

# Systematic Botany. Lecture 11

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# Outline

## Questions and answers

### Woody angiosperms

Salicaceae—willow family

Fagaceae—beech family

Betulaceae—birch family

Elaeagnaceae—Russian olive family

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## Woody angiosperms

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## Previous final question: the answer

Heterosporous vs. homosporous ferns: explain the difference

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- ▶ Heterosporous ferns have two kinds of spores and two sexes of gametophytes

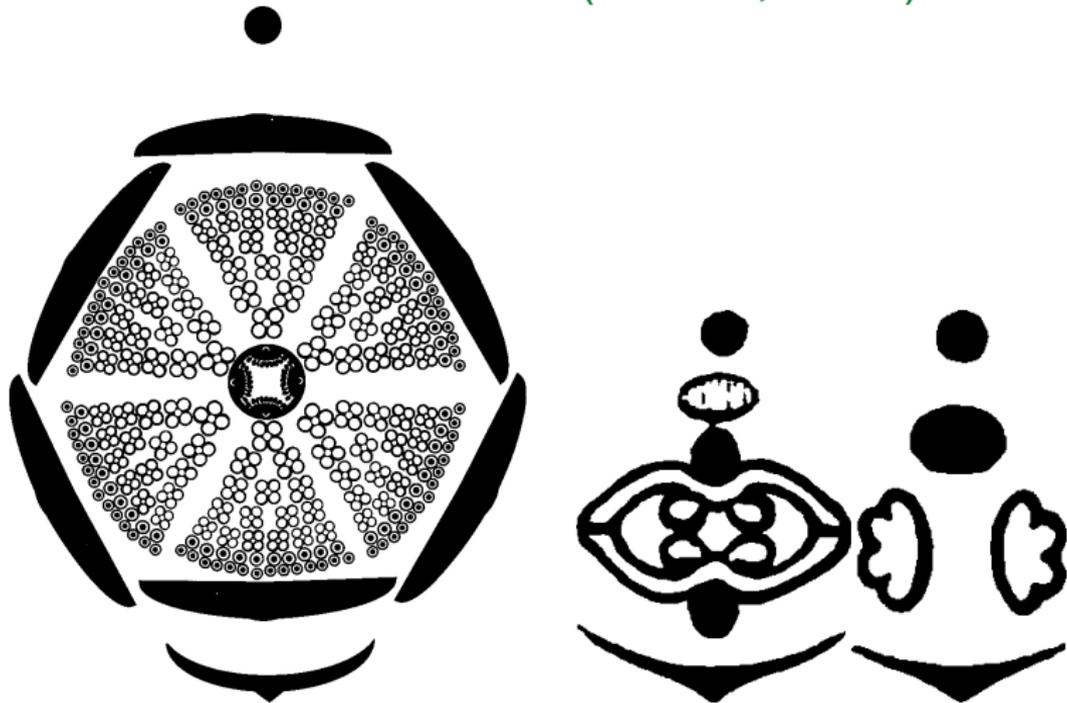
## General features of Salicaceae

- ▶  $\approx$  1010 species
- ▶ Distributed across all climatic zones, most genera are in tropics, most species in temperate regions
- ▶ Poplar (*Populus*) and willow (*Salix*) are important component of temperate riparian forests

## Morphology of Salicaceae

- ▶ Trees, usually with alternate simple leaves with stipules and salicoid teeth
- ▶ In many genera, flowers are more and more reduced—from flowers with numerous stamens and both sepals and petals to apetalous flowers with several stamens
- ▶ Flowers often have disk—flattened nectariferous structure
- ▶ Pistil of two carpels
- ▶ Fruit is a capsule
- ▶ Seeds often with hairs

## Salicaceae: *Azara* and *Salix* (female, male)

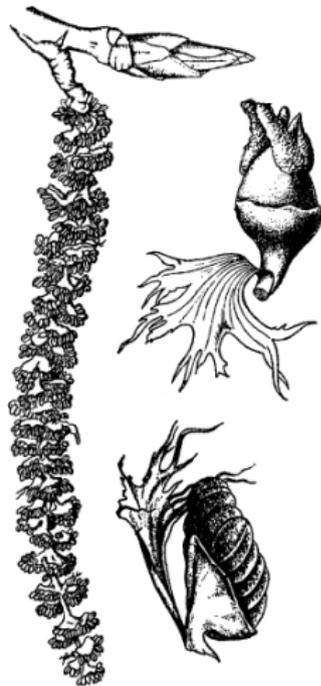
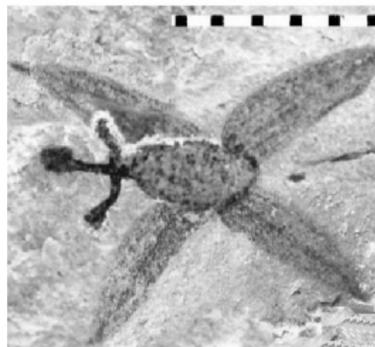


