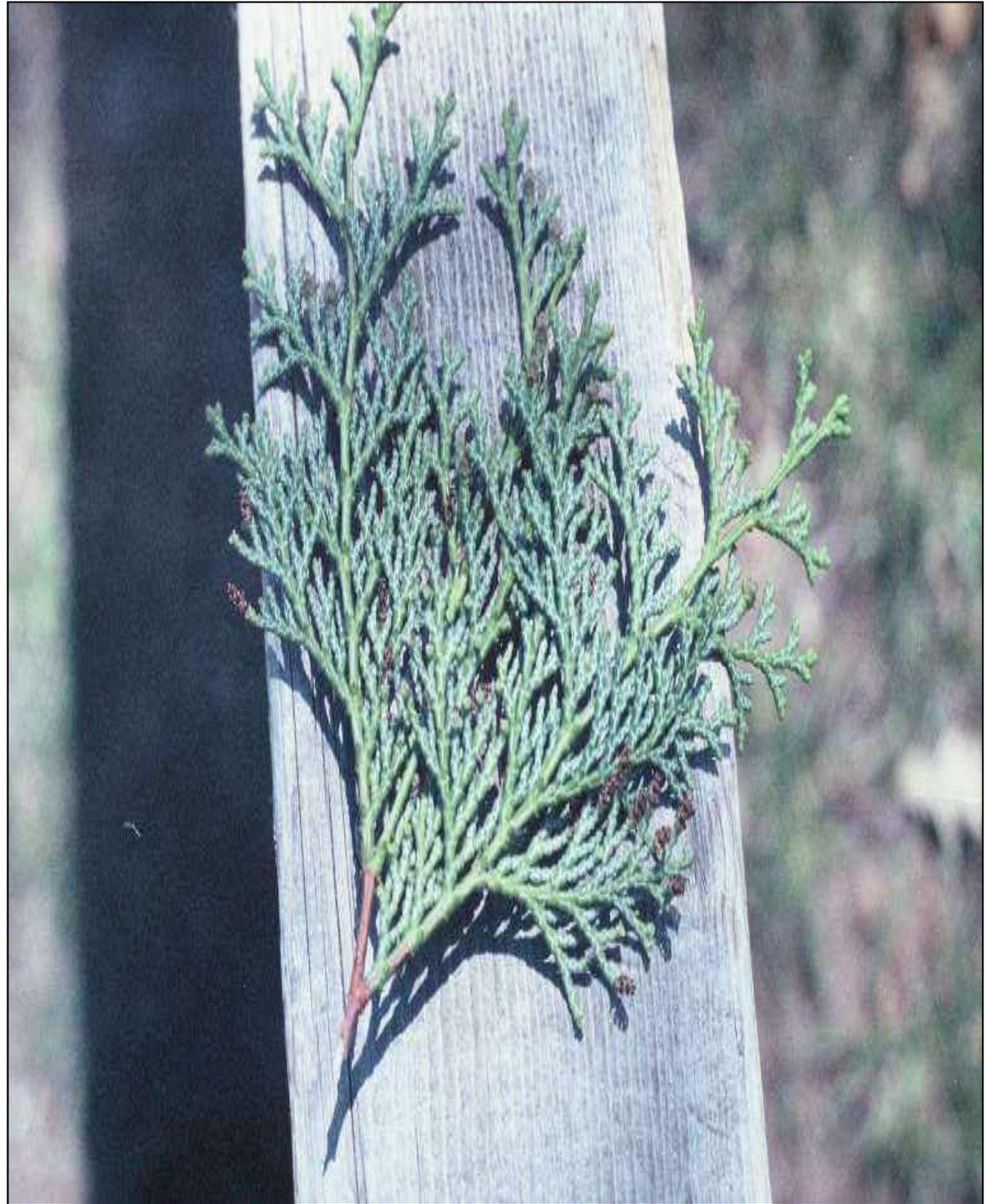
## Northern White-Cedar

Slender  $\frac{1}{2}$ " bell-shaped cones,  
turning brown when mature



# Atlantic White-Cedar (*Chamaecyparis*)

- Similar to Northern White Cedar but bottom of leaves have white stoma
- Leaves tend to be narrower and less flattened than Northern White Cedar
- Small ¼" cones turn blue when mature
- Aromatic citrus fragrance of crushed foliage



# Atlantic White-Cedar (right)

- Found near coastal swamps from Maine to Florida
- Decay resistant wood used for shingles and lumber
- Many varieties of this tree and its relatives are planted ornamentally i.e. Hinoki, Alaskan weeping, threadleaf, Sawara



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## Eastern Red Cedar

Both scale-like and awl-like needles with  $\frac{1}{4}$  " blue berries used to flavor gin and sauerkraut



Conical head becoming wider with age, often without branches near the base



## Eastern Red Cedar

- Brown, dry bark shredding in vertical strips
- Most widely distributed conifer in the Eastern 37 states of U.S.
- Found in old fields, dry sites and along Connecticut Highways
- Red, decay resistant, fragrant heartwood used for furniture, fence posts, closets and chests



