



The Wind Pollinated Trees

- Alternate leaved tree families
- Wind pollinated with **ament/catkin** inflorescences
- Nut fruits = 1 seeded, unilocular, indehiscent
(example - acorn)



*Juglandaceae - walnut family



Well known family containing walnuts, hickories, and pecans

Only 7 genera and ca. 50 species worldwide, with only 2 genera and 4 species in Wisconsin



Juglans cinerea
Butternut, white walnut

Carya ovata
shagbark hickory

*Juglandaceae - walnut family



Leaves pinnately compound, alternate
(walnuts have smallest leaflets at tip)

Leaves often aromatic from resinous peltate glands; allelopathic to other plants



Juglans cinerea
Butternut, white walnut

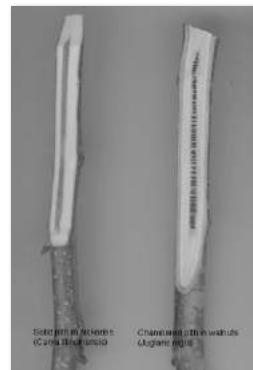
Carya ovata
shagbark hickory

*Juglandaceae - walnut family



Juglans regia
English walnut

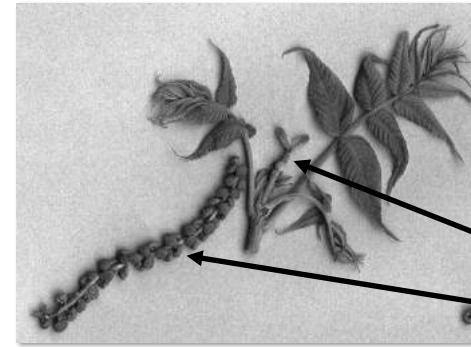
The chambered pith in center of young stems in *Juglans* (walnuts) separates it from un-chambered pith in *Carya* (hickories)



Solid pith in hickories
(*Carya illinoinensis*)

Chambered pith in walnuts
(*Juglans regia*)

*Juglandaceae - walnut family



Juglans nigra
Black walnut

Trees are monoecious

Wind pollinated

Female flower

Male inflorescence

*Juglandaceae - walnut family



Juglans cinerea
Butternut, white walnut

Male flowers apetalous and arranged in pendulous (drooping) catkins or aments on last year's woody growth

Calyx small; each flower with a bract

CA 3-6 CO 0 A 3-∞ G 0

*Juglandaceae - walnut family

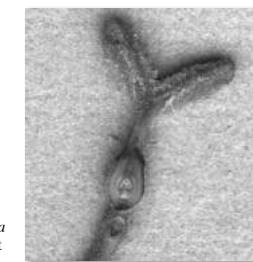


Juglans cinerea
Butternut, white walnut

Female flowers apetalous and terminal

Calyx cup-shaped and persistant; 2 stigma feathery; bracted

CA (4) CO 0 A 0 G (2-3)



Juglans nigra
Black walnut

*Juglandaceae - walnut family

Fruit a nut

Single ovule fused to ovary wall
Surrounded often by persistent 4-parted calyx which can become fleshy;
thus sometimes mistakenly called a "drupe"



Carya cordiformis
Bitternut hickory



Juglans cinerea
Butternut, white walnut

*Juglandaceae - walnut family

Fruit a nut

Single ovule fused to ovary wall
Surrounded often by persistent 4-parted calyx which can become fleshy;
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*Juglandaceae - walnut family



One of the most prized of all lumber trees for fine furniture is black walnut - primarily southern Wisconsin tree



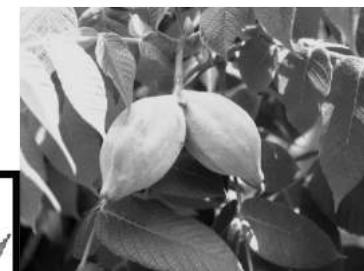
Juglans nigra - black walnut



*Juglandaceae - walnut family



Previously wide-spread, the butternut is now "special concern" species with up to 60% of the trees in Wisconsin now infected with the butternut canker fungus (*Sirococcus clavigignenti-juglandacearum*)