\*K<sub>0-6</sub>C<sub>0-8</sub>A<sub>2-∞</sub>G<sub>(2-4)</sub>

## Representatives of Salicaceae

- ▶ Willow (*Salix*), almost 300 species of trees and shrubs, important component of Northern flora
  - ▶ Subgenus *Salix*
    - ▶ *S. amygdaloides*
    - ▶ *S. alba*\*
    - ▶ *S. babylonica*\*
    - ▶ *S. fragilis*\*
    - ▶ *S. lucida*
    - ▶ *S. serissima*
  - ▶ Subgenus *Longifoliae*
    - ▶ *S. exigua*
  - ▶ Subgenus *Chamaetia*
    - ▶ *S. pedicellaris*
  - ▶ Subgenus *Vetrix*
    - ▶ *S. cordata*
    - ▶ *S. eriocephala*
    - ▶ *S. lutea*
    - ▶ *S. discolor*
    - ▶ *S. humilis*
    - ▶ *S. bebbiana*
    - ▶ *S. candida*
- ▶ Poplar, or cottonwood (*Populus*) has  $\approx$  40 species. Cultivated as a wood source. Aspen (*Populus tremuloides*) is a main component of North Dakota forests.

## Salicaceae: salicoid teeth; fossil *Pseudosalix* and recent *Populus*



## *Salix hastata*, female and male plants



## Aspen, *Populus tremuloides*



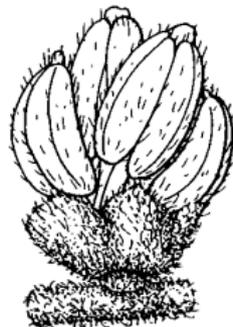
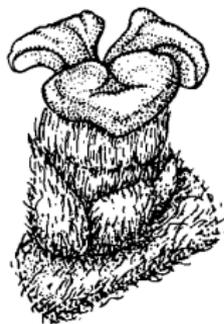
## *Azara* flowers



## Fagaceae—beech family

- ▶  $\approx$  800 species
- ▶ Distributed mostly in broad-leaved forests of North hemisphere
- ▶ Life forms: trees, rarely shrubs with mycorrhizal roots
- ▶ Leaves simple, entire or lobed, alternate, with minute stipules
- ▶ Flowers in catkins, very reduced due to wind pollination, unisexual; carpellate flowers with involucre of multiple fused bracts; perianth scale-like, stamens from 4 to numerous
- ▶ Pistil of 3–6 carpels, ovary inferior, 5 of 6 ovules are aborting
- ▶ Fruit a nut (acorn is a nut + involucre) with one seed with large embryo and no endosperm

## *Quercus* flowers and inflorescences





## Representatives of Fagaceae

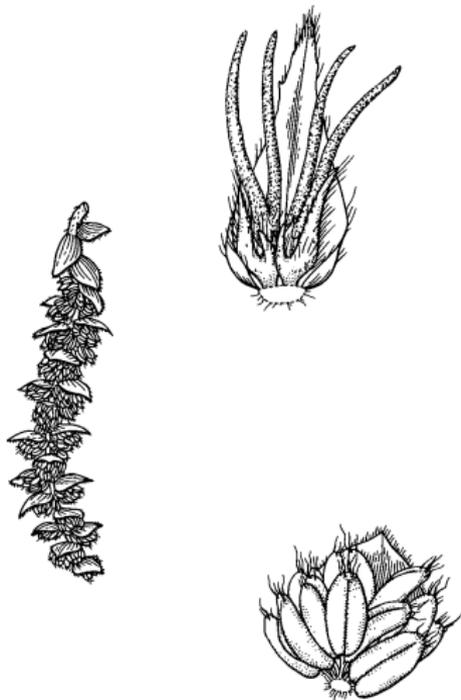
Importance: wood producers, sometimes (chestnut) also food plants

