

***Malpighiales**

• large and diverse group of 39 families - many of them contributing importantly to tropical forest diversity

Rosid Phylogeny
 APG III 2009

***Salicaceae - willows, poplars**

Chemically defined by salicins (salicylic acid). Many members of the tropical "Flacourtiaceae" with showy flowers also have salicins and are now part of the Salicaceae

***Salicaceae - willows, poplars**

55 genera, 1000+ species of shrubs/trees - 450 are willows (*Salix*), less numerous are poplars, aspens (*Populus*).

Populus deltoides - American cottonwood

Salix babingtonii - weeping willow

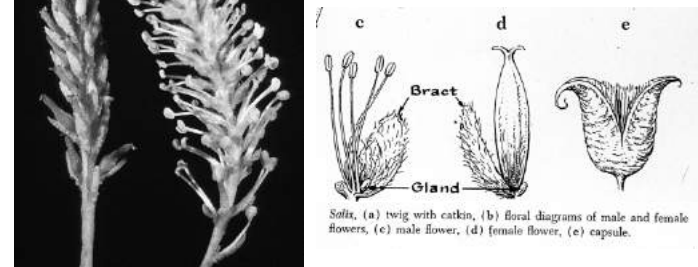
*Salicaceae - willows, poplars

Willows (*Salix*) are dioecious trees of temperate regions with reduced flowers in aments - both insect and wind pollinated



*Salicaceae - willows, poplars

- nectar glands at base of bract allows insect as well as wind pollination
- fruit is a capsule with cottony seeds for wind dispersal



*Salicaceae - willows, poplars



- many species are "precocious" - flower before leaves flush in spring

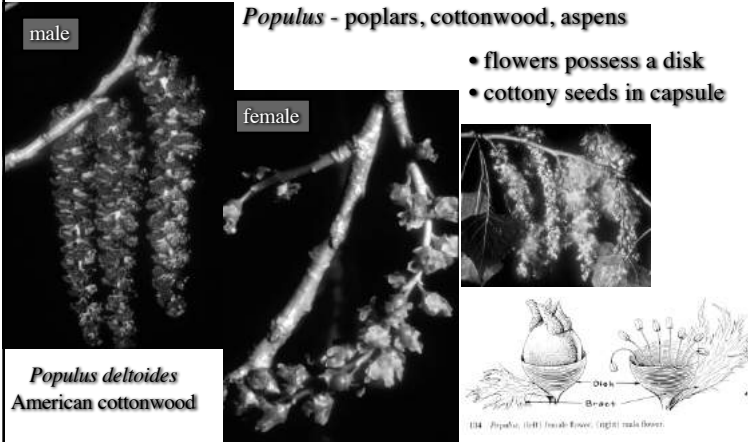


*Salicaceae - willows, poplars

- species vary from large trees, shrubs, to tiny tundra subshrubs



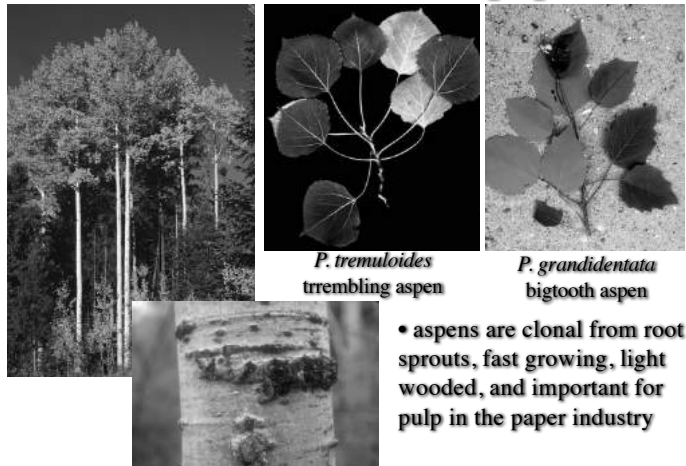
*Salicaceae - willows, poplars



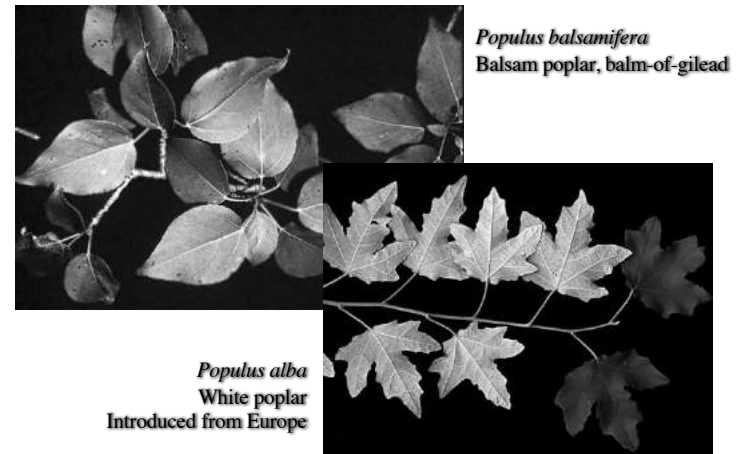
*Salicaceae - willows, poplars



*Salicaceae - willows, poplars



*Salicaceae - willows, poplars



*Euphorbiaceae - spurges

Euphorbiaceae s.l. is polyphyletic and now broken into 3 families



*Euphorbiaceae - spurges



- large cosmopolitan family of trees, shrubs, and herbs of 222 genera and 6000 species