Juglans cinerea - white walnut, butternut



*Juglandaceae - walnut family



One of the more common trees of more mesic to xeric forests over much of Wisconsin - oak/hickory forests - is the shagbark hickory with its characteristic peeling bark and usually 5 leaflets



Carya ovata - shagbark hickory

401 final exam trick "flower"



*Juglandaceae - walnut family

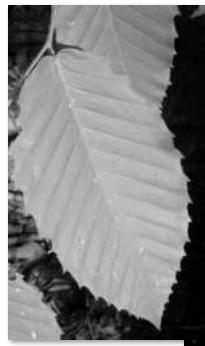


Carya cordiformis
Bitternut hickory

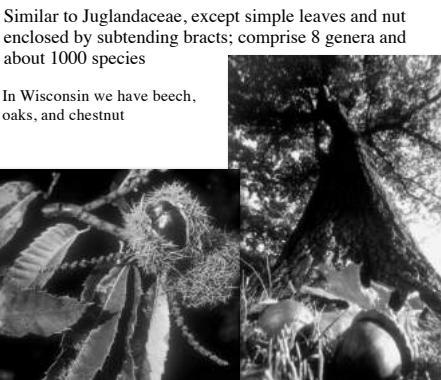
Usually 7 leaflets



**Fagaceae - beech family



Fagus - beech



Castanea - chestnut

Similar to Juglandaceae, except simple leaves and nut enclosed by subtending bracts; comprise 8 genera and about 1000 species

In Wisconsin we have beech, oaks, and chestnut

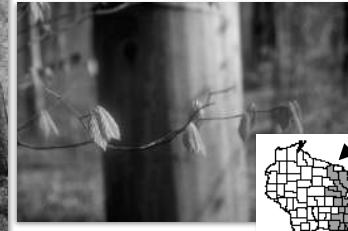
Quercus - oak

**Fagaceae - beech family



American beech is characteristic of mesic forests in eastern Wisconsin - beech/maple forest

Beech apparently colonized Wisconsin from both the southeast and northeast via Upper Peninsula



Fagus grandifolia - American beech

**Fagaceae - beech family

Branches are flattened, leaves with toothed edges

2 pistillate flowers (2 nuts)
surrounded by one set of bracts



Fagus grandifolia - American beech



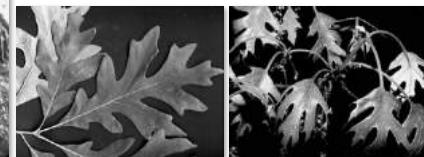
**Fagaceae - beech family

Quercus, the oaks, have bracts below female flower that coalesce into a woody cup of the acorn fruit (nut)

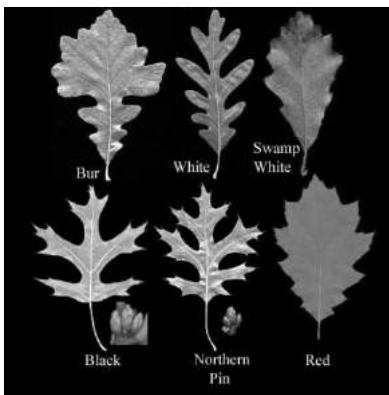
Quercus usually separated into two groups:

White oaks - rounded leaf lobes, thinner walled xylem of summer wood, fruit matures in 1 yr

Red oaks - bristle tipped leaf lobes, thicker xylem, fruit matures in 2 yrs



**Fagaceae - beech family



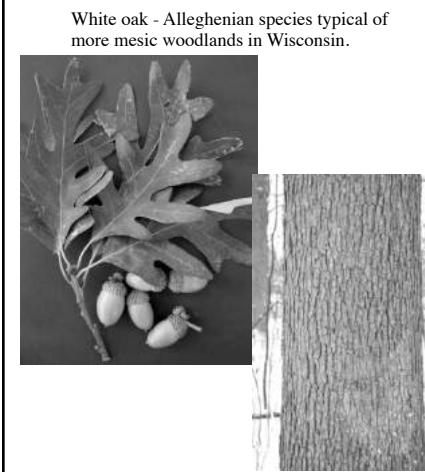
White oaks - rounded leaf lobes, thinner walled xylem of summer wood, fruit matures in 1 yr

Red oaks - bristle tipped leaf lobes, thicker xylem, fruit matures in 2 yrs

Extensive (!) hybridization within each of the two groups — species boundaries not at all clear

**Fagaceae - beech family

White oak - Alleghenian species typical of more mesic woodlands in Wisconsin.



