Diversity and Evolution of Rosids
...gourds, walnuts, and maples...

Cucurbitales

previously recognized group of 7 families (some N2 fixers)
palmate leaves, cucurbitoid teeth, imperfect flowers, parietal placentation

Cucurbitaceae

Mainly tropical and subtropical family of 118 genera, 845 species of herbaceous or woody vines with tendrils (modified inflorescences)

Cucurbitaceae - melons

Male flower

• fusion of perianth (Asterid-like!); stamens are weird.
• flowers unisexual and plants usually dioecious, cultivated ones monoecious

Cucurbitaceae - melons

Female flower

• flowers unisexual and plants usually dioecious, cultivated ones monoecious
**Fruit is a berry with leathery rind = pepo** (pumpkin, melon, pickle, gourd)

**Note the many small male flowers and few female flowers going into fruit and spiny pepo**

**Small “burred” cucumber or pickle-like fruits can be seen on bottom right**

**core “Amentiferae” of Engler & Prantl and subclass “Hamamelidae” of Cronquist - wind pollinated**

- trees with unisexual flowers in aments/catkins
- inferior G (2-3)
- nut - bony 1-seeded
*Fagales

*Fagaceae - beeches

- *Fagus* (beech) is characteristic of mesic forests in north temperate deciduous forests
- easy to recognize with gray bark
- 2 pistillate flowers (2 nuts) surrounded by one set of bracts

*Fagus grandifolia - American beech

*Fagaceae - oaks

- *Quercus*, the oaks, have bracts below female flower that coalesce into a woody cup of the acorn fruit (nut)
- hybridizing group and taxonomically challenging
**Fagaceae - oaks**

- **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

*Bur oak* - Ozarkian element species of xeric oak woodlands and oak savannas

*Red oak* - more mesic member of the red oak group; black oak, hill’s oak are more xeric tolerant
*Fagaceae - chestnuts

- *Castanea*, the chestnuts, have 2 female flowers per spiny involucre

*Castanea dentata* - American chestnut

*Fagaceae - chestnuts

- American chestnuts Massachusetts in late 1800s prior to 1904 chestnut blight
- Japanese chestnut in Connecticut resistant

*Castanea dentata* - American chestnut original distribution

*Juglandaceae - walnuts

- Well known tree family containing walnuts, hickories, and pecans
- 10 genera and 50 species are divided into two subfamilies

Engelhardia  
Juglans

*Juglandaceae - walnuts

- Leaves pinnately compound, alternate
- Leaves often aromatic from resinous peltate glands; allelopathic

*Juglans cinerea* - Butternut, white walnut
Trees are monoecious and wind pollinated features.

*Juglandaceae - walnuts*

- Male flowers apetalous and arranged in pendulous catkins or aments on older stems
- Calyx small; each flower bracted

- Female flowers apetalous and in a small group on this year’s new growth
- Calyx small, persistent, often fused to involucral bracts; 2 stigma feathery

- Fruit a nut - single ovule fused to ovary wall
- Surrounded often by persistent involucral bracts which can become fleshy; thus sometimes mistakenly called a “drupe”
**Juglandaceae - walnuts**
- *black walnut*: one of the most prized of all lumber trees for fine furniture

**Juglandaceae - hickories**
- *shagbark hickory*: common tree of more mesic to xeric forests over much of North America - oak/hickory forests

**Betulaceae - birches**
- North Temperate family of 6 genera and 110 species of shrubs to trees - birches and alders
- both female and male (drooping) inflorescences are in aments/catkins
- flowers possess no perianth
- fruit a small nut or 1 seeded samara, subtended by 3-lobed bract
**Betulaceae - birches**

- *Betula papyrifera* - Paper birch
- *Betula allegheniensis* - Yellow birch

**Myricaceae - sweet gale**

- Small family 3 genera that fix atmospheric nitrogen
- Dioecious shrubs or subshrubs with sweet aromatic smell

- *Myrica gale* - Sweet gale
- *Comptonia peregrina* - Sweet fern

**Casuarinaceae**

- Small family of 100 species - the she oaks of Australia
- *Casuarina cunninghamiana* - She-oak of Cunningham
**Sapindales**
- long recognized group of 9 families
- woody, compound leaves
- nectar disk
- 1-2 seeded fruit

*Sapindaceae*
*Geijera multiflorum*

**Anacardiaceae - sumacs**
- Woody, worldwide family (70/985) with alternate, compound leaves and pungent, often nasty volatiles or black exudates (phenolics)
- *Rhus glabra* - smooth sumac

**Anacardiaceae - sumacs**
- flowers are small, congested, variously unisexual or perfect but with disk
- one-seeded drupes (mango, pistachio, cashew)
- *Rhus glabra* - smooth sumac
**Anacardiaceae - sumacs**

- *Rhus hirta* - staghorn sumac
- *Toxicodendron radicans* - poison ivy: variable in habit
- *Toxicodendron vernix* - poison sumac
  - Multi-stemmed shrub in wetlands

**Sapindaceae - maples**

Largely tropical woody family of 735 genera and 1600 species and includes previously recognized smaller temperate families (maples - *Aceraceae*, buckeyes - *Hippocastanaceae*):

- most have opposite, compound leaves
- 1-2 seeded drupes or samaras
*Sapindaceae - maples

The family includes 2 of the most important or dominant tree species in many of our forest types - sugar maple and red maple.

- Acer saccharum - sugar maple
- Acer rubrum - red maple

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One of the most dominant mesic forest tree species throughout Wisconsin is the sugar maple; leaves are smooth and lobed; flowers are without petals.

Another dominant hydric-xeric forest tree species throughout Wisconsin and eastern North America is the red maple.

Silver maple is characteristic of wet conditions, fast growing, and with whitish underside to leaves; like sugar maple it has no petals.
**Sapindaceae - maples**

- Horse chestnuts are now included in Sapindaceae along with the maples.
- Leaves are palmately compound and opposite.

*Sapindaceae - maples*  
*Aesculus glabra* - Ohio buckeye  
*Aesculus hippocastanum* - horsechestnut

**Simaroubaceae - tree of heaven**

The tree-of-heaven is originally from Asia, widely planted, and somewhat naturalized.

Like most members of the family, the tree is strongly (pungently) odored.

*Simaroubaceae - tree of heaven*  
*Ailanthus altissima* - tree of heaven

**Rutaceae - citrus**

Largely alternate, compound leaved family (except oranges and relatives).

Family is well known for its volatile terpenoid compounds that the leaves & flowers emit.

*Rutaceae - citrus*  
*Ptelea trifoliata* (hop tree, wafer-ash) - medicinal plant  
*Citrus sinensis* - orange

**Rutaceae - citrus**

Native clonal and spiny armed shrub with pinnately compound leaves; flowers reduced

Potentially invasive shrub in drier habitats

*Rutaceae - citrus*  
*Zanthoxylum americanum* - prickly-ash
Meliaceae - mahogany

Mahogany - *Swietenia brasiliensis* - important lumber tree in Neotropics.