- latex bearing and filled with nasty chemicals (source of rubber, castor oil, tapioca, poinsettia)

- leaves alternate, simple (often palmately lobed) or palmately compound

Ricinus - castor oil bean

*Euphorbiaceae - spurges

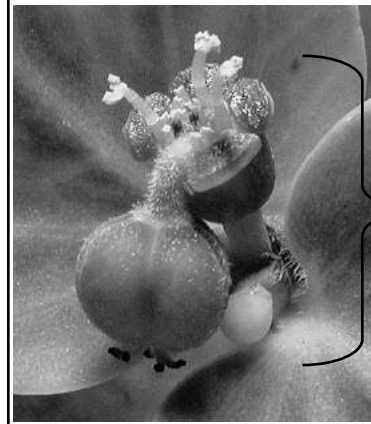


CA 5 CO 0 A ∞ G 0
CA 5 CO 0 A 0 G (3)

Majority of the family has unisexual flowers, 5 sepals, no petals, numerous stamens, 3 fused carpels, and capsules



*Euphorbiaceae - spurges



A quite different arrangement of unisexual flowers is seen in many of our spurges of the genera *Euphorbia* and *Chamaesyce*.

Flower or inflorescence?

*Euphorbiaceae - spurges

Euphorbia corollata - flowering spurge



The "flower" of our flowering spurge is actually a highly modified inflorescence = cyathium



Shown here are 3 cyathia; the whole unit here is one cyathium

*Euphorbiaceae - spurges

Cyathium is composed of:

glands



*Euphorbiaceae - spurges

Cyathium is composed of:
glands
appendages of glands (bracts)



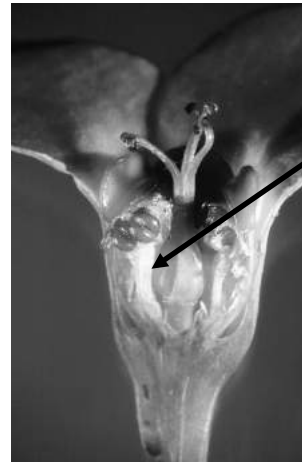
*Euphorbiaceae - spurges

Cyathium is composed of:

glands

appendages of glands (bracts)

∞ male flowers, 1- stamened (no perianth)



*Euphorbiaceae - spurges



Cyathium is composed of:
 glands
 appendages of glands (bracts)
 ∞ male flowers, 1- stamened (no perianth)
 1 female flower (tricarpellate - 3 styles)



*Euphorbiaceae - spurges



Euphorbia virgata - leafy spurge

- one of several species labelled "obnoxious weed" by state law

*Euphorbiaceae - spurges



Euphorbia is a "giant" genus (> 2,000 spp.) with some spectacular radiations - is the cyathium a "key innovation"?

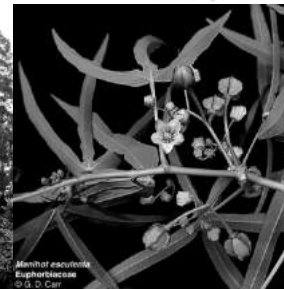
*Euphorbiaceae - spurges



- economically important members from Neotropics

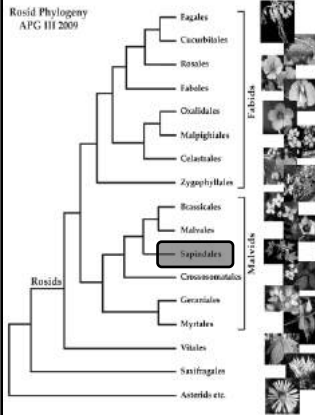
Manihot esculenta - manioc, cassava, tapioca

Hevea - rubber



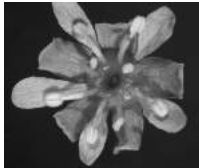
*Sapindales

Rosid Phylogeny
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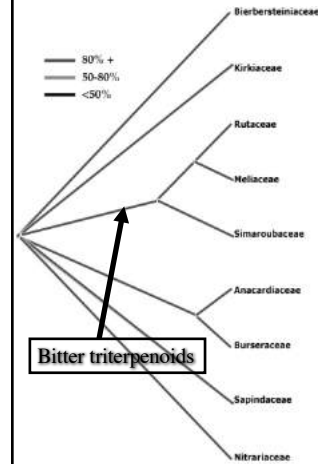
- long recognized group of 9 families
- woody, compound leaves
- nectar disk
- 1-2 seeded fruit