Quercus alba - white oak

**Fagaceae - beech family

Bur oak: Ozarkian element species of xeric oak woodlands and oak savannas



Quercus macrocarpa
bur oak

**Fagaceae - beech family

Other white oaks:



Quercus muehlenbergii
Chinquapin oak



Quercus bicolor - swamp white oak



**Fagaceae - beech family

Red oaks:



Quercus rubra
Red oak

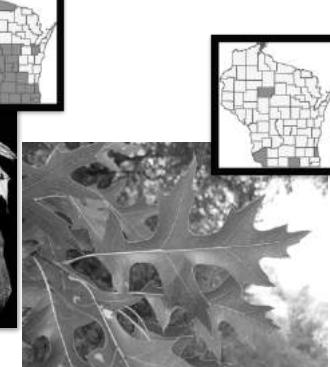


**Fagaceae - beech family

Red oaks:

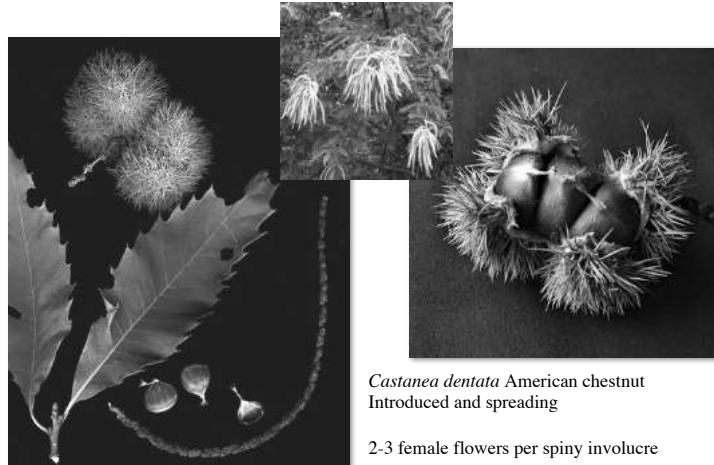


Quercus velutina
Black oak

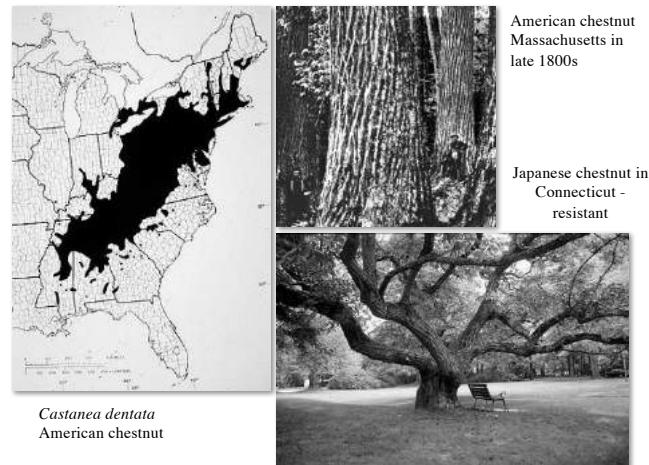


Quercus palustris
Pin oak
special concern

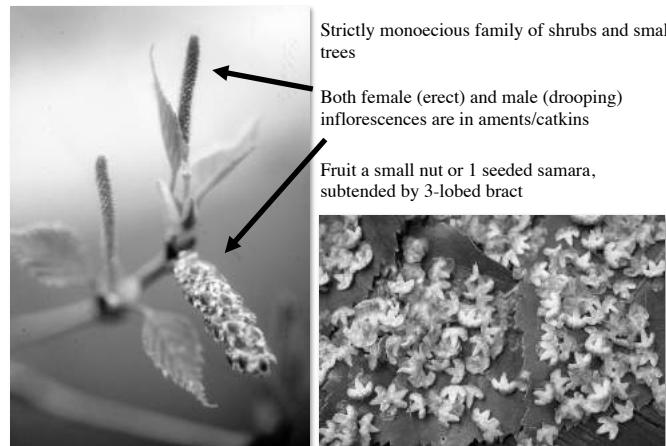
**Fagaceae - beech family



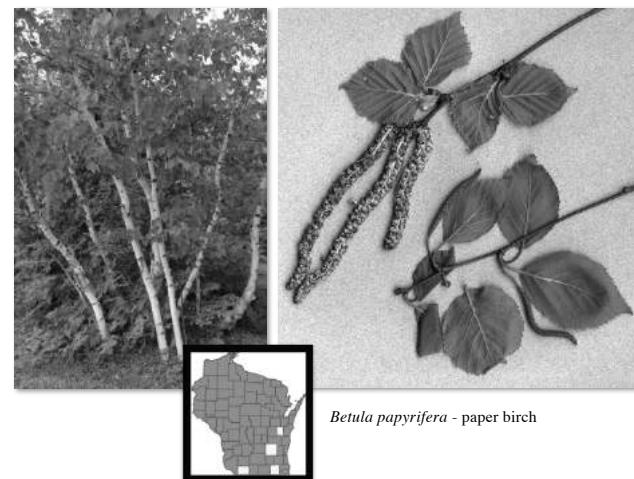
**Fagaceae - beech family



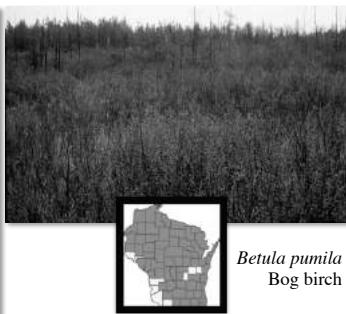
**Betulaceae - birch family



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**Betulaceae - birch family



Betula allegheniensis
Yellow birch
Characteristic of northern hardwood forest;
requires rich humus of tree falls to
germinate; once prized veneer tree

Betula pumila
Bog birch



**Betulaceae - birch family



Betula nigra - river birch

River birch is a classic floodplain tree
species south of the tension zone growing
with silver maple



**Betulaceae - birch family



Alnus, the alders form extensive thickets in
wet areas or along rivers and lakes; seeds
form in woody "cone" inflorescences

**Betulaceae - birch family



Ostrya virginiana - eastern hop hornbeam, ironwood
Note the hops-like inflorescence



2 trees of mesic woods:



Humulus – hops
Cannabinaceae



**Betulaceae - birch family



2 trees of mesic woods:

and

Carpinus caroliniana
Hornbeam, blue beech,
muscle tree

Note the sinewy trunk

**Betulaceae - birch family



Corylus cornuta
Beaked hazelnut, filbert

Corylus americana
Hazelnut, filbert

Hazelnuts or filberts are small shrubs with
highly prized fruits low in saturated fats

Myricaceae - bayberry family



Myrica gale - sweet gale

Dioecious shrubs or subshrubs with sweet
aromatic smell

Fix atmospheric nitrogen via
actinomycetes (*Frankia*) in roots (found
in bogs, sandy soil)



Comptonia peregrina - sweet fern

*Lythraceae - loosestrife family



Lythrum alatum - winged loosestrife

Close relative of the evening primrose
family; mainly tropical in distribution

4 genera and 5 species occur in
Wisconsin, most of these are wetland
plants

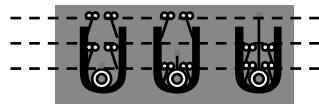
CA 4-6 CO 4-6 A 8-12 G (4)

Flowers 4, 5, or 6 merous with
stamens double the number of
sepals and in two distinct sets

Hypanthium well developed but
with superior pistil = **perigynous**

*Lythraceae - loosestrife family

- tristylous common — 3 levels at which 2 sets of anthers and 1 set of styles are positioned



*Lythraceae - loosestrife family



Lythrum salicaria
purple loosestrife

Ecologically invasive in
wetlands; from Europe



*Lythraceae - loosestrife family



2 unrelated "loosestrifes"
Lythrum & *Lysimachia*



Lythrum alatum - winged loosestrife
Native species hybridizing with *L. salicaria*?

