Diversity and Floristics of Monocots...

...aroids, lilies, orchids...

The Monocots

We will finish our survey of angiosperms by going back to the basal angiosperms and take a look at the monocotyledons - those possessing one seed leaf.

The other main features of the monocots separating them from all other flowering plants are:

1. 3-merous flowers
2. Parallel-veined leaves
3. Absence of woody tissue
The Aquatic Monocots

Emergent, floating, or submerged aquatic group of monocots

These are the first diverging monocots

Associated with the aquatic habit is the trend from insect-pollinated, showy flowers to water-pollinated, reduced flowers.

The group shows increasing effort to vegetative reproduction over sexual reproduction.

Showy flowers, insect-pollinated

Reduced unisexual flowers, water-pollinated

*Alismataceae - water plantain family

Aquatic or wetland family, especially in north temperate regions

Leaves long petioled, often with sagittate-shaped leaves

Tubers starchy, often edible

Calyx of 3 green sepals, corolla of 3 white petals

Carpels apocarpic

1-seeded achenes

Flowers can be unisexual

Head of achenes

Sagittaria - arrowhead
*Alismataceae - water plantain family

Similar to Sagittaria, but with carpels in one ring rather than globose head

*Potamogetonaceae - pondweed family

Aquatic plants with dimorphic leaves
Wind (and water) pollination
25 species in Wisconsin difficult to identify, hybridize, and some are troublesome weeds

*Potamogetonaceae - pondweed family

Perianth of 4 clawed segments if present
Gynoecium typically of 4 free, 1-ovuled carpels
Fruit drupe-like

*Potamogetonaceae - pondweed family

Flowers (top) and fruits (bottom)
**Araceae - jack-in-the-pulpit family**

Large family primarily of the tropics
Mainly epiphytic, others terrestrial, a few aquatic

Vegetative parts often containing raphides in the vacuoles with mucilage; raphides often calcium oxalate - an irritant

Inflorescence a fleshy spadix, surrounded by bract called the spathe

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Flowers unisexual or perfect
Fruits berries clustered on spadix

**Araceae - jack-in-the-pulpit family**

Rotting flesh odor, mottled purple and yellow-green coloration indicate specialized pollination syndrome

Symplocarpus foetidus - skunk cabbage
Flesh flies - Sarcophagidae
carrion flies - Calliphoridae
gnats - Mycetophilidae

Foetid smelling inflorescence emerges early in spring or late winter; attracts carrion flies by heating up and volatilizing off the odor

Cabbage-like leaves emerge later in the spring

Symplocarpus foetidus - skunk cabbage
Endogenous heating of skunk cabbage (S. renifolius) spadix

Cyclical heating of the skunk cabbage spadix in the male phase

**Araceae - jack-in-the-pulpit family

Calla palustris - water arum
Our emergent aquatic member of the family
**Araceae - jack-in-the-pulpit family**

Floating or submersed aquatics derived from within jack-in-the-pulpit family

Vegetative reproduction primarily

*Lemna minor* - small duckweed

Includes the smallest angiosperm, and the smallest flower

Inflorescence reduced to 1 female and 1-2 male flowers

*Lemna turionifera* - perennial duckweed

*Lemna turionifera* - perennial duckweed

**Araceae - jack-in-the-pulpit family**

*Wolffia columbiana* - water meal

Largest of the aquatics

*Spirodela polyrhiza* - great duckweed

Smallest member of the family and the angiosperms

*Wolffia columbiana* - water meal

Petaloid Monocots (Liliales + Asparagales)

The petaloid monocots represent two orders and contain most of the showy monocots such as lilies, tulips, blue flags, and orchids

They are defined by 3 features:

1. **Geophytes**: herbaceous above ground with bulbs, corms, rhizomes, tubers as modified, perennial stems below ground

2. **Tepals**: showy perianth in 2 series of 3 each; usually all petaloid, or outer series not green and sepal-like

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3. Nectaries: usually well-developed nectar tissue at the base of ovary or stamens; insect or bird-pollinated

**Liliaceae s.s. - lily family**

The family comprises herbaceous perennials common in the north temperate forests.