# ***Fan-shaped leaves***

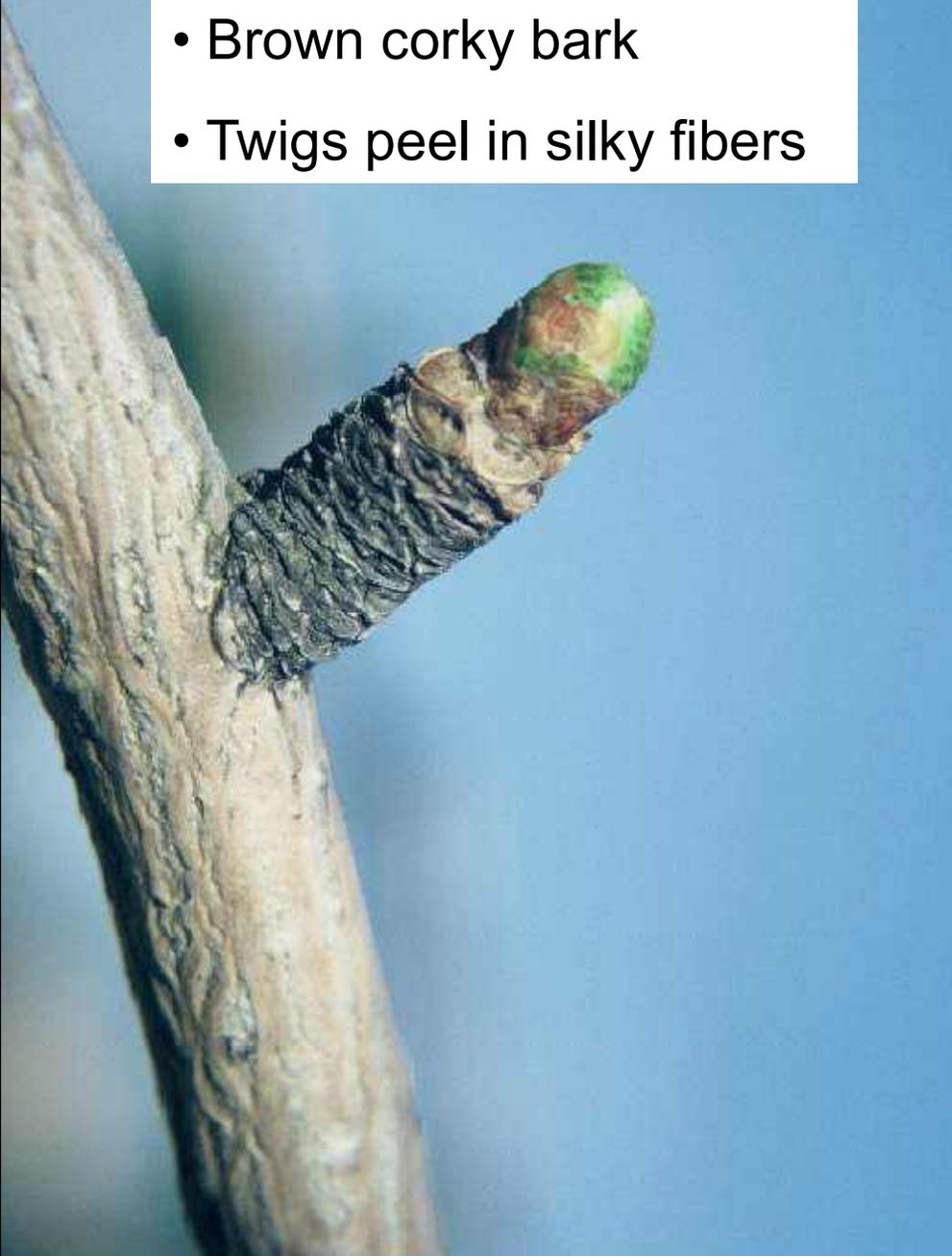
## **Ginkgo**

- Tree of Chinese descent. The most ancient broad-leaved species
- Tree may live over 1,000 years
- Veins form “Y” shaped pattern in leaf
- Females produce a smelly seed with a fruitlike exterior though the interior “nut” is edible



# Ginkgo

- Buds on woody spurs
- Brown corky bark
- Twigs peel in silky fibers



- Upright crown with spreading branches
- Tolerant of urban conditions, beautiful golden fall foliage. Institute of Living

# Broad-leaved Trees

Peterson organizes broad-leaved trees into four groups:

- **Opposite Compound Leaves** – Horsechestnut, Ash, Boxelder and Paperbark Maple
- **Opposite Simple Leaves** – Catalpa, Maples and Dogwood
- **Alternate Compound Leaves** – Locust, Walnut, Ailanthus, Hickories and Silktree
- **Alternate Simple Leaves** – Part II

# *Opposite Compound Leaves*

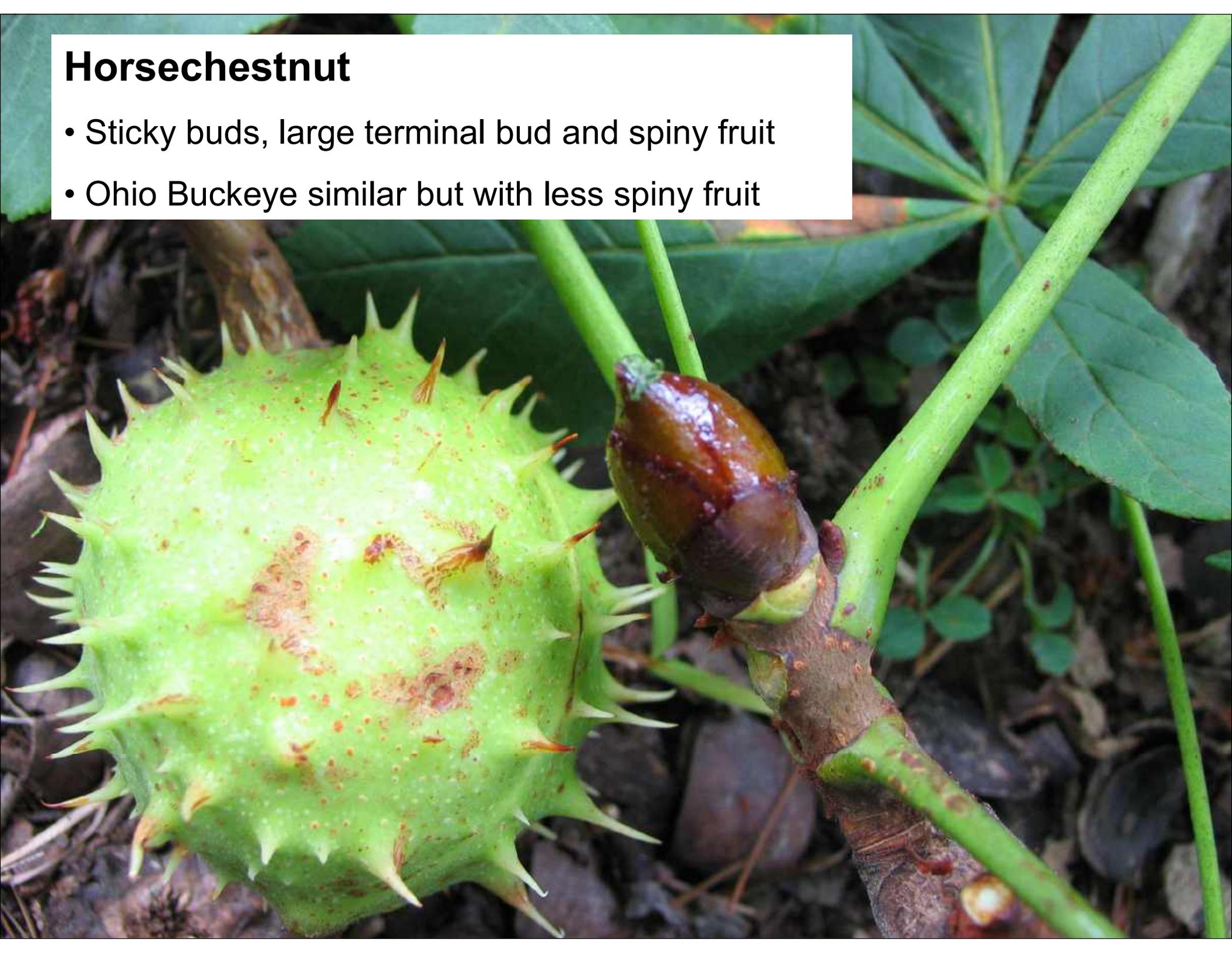
## **Horsechestnut**

- Large “U” shaped leaf scars
- Bundle traces along edge of leaf scar
- White and pink flowers



# Horsechestnut

- Sticky buds, large terminal bud and spiny fruit
- Ohio Buckeye similar but with less spiny fruit





## **Horsechestnut**

Palmately compound leaf - leaflets arranged like the spokes of a wheel

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**Green Ash** Top of leaf scar is straight

**White Ash** Top of leaf scar is U shaped on white ash



**Ash**  
Crescent shaped leaf scar and bundle traces form a line

UGA12



## Single winged samaras

- White ash (shown below) and green ash are winged  $\frac{1}{2}$  way up seed
- Black ash is winged along the entire seed



## White Ash

- Compound leaf with 5 – 9 stalked leaflets
- Green ash also has stalked leaflets, black ash does not

# White Ash

- Round to oval shaped crown
- Diamond shaped bark with interwoven pattern of shallow ridges and furrows, soft and corky texture
- Emerald Ash Borer in CT
- Wood splits easily. “Splints” woven into baskets and chair bottoms



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## **Box Elder (Ash-leaved maple)**

- Purplish-white twigs with bloom that rubs off
- Opposite compound leaf with 3 to 5 leaflets
- Crescent-shaped leaf scars with 3 bundle scars

# Paperbark Maple

- Slow growing ornamental maple maturing to 25-35 feet in height.
- Native to China, with distinctive cinnamon-brown peeling bark
- Trifoliate (3-leaflets) compound leaves which turn red in fall.