Sapindaceae
Acer platanoides



*Sapindales

— 80% +
— 50-80%
— <50%



- chemically distinct (lemon smells)
- preferential herbivory by hemipteran *Calophya*



Calophya on *Schinus*
(Anacardiaceae)

*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

CA 5 CO 5 A 5, 10 G (2-3)

- flowers are small, congested,
variously unisexual or perfect but
with disk

Rhus glabra - smooth sumac



*Anacardiaceae - sumacs



CA 5 CO 5 A 5, 10 G (2-3)

- one-seeded drupes (mango, pistachio, cashew)

Rhus glabra - smooth sumac

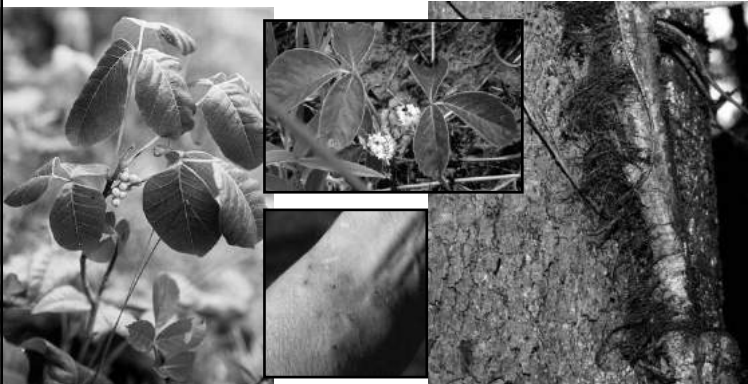


*Anacardiaceae - sumacs



Rhus hirta - staghorn sumac

*Anacardiaceae - sumacs



Toxicodendron radicans - poison ivy: variable in habit
Toxicodendron includes our 3 poisonous species

*Anacardiaceae - sumacs



Toxicodendron vernix - poison sumac
Multi-stemmed shrub in wetlands

*Anacardiaceae - sumacs

One of the most poisonous members of this family is the source of Japanese lacquer – *Toxicodendron vernicifluum* (urushiol compound)



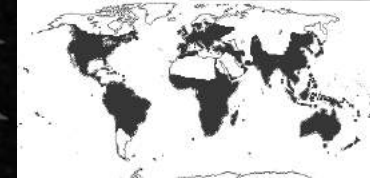
*Sapindaceae - maples

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



Sapindus - soapberry



*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

*Sapindaceae - maples

CA 4-5 CO 0 or 4-5 A 8, 10 G (2)

- maple flowers typically unisexual by abortion. Perianth 4-5 merous, but petals lacking in sugar and silver maples and boxelder
- nectariferous disk is often present in the whorl associated with stamens



Acer platanoides - Norway maple
Introduced ornamental

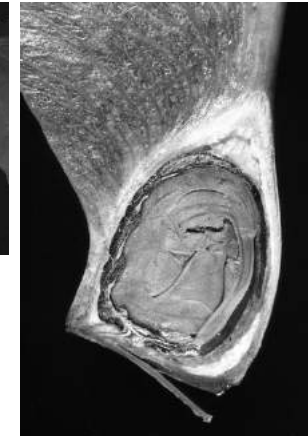
*Sapindaceae - maples

CA 4-5 CO 0 or 4-5 A 8, 10 G (2)

- superior pistil composed of 2 carpels and 2 extended styles
- note reduced and probably non-functional stamens



*Sapindaceae - maples



- fruit is a schizocarp - each carpel separates into a one seeded mericarp
- fruit is also a samara - 2 winged achenes

*Sapindaceae - maples



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



*Sapindaceae - maples



Acer rubrum - Red maple



Another dominant hydric-xeric forest tree species throughout Wisconsin and eastern North America



*Sapindaceae - maples



Acer saccharinum - silver maple

Silver maple is characteristic of wet conditions, fast growing, and with whitish underside to leaves; like sugar maple has no petals



*Sapindaceae - maples



- only dioecious species of maple and only one with compound leaves

- initially male only, as they age they switch to female



Acer negundo
Three Leaves from the Same Tree

*Sapindaceae - maples



Aesculus glabra - Ohio buckeye

- buckeyes are now included in Sapindaceae along with the maples.



*Sapindaceae - maples



Aesculus glabra - Ohio buckeye

- buckeyes are now included in Sapindaceae along with the maples.

- leaves are palmately compound and opposite.



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.



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



Citrus sinensis



Prickly ash (*Zanthoxylum*) - medicinal plant

Rutaceae - citrus



Zanthoxylum americanum
Prickly ash

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

Potentially invasive shrub in drier habitats