Leaves usually do not have a well-developed petiole and leaves are either sessile or basal.
**Liliaceae s.s. - lily family**

Flowers are showy and 3 merous with 6 tepals

3 fused carpels (superior) form capsule or berry with numerous seeds

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**Liliaceae s.s. - lily family**

Lilium michiganense - Turk’s cap lily

Medeola virginica - Indian cucumber root [special concern]

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**Liliaceae s.s. - lily family**

Clintonia borealis - Yellow bead lily

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**Liliaceae s.s. - lily family**

Erythronium americanum - yellow trout lily

Tulipa sp. - tulip
**Melanthiaceae – trillium family**

- *Trillium recurvatum* - prairie trillium
- *Trillium grandiflorum* - large flowered trillium

**Colchicaceae – bellwort family**

- *Uvularia grandiflora* - bellwort

**Asparagaceae – asparagus family**

- *Asparagus officinalis* - asparagus adventive, cultivated
- *Maianthemum canadense* - wild lily of the valley
Maianthemum racemosum - False Solomon's-seal

Maianthemum stellatum - Starry false Solomon's-seal

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*Asparagaceae – asparagus family

Polygonatum pubescens - Solomon's-seal

*Asparagaceae – asparagus family

Amaryllidaceae – amaryllis family

Allium tricoccum - Wild leak

Amaryllidaceae – amaryllis family

some common cultivated species

Scilla sibirica - English bluebell

[Narcissus sp. - daffodil

[Amaryllidaceae]

Cultivated, note corona

Scilla sibirica - English bluebell

[Narcissus sp. - daffodil

[Amaryllidaceae]

Cultivated, note corona
**Smilacaceae - catbriar family**

- Small family, mainly of South Hemisphere
- Climbing via tendrils (modified stipules)
- Starchy tubers, edible
- Distinctive with large, net-veined leaves and definite petioles

*Smilax herbacea - bristly greenbriar*

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**Iridaceae - iris family**

- A family primarily of Mediterranean climate geophytes
- Leaves are basal and equitant - folded and overlapping

*Iris virginica - Blue flag, iris*
**Iridaceae - iris family**

CA 3  CO 3  A 3  G (3)

Tepals 6, the 3 inner (petals) forming the "flags or standards."

The 3 outer (sepal) forming the "falls"
Note the nectar guides for insects

The 3 stamens are positioned under the 3 petal-like styles

The gynoecium is inferior and forms a 3-parted capsule

*Iris virginica - Blue flag, iris*

**Iridaceae - iris family**

*Iris versicolor - Blue flag*

Iris pseudacorus - Yellow flag
Introduced and potentially invasive

**Iridaceae - iris family**

Sisyrinchium campestre - blue-eyed grass
Sisyrinchium found in drier areas than Iris

**Iridaceae - iris family**

*Iris lacustris - Dwarf lake iris*

Endangered species restricted to fringe areas of northern Great Lakes; clonal growth

*Iris lacustris* Dwarf lake iris
**Iridaceae - iris family**

*Crocus vernalis - Crocus cultivated*

Crocuses are all introduced but are some of the earliest flowering plants in the spring. The dried styles of *C. sativus* yields the expensive saffron.

**Orchidaceae - orchid family**

*Cypripedium acaule - stemless lady's slipper*

The lower petal is elaborated into the labellum/lip - the landing platform

Main features of the family:
- Pollen masses or pollinia
- Specialized floral structure and pollination biology
- Reduced stamen number
- Many, minute, dust-like seeds in capsules

Remember the Ericaceae!
**Orchidaceae - orchid family**

Cypripedium arietinum
Ram’s-head lady’s-slipper
threatened

Cypripedium calceolus
Yellow lady’s-slipper

Cypripedium reginae
Showy lady’s-slipper

Cypripedium candidum
White lady’s-slipper
Threatened, fen or calcareous soils

All our other orchids have only 1 functional stamen with one or two pollinia.

The stamen is situated on a column formed by fusion with the top of the inferior gynoecium.
**Orchidaceae - orchid family**

- 2 pollinia sacs
- Style/stigmatic region
- Enlarged column

**Orchidaceae - orchid family**

- *Aplectrum hyemale*
  - Putty root, Adam and eve
  - [Special concern]

**Orchidaceae - orchid family**

- *Arethusa bulbosa* - Dragon’s mouth
  - [Special concern]

- *Calypso bulbosa* - calypso orchid
  - [threatened]

**Orchidaceae - orchid family**

- *Calopogon tuberosus* - grass pink: note the labellum on top!
Orchidaceae - orchid family

Goodyera pubescens - Rattlesnake plantain

Goodyera tesselata - Rattlesnake plantain

Corallorhiza trifida - Early coral root

Corallorhiza striata - Striped coral root

Platanthera leucophaea - Prairie fringed orchid

State endangered, Federally threatened

Galearis spectabilis - Showy orchid

Malaxis monophyllos - adder’s mouth

**Orchidaceae - orchid family

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**Orchidaceae - orchid family
**Orchidaceae - orchid family**

*Pogonia ophioglossoides* - snake mouth

*Spiranthes cernua* - nodding ladies’ tresses

*Dioscoreaceae - yam family*

Small family, mostly of the tropics, with viney stems and net-veined leaves. Fruits are 3-winged.

Source of edible yam; sources of steroids, cortisones, first oral contraceptives (diosgenin, progesterone)