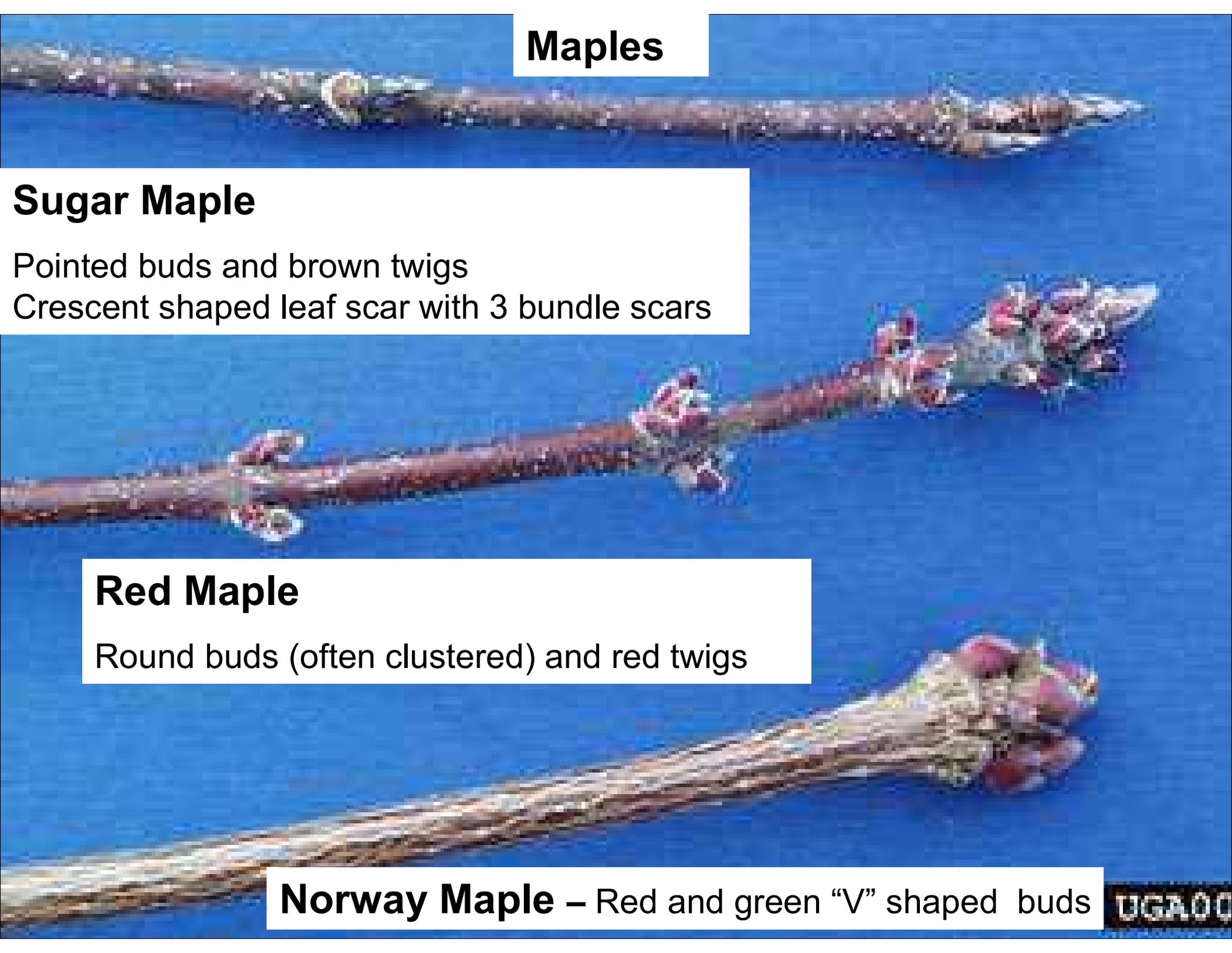




## ***Opposite Simple Leaves - Catalpa***

- Large heart shaped leaves and cigar shaped seed pods
- Round leaf scar and bundle scars

- Buds may be opposite or whorled
- Clusters of white flowers with yellow and purple spots at end of twigs

The image displays three maple twigs against a solid blue background. The top twig is a Sugar Maple, showing pointed buds and brown twigs with crescent-shaped leaf scars. The middle twig is a Red Maple, featuring round buds and reddish twigs. The bottom twig is a Norway Maple, characterized by red and green "V" shaped buds. Each twig is positioned horizontally and slightly angled.

# Maples

## Sugar Maple

Pointed buds and brown twigs  
Crescent shaped leaf scar with 3 bundle scars

## Red Maple

Round buds (often clustered) and red twigs

**Norway Maple** – Red and green “V” shaped buds

# Maple Bark



## Red Maple

Young - smooth, gray  
Mature – Broken, dark  
Circular “bullseye”



