

Systematic Botany. Lecture 11

Alexey Shipunov

Minot State University

September 21st, 2011

Outline

Questions and answers

Woody angiosperms

Salicaceae—willow family

Fagaceae—beech family

Betulaceae—birch family

Elaeagnaceae—Russian olive family

Outline

Questions and answers

Woody angiosperms

Salicaceae—willow family

Fagaceae—beech family

Betulaceae—birch family

Elaeagnaceae—Russian olive family

Previous final question: the answer

Heterosporous vs. homosporous ferns: explain the difference

Previous final question: the answer

Heterosporous vs. homosporous ferns: explain the difference

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

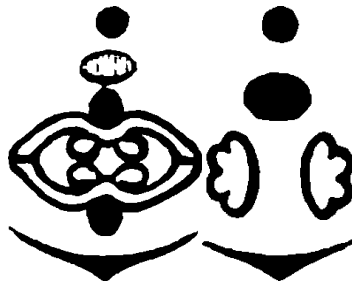
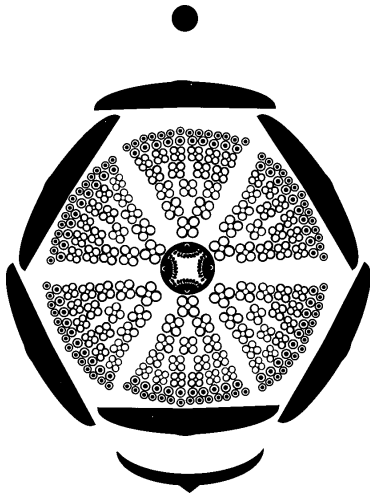
General features of Salicaceae

- ▶ ≈ 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)



*K₀₋₆C₀₋₈A_{2-∞}G₍₂₋₄₎

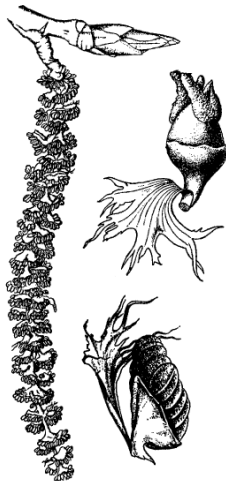
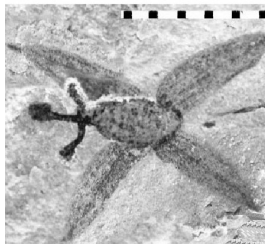
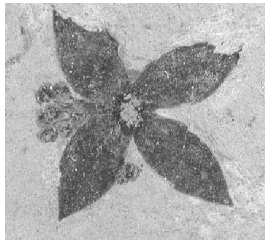
- └ Woody angiosperms
- └ Salicaceae—willow family

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 ≈ 40 species. Cultivated as a wood source. Aspen (*Populus tremuloides*) is a main component of North Dakota forests.

- └ Woody angiosperms
- └ Salicaceae—willow family

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



- └ Woody angiosperms
- └ Salicaceae—willow family

Salix hastata, female and male plants



- └ Woody angiosperms
- └ Salicaceae—willow family

Aspen, *Populus tremuloides*



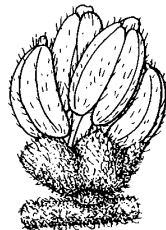
Azara flowers



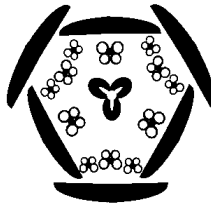
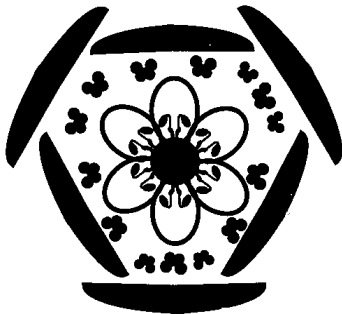
Fagaceae—beech family

- ▶ \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



Fagaceae flowers


$$\begin{array}{l} \text{♀} * \text{P}_{6-9} \text{G}_{(6)} \\ \text{♂} * \text{P}_{6-9} \text{A}_{6-12} \end{array}$$

- └ Woody angiosperms
 - └ Fagaceae—beech family

Representatives of Fagaceae

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

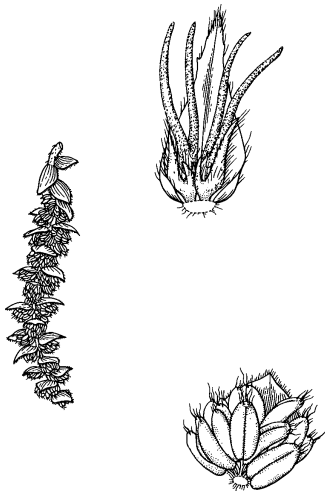
- ▶ *Quercus*—oak
- ▶ *Fagus*—beech
- ▶ *Castanea*—chestnut

Betulaceae—birch family

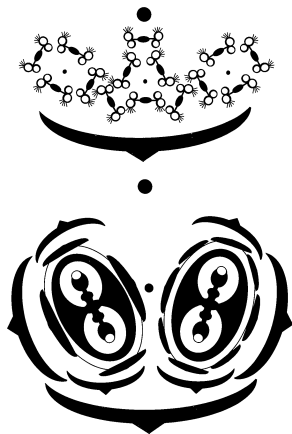
- ▶ \approx 150 species
- ▶ Distributed in Northern hemisphere, frequent from temperate to arctic regions
- ▶ Life forms: trees and shrubs with mycorrhizal roots
- ▶ Leaves alternate, simple, serrate, deciduous, with stipules
- ▶ Flowers in catkins or compact inflorescences, very reduced, unisexual, 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

- └ Woody angiosperms
- └ Betulaceae—birch family

Carpinus flowers and inflorescences



Betulaceae flowers and inflorescences



♂ * $K_{0-6} C_0 A_{1-4}$

♀ * $K_{0-6} C_0 \overline{G_{(2)}}$

- └ Woody angiosperms
- └ Betulaceae—birch family

Representatives of Betulaceae

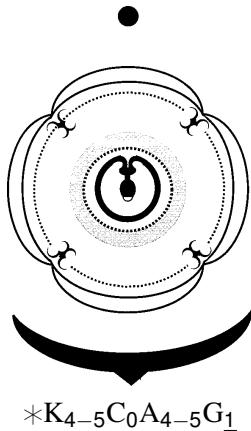
Importance: ornamental, wood, edible nuts (*Corylus*)

- ▶ *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



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

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)

Final question (2 points)

How to distinguish between Betulaceae and Fagaceae?



Handbook of North Dakota plants. 3rd edition.
NDSU, 1963.