- ▶ *Quercus*—oak
- ▶ *Fagus*—beech
- ▶ *Castanea*—chestnut

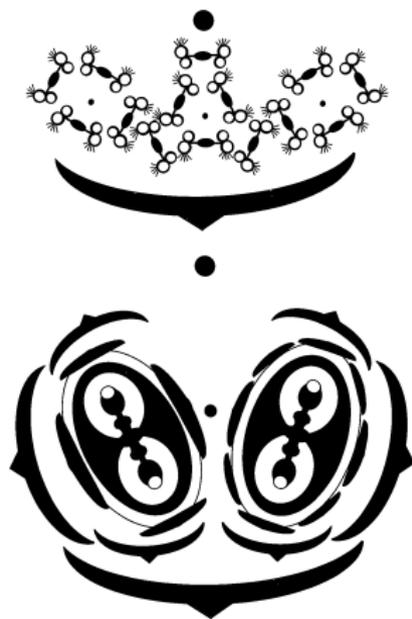
## Betulaceae—birch family

- ▶  $\approx$  150 species
- ▶ Distributed in Northern hemisphere, frequent from temperate to arctic regions
- ▶ Life forms: trees and shrubs with mycorrhizal roots
- ▶ Leaves alternate, simple, serrate, deciduous, with stipules
- ▶ Flowers in catkins or compact inflorescences, very reduced, unisexual, associated with bracts; perianth minute or absent, stamens 1–4
- ▶ Pistil bicarpellate, ovary inferior, ovules 2, one aborting
- ▶ Fruit a nut or nutlet, with subtended bracts, seeds with large embryo and almost no endosperm

## *Carpinus* flowers and inflorescences



# Betulaceae flowers and inflorescences



$$\text{♂} * K_{0-6} C_0 A_{1-4}$$

$$\text{♀} * K_{0-6} C_0 \overline{G(2)}$$

## Representatives of Betulaceae

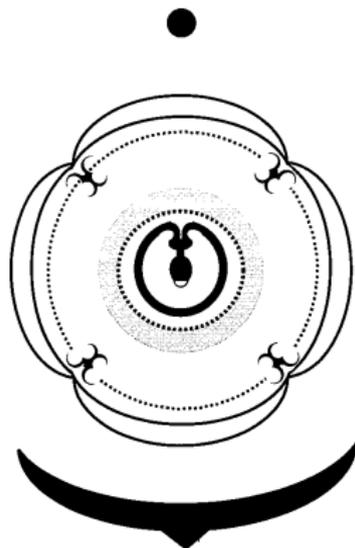
Importance: ornamental, wood, edible nuts (*Corylus*)

- ▶ *Corylus*—hazelnut (in subfamily Coryloideae: naked male flowers and female flowers with perianth)
- ▶ *Betula*—birch
- ▶ *Alnus*—alder

## Elaeagnaceae—Russian olive family

- ▶  $\approx$  50 species
- ▶ Distributed in temperate and subtropical parts of Northern hemisphere
- ▶ Life forms: shrubs or small trees, often thorny, roots nodulated with nitrogen-fixing bacteria
- ▶ Leaves alternate or opposite, simple, entire, without stipules, with specific lepidote trichomes
- ▶ Flowers solitary or in inflorescences, 4-merous, without petals; 4 sepals attached to the hypanthium, stamens also 4.
- ▶ Pistil monomeric, with one basal ovule, ovary superior
- ▶ Fruit consists of dry achene inside of fleshy hypanthium

## Elaeagnaceae flower



\*K<sub>4-5</sub>C<sub>0</sub>A<sub>4-5</sub>G<sub>1</sub>

## Representatives of Elaeagnaceae

Importance: fruits are edible, *Hippophaë* is cultivated as berry plant

- ▶ *Elaeagnus*—Russian olive: we have *E. angustifolia*, Russian olive, and *E. argentea*, silverberry
- ▶ *Shepherdia*—buffaloberry, two species in ND: *Sh. argentea* and *Sh. canadensis*
- ▶ *Hippophaë*—sea-buckthorn



## Some other “woody families” of angiosperms

- ▶ Sapindaceae—*Acer* (maple)
- ▶ Ulmaceae—*Ulmus* (elm)
- ▶ Caprifoliaceae—*Lonicera* (honeysuckle), *Symphoricarpos* (snowberry)
- ▶ Rhamnaceae—*Rhamnus* (cascara, buckthorn)
- ▶ Cornaceae—*Cornus* (dogwood)
- ▶ Saxifragaceae—*Ribes* (gooseberry, currant)

## Final question (2 points)

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How to distinguish between Betulaceae and Fagaceae?

## For Further Reading



O. A.Stevens.

*Handbook of North Dakota plants.* 3rd edition.

NDSU, 1963.