## Silver Maple

Young - smooth, gray  
Mature – Vertical strips  
like shagbark hickory



**Norway Maple** Gray/brown with shallow grooves, ash-like in appearance



**Sugar Maple** Gray/brown with vertical grooves and loose edge plates

# Maple Samaras



**Sugar Maple – “U” shaped**



**Red Maple – “V” shaped**

**Silver Maple - “V” Shaped**

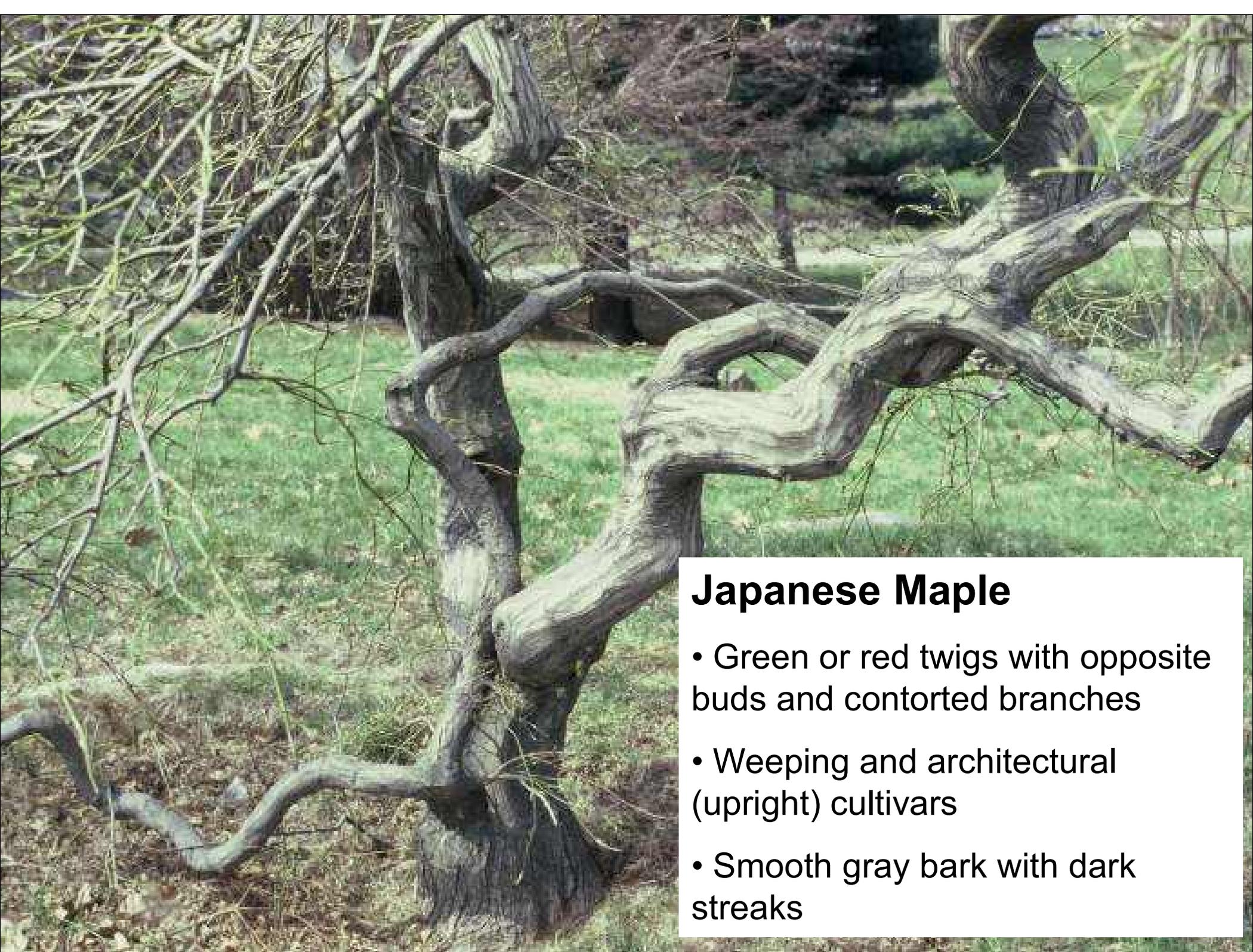


**Norway Maple - Straight**



## **Crimson King Maple**

- Relatively fast growing Norway maple, tolerant of urban conditions and often planted as an ornamental.
- Weak branch crotches make Norways susceptible to storm damage
- “Plant the Right Tree in the Right Place”



## **Japanese Maple**

- Green or red twigs with opposite buds and contorted branches
- Weeping and architectural (upright) cultivars
- Smooth gray bark with dark streaks

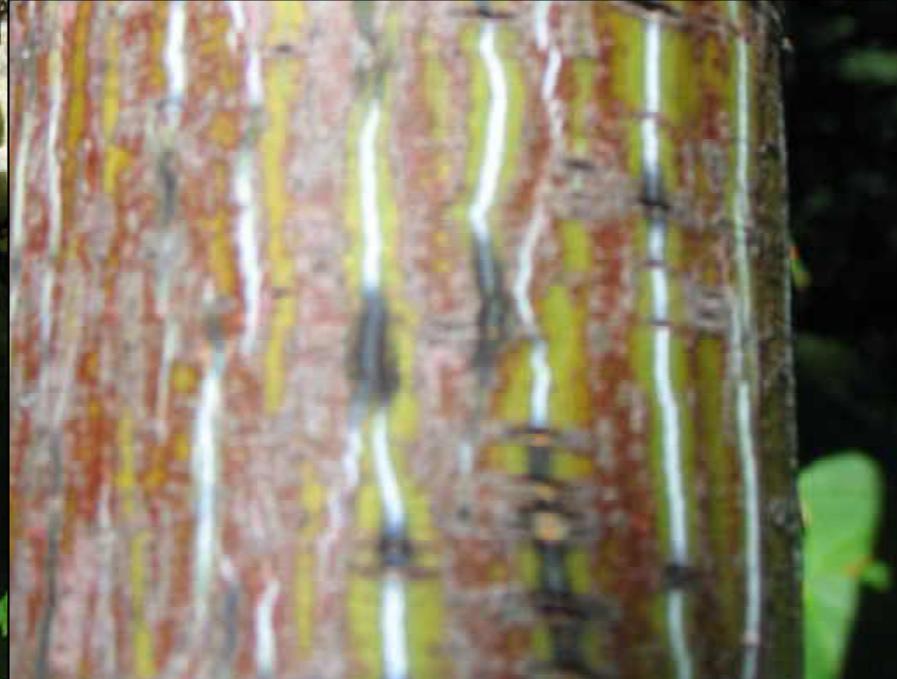


## Japanese Maple

- Threadleaf (left) - lacey, threadlike leaves
- Palmatum (right) – cannabis like leaves
- Green, red, purple or orange leaves; some with fiery orange-red fall color

# Striped Maple

Three lobed leaf in the shape of a goose's footprint



- Stalked, valvate buds
- Green/red bark with white stripes

# Maple Leaves

**Norway Maple:** 5-7 lobes, shallow "U" sinuses, milky sap at base of petiole, sunken leaf veins and longer petiole than sugar

**Sugar Maple:** 5-7 lobes, shallow "U" sinuses, center lobe often longer



**Red Maple:** 3 large lobes with "V" sinuses

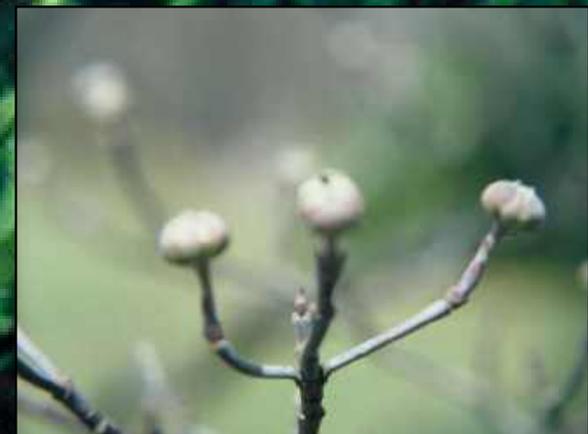
**Japanese Maple:** 5-9 narrow pointed lobes, deep "V" sinuses

**Silver Maple:** Deep "U" sinuses, back of leaf white



## Flowering Dogwood

- Showy white or pink flowers with 4 bracts
- Blooms prior to leafout, onion shaped flower buds





## Pink Flowering Dogwood

- Pink flowering scion grafted onto White Flowering Dogwood rootstock
- Dogwoods prefer understory of surrounding trees
- Blocky checkerboard shaped bark pattern

## Flowering Dogwood

Clusters of ½" egg-shaped fruit turning red when mature





## Kousa Dogwood

- Showy 4 bract flower, blooms after leafout
- Flower bud shaped like dome of Russian Orthodox church
- Unique “crunchberry” like fruit, pointed opposite buds, exfoliating bark
- ‘Constellation’ and ‘Century’ - cross of Kousa and Native Flowering dogwood

# Broad-leaved Trees

- Alternate  
Compound Leaves
- Locust
- Walnut
- Ailanthus
- Sumac
- Silktree
- Hickories



## ***Alternate Compound Leaves***

### **Honey Locust**

- Trunk and branches with many stout thorns, several inches long
- Bark dark and somewhat scaly

