Diversity and Floristics of Monocots

...aquatics, aroids, lilies...

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

Butomaceae - flowering rush family
Emergent aquatic family
Leaves show no obvious blade and petiole differentiation

\[ \text{CA 3 CO 3 A9 G6} \]
Flowers in umbels, unsealed carpels at top form follicles

*Butomus umbellatus* - flowering rush
non-native, potentially invasive!

*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

*Sagittaria* - arrowhead
**Alismataceae - water plantain family**

*Alisma plantago-aquatica* - water plantain (or *A. subcordatum*), similar to *Sagittaria*, but with carpels in one ring rather than globose head.

**Juncaginaceae - arrowgrass family**

*A. plantago-aquatica* - water plantain (or *A. subcordatum*), similar to *Sagittaria*, but with carpels in one ring rather than globose head.

**Hydrocharitaceae - frog bit family**

Both species in Wisconsin are considered "special concern" but are often overlooked because of size; this species has 6 carpels, the other 3.

**Triglochin maritima - arrowgrass**

*Elodea canadensis* - waterweed

Our native species of *Elodea* has a whorl of 3 leaves; cultivated and escaped *E. densa* from Argentina has a whorl of 6 leaves.

Pollen explodes out and floats.
Hydrocharitaceae - frog bit family

Vallisneria (tapegrasses, eelgrasses) are composed of two species, one New World, one Old World.

Vallisneria americana - tapegrass
(with Hydrilla verticillata)

Vallisneria americana - tapegrass (with floating flowers)

Hydrocharitaceae - frog bit family

Vallisneria spiralis - tapegrass (OW)

Note the floating male flowers and one large female with 3 stigmatic areas on a long peduncle

Potamogetonaceae - pondweed family

Aquatic plants with dimorphic leaves
25 species in Wisconsin difficult to identify, hybridize, and some are troublesome weeds

Potamogeton sp. - pondweed

Potamogetonaceae - pondweed family

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

CA 0,4  CO 0  A 4  G 4
*Potamogetonaceae - pondweed family

**Arisaema triphyllum - jack-in-the-pulpit family

**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

CAO COA A6∞ (2-3)

Flowers unisexual or perfect
Fruits berries clustered on spadix

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

flesh flies - Sarcophagidae
carrion flies - Calliphoridae
gnats - Mycetophilidae

Symlocarpus foetidus - skunk cabbage

Symplocarpus foetidus - skunk cabbage

**Arisaema triphyllum - jack-in-the-pulpit

[or jill-in-the-pulpit?]

urban legend!
**Araceae - jack-in-the-pulpit family**

*Syrphocarpus foetidus* - skunk cabbage

Cabbage-like leaves emerge later in the spring.

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


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Endogenous heating of skunk cabbage (*S. renifolius*) spadix

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*Calla palustris* - water arum

Our emergent aquatic member of the 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
**Araceae - jack-in-the-pulpit family**

*Spinoidea polyriza*
great duckweed

Largest of the aquatics

Smallest member of the family and the angiosperms

*Wolffia columbiana* - water meal

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**Acoraceae - sweetflag family**

Emergent aquatic plants with ethereal oils and no raphides – first diverging monocot!

2 species, one in both the old world and new world; both are in Wisconsin

Inflorescence with spathe and spadix, flowers bisexual

*Acorus americanus* - sweet flag

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**Lilioid Monocots (Liliales + Asparagales)**

The lilioid 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

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

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

The orders of Liliales and Asparagales contain 15 families in the new classification system, but these are not well demarcated based on morphological features.

Warning! The families used and placement of genera in the Field Manual of the Michigan Flora is often wrong (as they are in Wisflora). See the handout provided and on the Student Herbarium cabinets for correct naming and placements.

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

Leaves usually do not have a well-developed petioles and leaves are either sessile or basal.

**Lilium michigense** - Turk’s cap lily

**Medeola virginica** - Indian cucumber root

Flowers are showy and 3 merous with 6 tepals

3 fused carpels (either superior or inferior) form capsule or berry with numerous seeds
**Liliaceae s.l. - lily family**

*Clintonia borealis* - Yellow bead lily

*Tulipa sp.* - Tulip

*Erythronium americanum* - Yellow trout lily

**Melanthiaceae – trillium family**

*Trillium grandiflorum* - large flowered trillium

*Trillium recurvatum* - prairie trillium

**Colchicaceae – bellwort family**

*Uvularia grandiflora* - Bellwort
*Asparagaceae – asparagus family

Asparagus officinalis – asparagus adventive, cultivated

Maianthemum canadense – wild lily of the valley

Maianthemum stellatum – Starry false Solomon’s-seal
[= Smilacina stellata]

Maianthemum racemosum – False Solomon’s-seal
[= Smilacina racemosa]

Polygonatum pubescens – Solomon’s-seal
Amaryllidaceae – amaryllis family

*Allium tricoccum -
Wild leek

some common cultivated species

*Scilla sibirica - English bluebell
[Asparagaceae] cultivated

*Narcissus sp. - daffodil
[Amaryllidaceae] Cultivated, note corona

some common cultivated species

*Hemerocallis fulva - day lily
[Xanthorrhoeaceae] cultivated

*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
*Smilacaceae - catbriar family

Flowers unisexual, dioecious plants; carrion flowers are foetid

Smilax herbacea - common carrion-flower

Male umbel Female umbel

Fruit an umbel of black berries (red berries is from jack-in-the pulpit)