*Lythraceae - loosestrife family



Decodon verticillatus -
swamp loosestrife

This species has
whorled leaves =
"verticillate"



*Onagraceae - evening primrose family



Oenothera biennis - evening primrose

CA 4 CO 4 A 4.8 G (4)

4 merous flowers, epigynous, and often well developed **hypanthium**

Evening primrose is hawkmoth pollinated

A moderate sized family of 17 genera and about 650 species - most diverse in western N. America

6 genera and about 30 species in Wisconsin



*Onagraceae - evening primrose family



Circaeaa canadensis - enchanter's nightshade



Circaeaa alpina
Northern enchanter's nightshade

2 merous flowers; fruit is one-seeded and bristly

*Onagraceae - evening primrose family



Chamerion angustifolium - fireweed

Epilobium strictum - willowherb

Chamerion & *Epilobium* have capsules opening to release seeds with comas

*Onagraceae - evening primrose family



Oenothera (Gaura) biennis - gaura



Ludwigia palustris - water primrose

*Geraniaceae - geranium family



Family often scented; 2 genera in Wisconsin



Geranium maculatum- wild geranium

Common lavender flowered plant with lobed basal leaves seen in many forest sites at final exam time

*Geraniaceae - geranium family



Geranium maculatum- wild geranium

CA 5 CO 5 A 10 G (5)

5 merous flowers with a superior pistil made up of 5 carpels each with a single ovule

*Geraniaceae - geranium family



CA 5 CO 5 A 10 G (5)

Fruit is a **schizocarp** = dehiscing fruit where each carpel breaks apart separately; here each carpel is breaking off a one-seeded **mericarp**



*Geraniaceae - geranium family



Geranium sibiricum
Siberian crane's - bill

Geranium robertianum
Herb robert



*Geraniaceae - geranium family



The stork's-bills of genus *Erodium* drill their mericarps into the ground; pinnately compound leaves



Erodium cicutarium - stork' s-bill
(naturalized)

*Oxalidaceae - wood-sorrel family



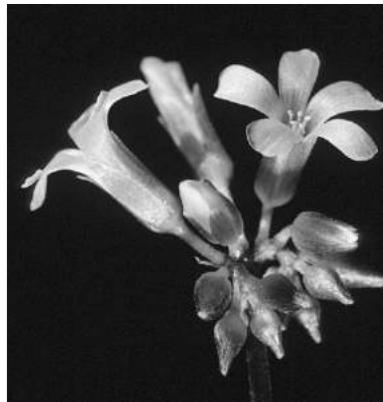
Oxalis corniculata - creeping yellow wood sorrel

Family is both tropical and temperate with over 600 of the 900 species belonging to the genus *Oxalis*

Typically 3-foliate leaves (the real Irish shamrock?), plants often creeping

Leaves are acidic to taste due to oxalic acid in the form of calcium oxalate

*Oxalidaceae - wood-sorrel family



Oxalis stricta - tall wood-sorrel

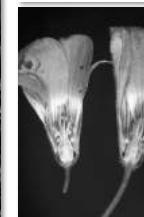
Flowers similar to wild geranium family, but each of the 5 carpels have ∞ seeds and produce capsules



*Oxalidaceae - wood-sorrel family



The violet wood-sorrel is an early spring flowering plant of prairies and dry woodlands south of the tension zone



Oxalis violacea
Violet wood sorrel

Like the loosestrife and geranium families who all have 2 sets of stamens, trimorphic heterostyly (tristylous) is common

*Staphyleaceae - bladdernut family



Single species in Wisconsin; easily recognized small tree by its striped bark, opposite odd-pinnately compound leaves, and 3 carpellate inflated or "bladder" fruit

Staphylea trifolia - bladdernut