## Thornless Honeylocust

i.e. 'Shademaster' and 'Sunburst'  
are thornless and fruitless

- Pinnate or bipinnately compound leaves



- Minute buds
- Zig-zaged shaped twigs

## Black Locust

- Small pairs of thorns
- Deeply ridged bark with cross-hatching
- Dense, durable and decay resistant wood (good for fence posts) though brittle
- Locust pegs used to secure timbers of covered bridges



## Black Locust

- Clusters of white flowers
- Pinnately compound leaves



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Black Locust (left) short bean pods  
(2" - 6")

Honey Locust (right) long bean  
pods (6" - 16")



## Butternut

- Yellow/brown twig
- Elongated terminal bud
- Leaf scars look like a monkey's face with "U" shaped bundle traces
- Superposed bud above lateral bud
- Velvet eyebrow above leaf scar
- Canker causing widespread mortality



## Black Walnut

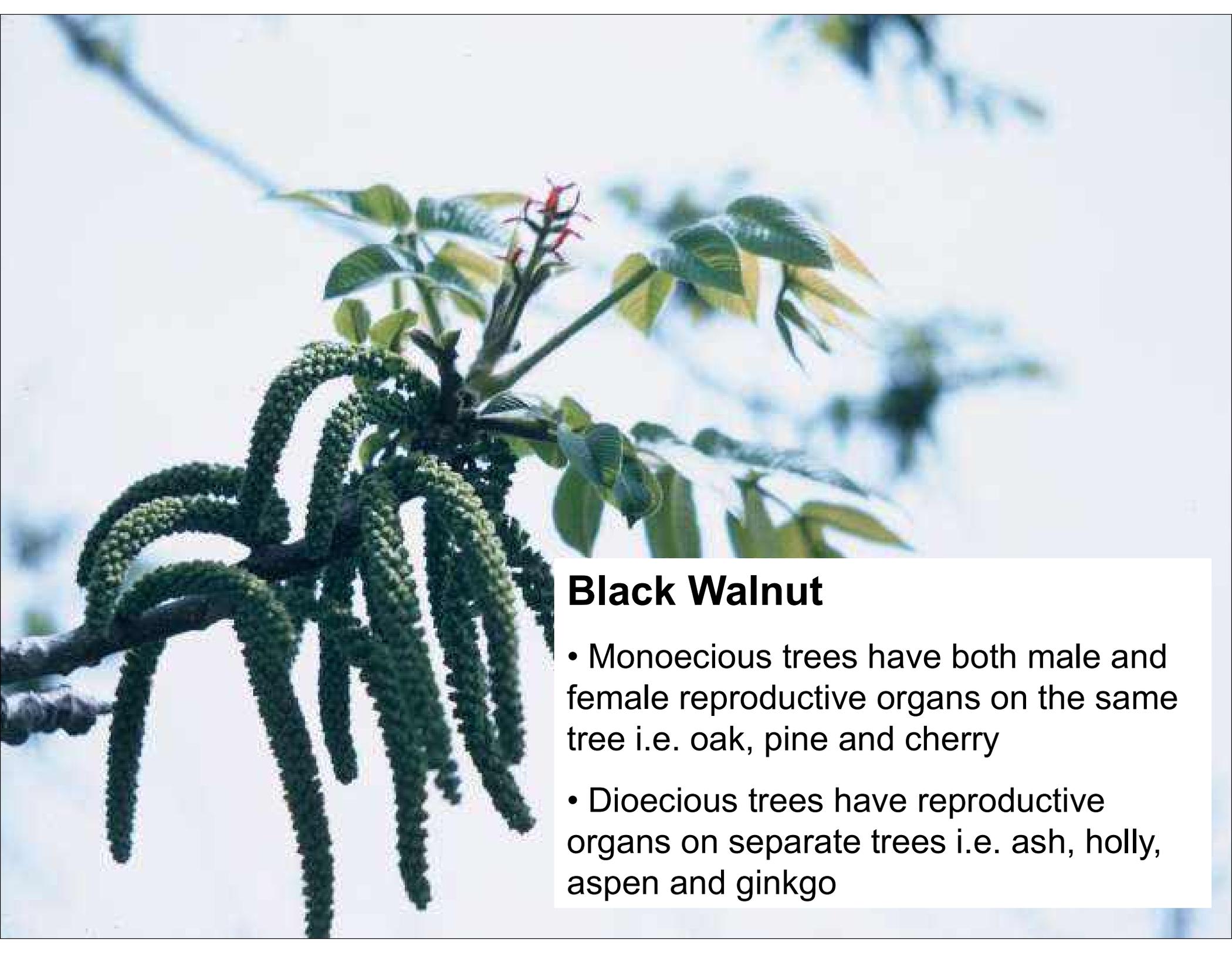
- Dull gray twig
- Blunt terminal bud
- Leaf scars look like a monkey's face with "U" shaped bundle traces
- Superposed bud above lateral bud
- Fruit, husks, roots and leaves of black walnut and butternut contain juglans – toxic to seedlings

## **Black Walnut (shown here) and Butternut**

### **Chambered pith:**

Tan colored in black walnut,  
chocolate brown in butternut





## **Black Walnut**

- Monoecious trees have both male and female reproductive organs on the same tree i.e. oak, pine and cherry
- Dioecious trees have reproductive organs on separate trees i.e. ash, holly, aspen and ginkgo



**Black Walnut** (left)

Compound leaf slightly hairy, end leaflet often lacking, rachis is smooth

Round 2" delicious nuts

**Butternut** (right)

Compound and downy leaves, sticky and hairy rachis

Oblong nuts



## **Black Walnut**

- Dark, deeply grooved bark
- One of the most valuable and beautifully grained woods



## **Butternut**

Wide bark ridges are smooth topped making a shiny interlaced network



## **Ailanthus**

- Weak wooded weed tree often confused with sumac
- Invasive and will grow in extremely adverse conditions.
- Clusters of small yellow and red blossoms with foul odor
- Fast growing (8' – 12' per year from stump sprouts)



## Ailanthus

- Thick twig with brown spongy pith
- Brown woolly buds
- Large leaf scar with many bundle scars
- False end bud (end bud is shed and a lateral bud acts as the end bud)



Occasionally growing into large mature street trees



**Ailanthus**



- Smooth gray bark, light grooves
- Compound leaf with gland on underside of leaflet teeth
- Clusters of winged, single-seeded fruit



