The Primitive
Flowering Plants

We will begin our survey of Great Lakes’ flowering plants by examining the primitive angiosperms - those groups that are now shown to be the oldest diverging.

These include all the groups shown here except “Eudicots” – a very very large group of advanced flowering plants.

We will look at the “Monocots” - another primitive angiosperm group but very large - at the end of the class.

Magnoliophyta - Flowering Plants

The Flower

fusion of floral parts

Primitive angiosperms tend to have floral parts not fused

Magnoliaceae - magnolia family

Not found in Wisconsin, but part of the Alleghenian flora. Tropical trees with ethereal oils which leads to a strong scent. They typically have simple, alternate entire leaves.

Floral parts are spiralled rather than whorled with an elongated receptacle

P ∞ A ∞ G ∞

Tepals, laminar stamens, apocarpic

Fruit = “cone” of follicles

Dehiscent fruit with one suture, derived from one carpel
Derivation of the follicle fruit

1 floral "leaf" or carpel with ovules
Folded carpel
1 carpel with 2 rows of seeds; the fruit opens along the 1 line of suture

Magnoliaceae - magnolia family

Tulip tree (Liriodendron) is also not native, but commonly planted. Most members of the family are pollinated by beetles which are attracted by smell and copious amount of stamens and pollen on which they feed.

Aristolochiaceae - birthwort family

8-10 genera and about 600 species worldwide; 1 species in Wisconsin. Mostly vines in the tropical regions, but herbs in temperate. The family occurs mostly in tropical forests and warm temperate scrub forests.

Aristolochia clematitis: doctrine of signatures - birthwort, "well born", aristocrat for family name

The leaves of many herbaceous, basal angiosperms are cordate or heart-shaped; these groups often been termed the paleoherbs.

Asarum canadense - wild ginger

Creeping rhizome; pair of cordate (heart-shaped) per year; hairy plants with trichomes over the petioles, flower etc.

Used by eastern native Americans as a contraceptive, thick rhizome root can be cut up, boiled, and cooked in heavy sugar syrup to make candied ginger.
Aristolochiaceae - birthwort family

Asarum canadense - wild ginger

Red/brown flowers arise between the leaves, foetid smell suggests that it is fly or beetle pollinated.

CA 3, CO 0, A 12, G (6)

Inferior ovary with 3 sepals and the stamens arising from top.

The petals are almost absent.

Seeds are dispersed by ants; these seeds possess an aril-like structure.

Nymphaeaceae - water lily family

These are aquatic herbs and have an obvious ecological niche - they inhabit still waters

Many of their characteristics reflect adaptations to this habitat.

- Floating or submersed leaves
- Air cavities in tissue
- Mucilaginous coverings
- Lack of vessels

Convergence [unrelated plants with similar adaptations] common

Check out Birge Hall lobby “Aquatic Plants” display!

For extra credit on first exam, find one of two aquatic invasive genera in Great Lakes Region that have leaves just like Nymphaea – one is an Asterid and the other is a Monocot:

N _____ and H _____

Nymphaea - water lily

Nelumbo - lotus lily

Nymphaea odorata - water lily
Nymphaeaceae - water lily family

Petaloid sepals & reduced petals
Laminar stamens grading from petals to pistils

Nuphar variegata - yellow pond lily

Nymphaeaceae - water lily family

Superior pistil of many carpels
Beetle pollination

Nuphar variegata - yellow pond lily

Brasenia shreberi - water shield
Small clonal floating aquatic
Peltate leaves
Wind pollinated

Cabombaceae - water shield family

[sometimes placed in Nymphaeaceae]

Brasenia shreberi - water shield

Cabombaceae - water shield family

[sometimes placed in Nymphaeaceae]

Cabomba - fanwort

- submerged and floating leaved
- dimorphic leaves
- insect pollinated
Ceratophyllaceae – coon’s-tail family
Submersed aquatic recognized by whorled leaves dichotomously forked
Reduced! and Unisexual flowers on same plant = monoecious
Propagates asexually by fragmentation
*Ceratophyllum demersum* - hornwort, coon’s-tail

Ranunculaceae - buttercup family
Largest family of the ranunculid lineage which is the first diverging group of true dicots = eudicots
Worldwide but is centered in temperate and cold regions of the northern and southern hemispheres. 13 native genera, 53 species in WI, 20 of these in *Ranunculus*
Important family of our Wisconsin “Spring Flora” – you will see these species!
Ranunculaceae - buttercup family

- Flowers very variable: except many stamens and many free carpels (apocarpic)
- Floral shape varies: some actinomorphic/zygomorphic and some have spurs. Mostly insect and animal pollinated group.
- Mostly bisexual flowers, but some species dioecious

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\begin{align*}
&CA 3+ & CO (0)5+ & A \approx G 3+ \\
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\end{align*}
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Fruits:

- **Foliicles** = \( \approx \) seeded dehiscent fruit
- **Berries** = \( \approx \) seeded fleshy fruit

Actaea - baneberry

Ranunculus - buttercup with animal dispersed achenes

Anemone - thimbleweed with wind dispersed achenes

Aconitum columbianum - monk’s hood

Aconitum ‘novboracense’ - monk’s hood
Ranunculaceae - buttercup family

Actaea rubra - red baneberry

Actaea alba - white baneberry

Ranunculaceae - buttercup family

Anemone patens - pasque flower

Anemone canadensis - Canada anemone

EXTRA CREDIT - digital image of pasque flower

Ranunculaceae - buttercup family

Anemone acutiloba (Hepatica acutiloba) - sharp-lobed liverleaf

Wisconsin Herbarium WiFlora
Michigan Online Flora

Anemone quinquefolia - wood anemone

Ranunculaceae - buttercup family
Ranunculaceae - buttercup family

Aquilegia canadensis - American columbine

Caltha palustris - marsh marigold
No petals; follicle fruits

Enemion biternatum [Isopyrum biternatum] - false rue anemone
One of most abundant spring ephemerals forming large colonies
No petals; 3-4 follicle fruits

Ranunculus abortivus - cursed crowfoot
Ranunculus acris - tall buttercup
Ranunculus hispidus - bristly buttercup

sepals + petals + achenes
Ranunculaceae - buttercup family

Thalictrum dioicum - early meadow-rue

Large herbs of more open habitats; wind pollinated

dioecious: with separate male and female plants

Ranunculaceae - buttercup family

Thalictrum thalictroides - rue anemone

Named after Thalictrum because the leaves were so similar, although showy, insect-pollinated flowers

Anemonella thalictroides - rue anemone

Now called Thalictrum thalictroides

. . . . and so it is "the thalicrum with the thalicrum-like leaves"!

Good example of the re-evolution of insect pollination within a wind pollinated group