# Staghorn Sumac

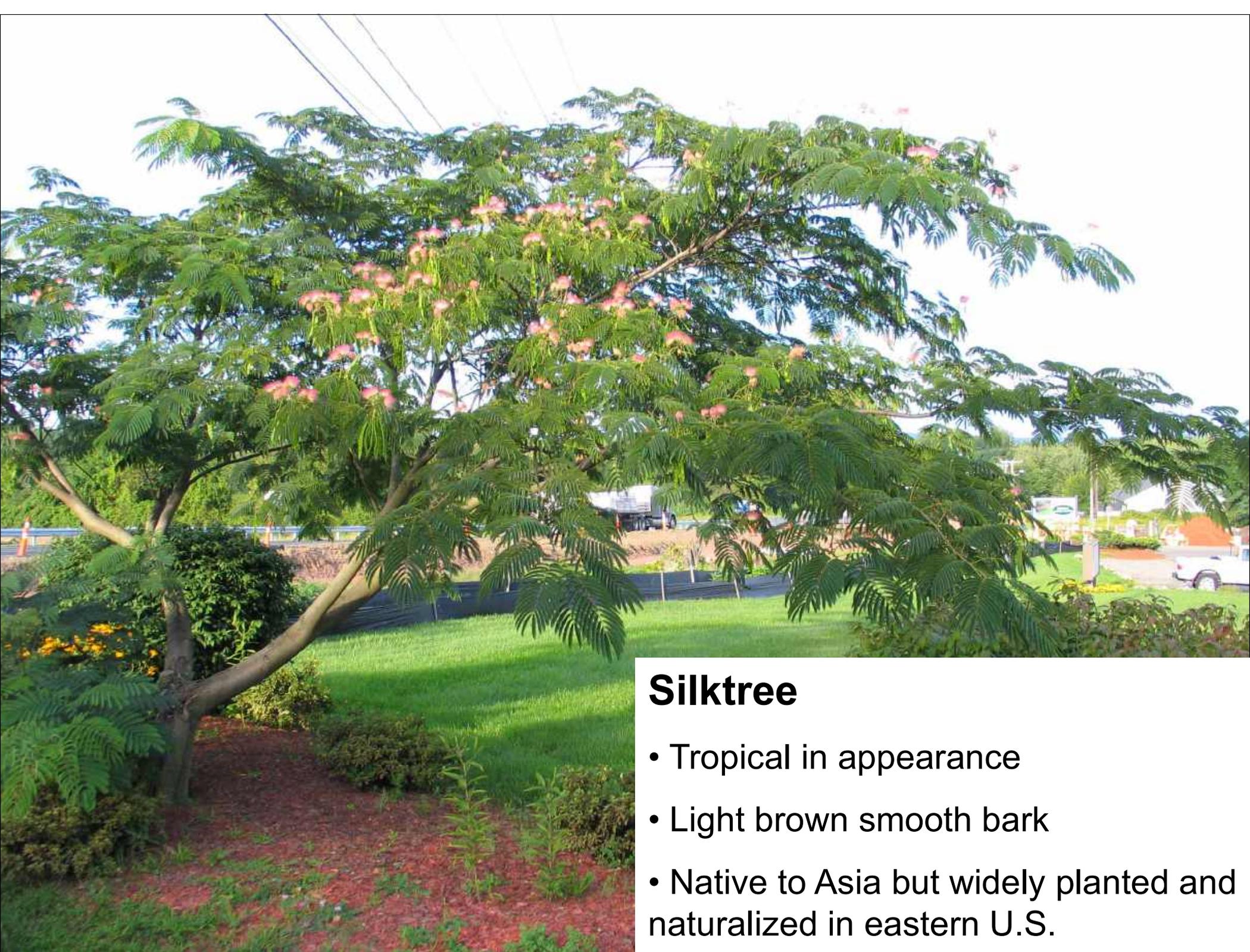
- Thick woolly twig with brown spongy pith
- Clusters of red berries
- Smooth sumac has hairless twigs
- Dwarf sumac has wings along the rachis





## **Silktree (Mimosa)**

- Feather-like bipinnately compound leaves
- Powderbrush-like pink flowers
- Long slender beanlike pods



## **Silktree**

- Tropical in appearance
- Light brown smooth bark
- Native to Asia but widely planted and naturalized in eastern U.S.



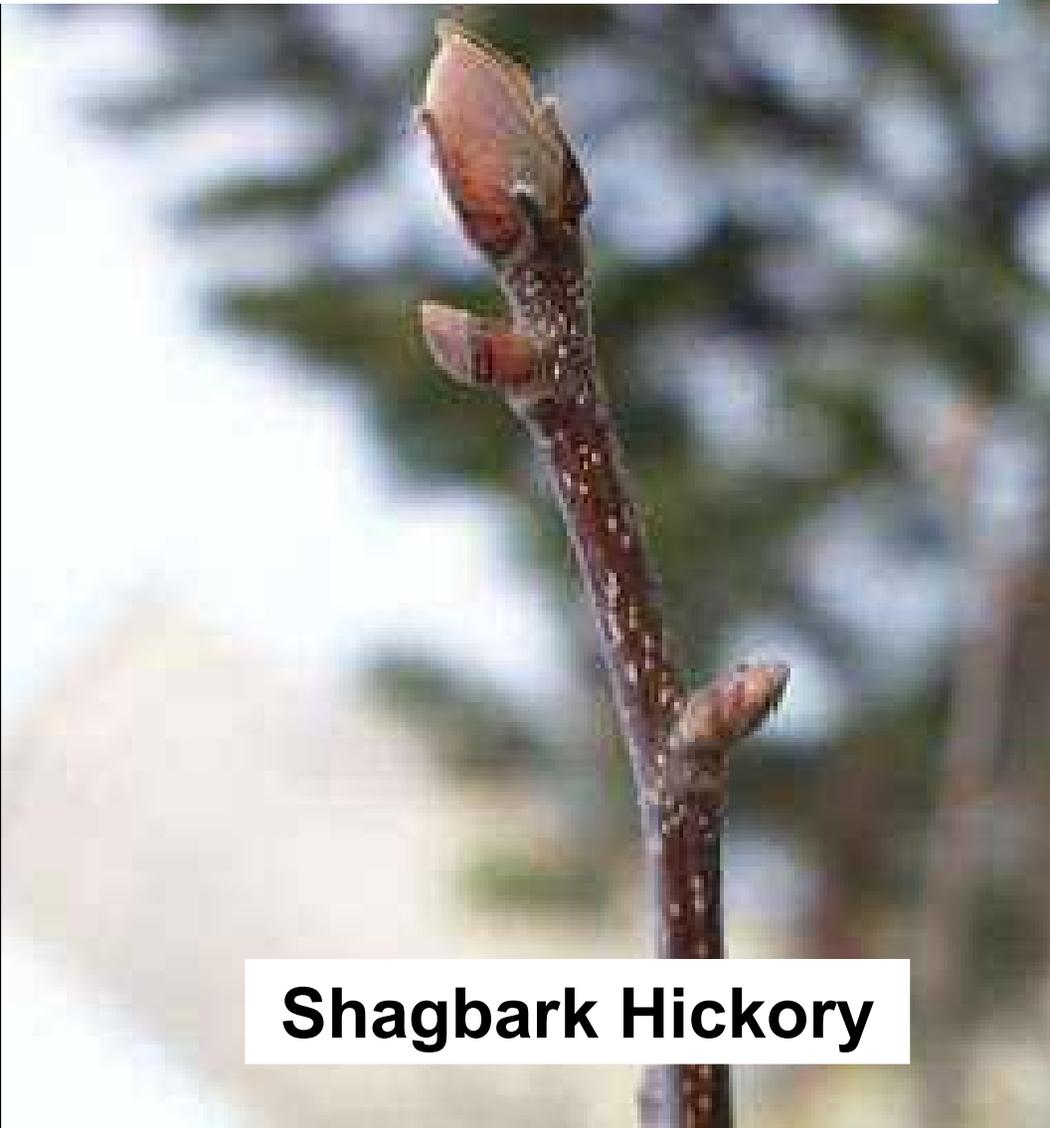
## **Shagbark Hickory**

- Very shaggy bark with long thin strips
- Oblong crown
- Hickories have very strong, heavy and elastic wood used for tool handles

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- Large end bud (>1/2") with loose overlapping scales
- May be slightly hairy
- Red-brown twig with light colored lenticels

- Large end buds, outer scales drop in fall
- Woolly buds, twigs and foliage
- Red-brown twig with light colored lenticels



**Shagbark Hickory**

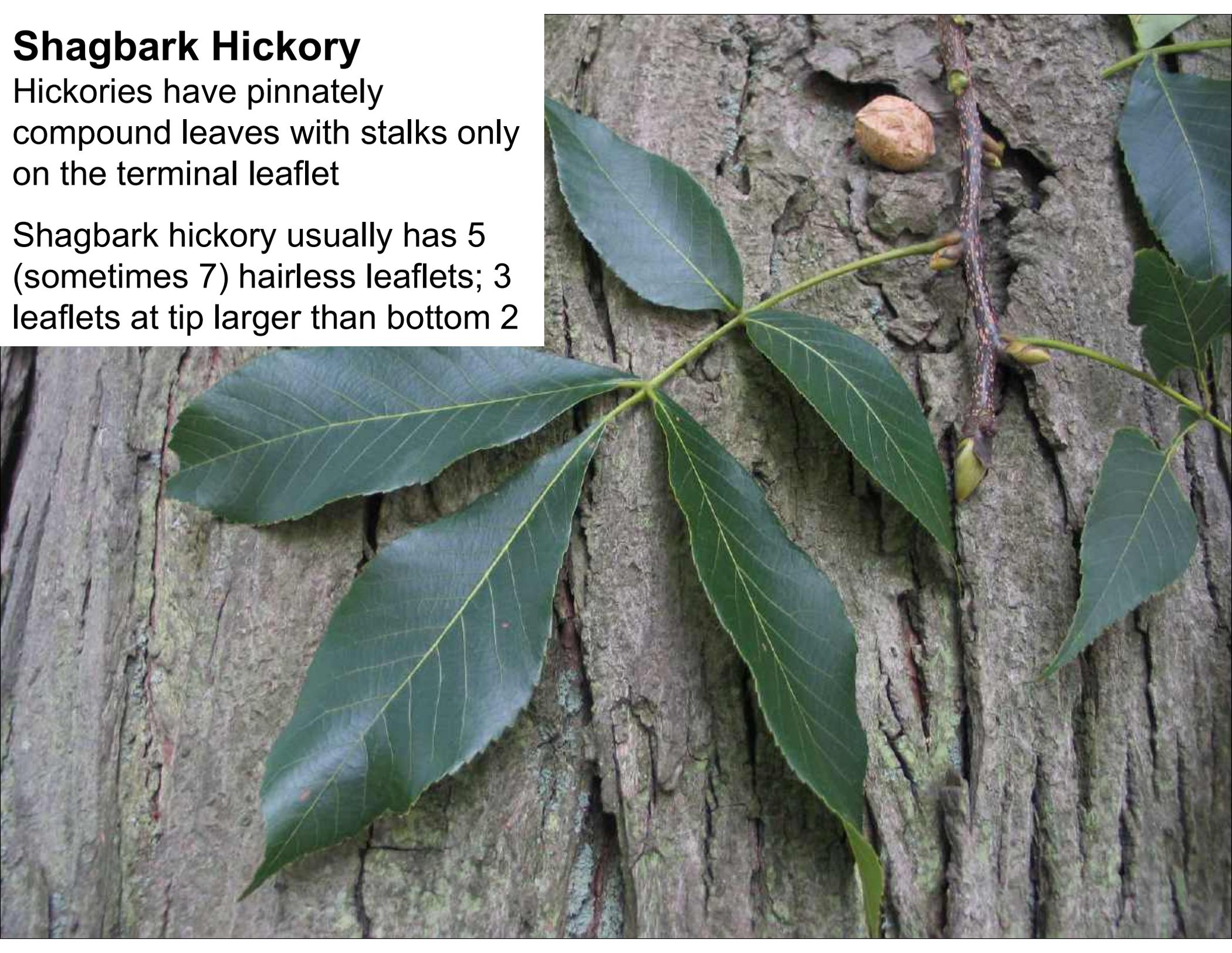


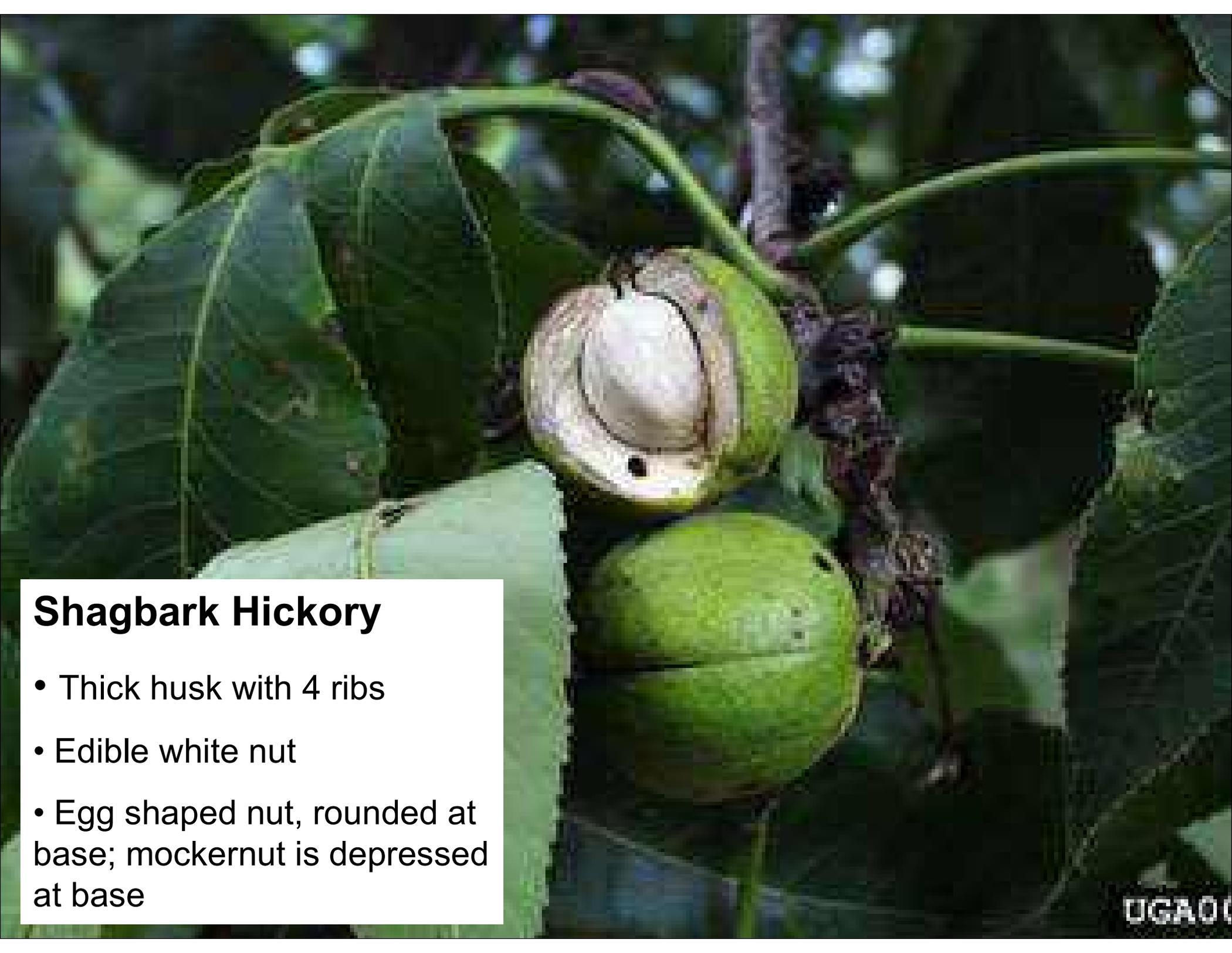
**Mockernut Hickory**

# Shagbark Hickory

Hickories have pinnately compound leaves with stalks only on the terminal leaflet

Shagbark hickory usually has 5 (sometimes 7) hairless leaflets; 3 leaflets at tip larger than bottom 2





## Shagbark Hickory

- Thick husk with 4 ribs
- Edible white nut
- Egg shaped nut, rounded at base; mockernut is depressed at base



## **Mockernut Hickory**

- Usually 7 (sometimes 9), leaflets per leaf
- Pubescent rachis and underside of leaf
- Mature bark mostly tight netted with smooth ridges and shallow furrows



- 5 to 7 hairless leaflets per leaf
- Tight and smooth ridged bark



## Pignut Hickory

- Small (less than ½") egg shaped buds
- Outer bud scales drop in autumn
- Smooth red-brown twigs



## **Pignut Hickory**

- Brown nut
- Thin husk nut, not winged
- Husk splits into 4, usually not to the base



## **Mockernut Hickory**

Thick husk

4 angled tan/brown nut  
depressed at base

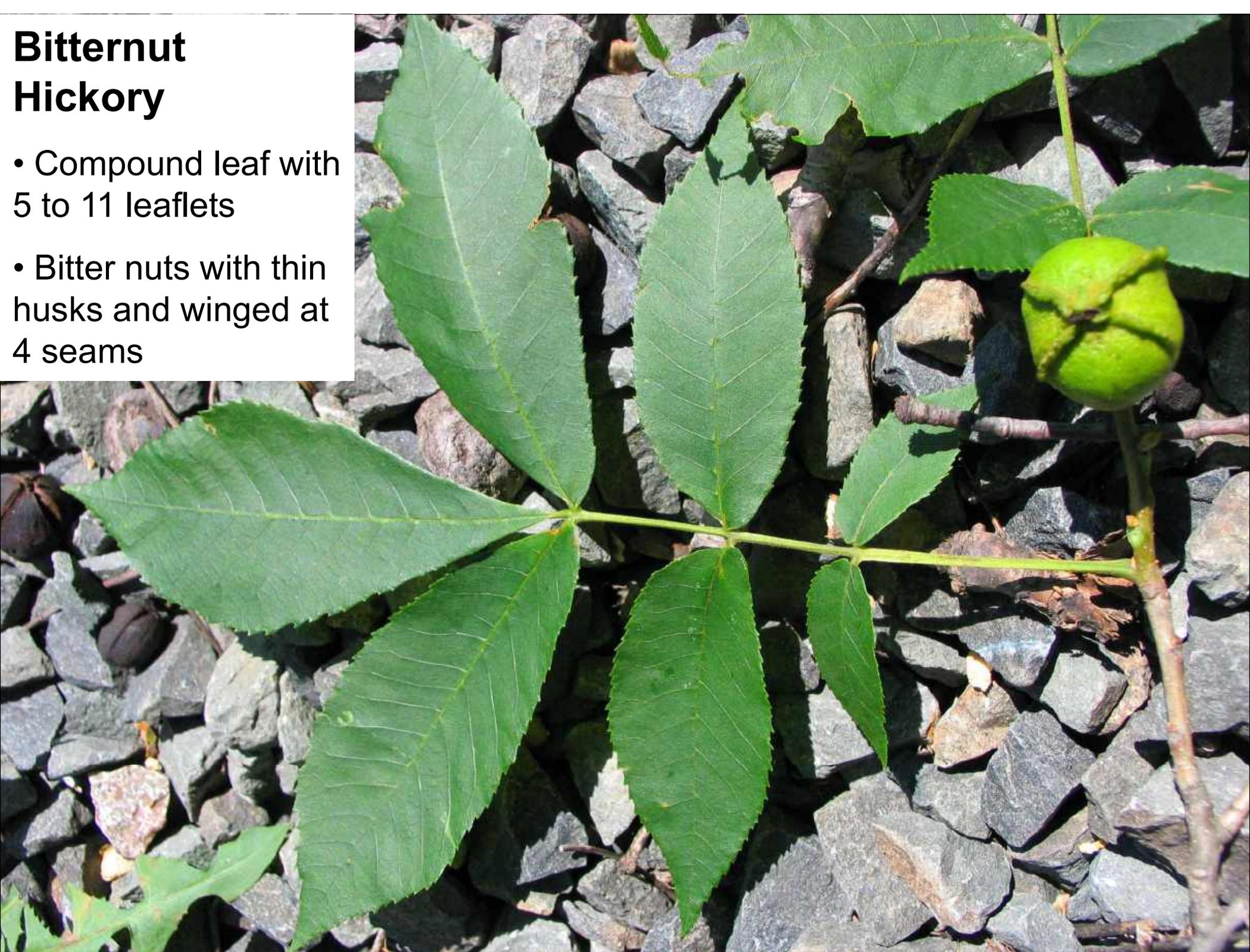
## Bitternut Hickory

- Bright mustard yellow paired buds (valvate)
- Twigs mostly hairless



# Bitternut Hickory

- Compound leaf with 5 to 11 leaflets
- Bitter nuts with thin husks and winged at 4 seams



# William H. Harlow, Fruit Key and Twig Key to Trees and Shrubs

## Dichotomous key - "continually forks in two"

WOODY PLANTS OF EASTERN NORTH AMERICA

43

### Key to the Common Hickories

1. Bud scales paired, valvate; buds often appearing naked ----- 2
1. Bud scales imbricate, usually more than 2 visible ----- 3
  
2. Buds bright yellow. Bitternut Hickory *Carya cordiformis* (Wangenh.) K. Koch. 1
2. Buds brownish. Pecan Hickory *Carya illinoensis* (Wang.) K. Koch. 2
  
3. Terminal buds short and stout; somewhat globose, usually glabrous. Pignut Hickory *Carya glabra* (Mill.) Sweet; and Red Hickory *Carya ovalis* (Wang.) Sarg. 3  
The 1953 "Checklist" considers *C. ovalis* a synonym for *C. glabra*.
3. Terminal buds larger, more ellipsoidal, more or less hairy ----- 4
  
4. Outer scales soon deciduous, showing the lighter colored ones beneath; twigs often hairy, and quite fragrant when bruised. Mockernut Hickory *Carya tomentosa* Nutt. 4
4. Outer scales persistent, twigs less hairy, or glabrous ----- 5
  
5. Twigs orange-brown, or buff colored, lenticels orange colored. Shellbark Hickory *Carya laciniosa* (Michx. f.) Loud.
5. Twigs dark reddish brown. Shagbark Hickory *Carya ovata* (Mill.) K. Koch. 5



