Diversity and Evolution of Asterids

. . . mints and snapdragons . . .

*Boraginaceae - borage family

Widely distributed, large family of alternate leaved plants. Typically hairy. Typically possess helicoil or scorpisid cymes = compound monochasium. Many are poisonous or used medicinally.

Mertensia virginica - Eastern bluebells

*Boraginaceae - borage family

CA (5) - CO (5) A 5 G (2)

Gynobasic style: not terminal style which is usual in plants; this feature is shared with the mint family (Lamiaceae) which is not related

Myosotis - forget me not

2 carpels each with 2 ovules are separated at maturity and each further separated into 1 ovuled compartments

Fruit typically 4 nutlets

Echium vulgare - Blueweed, viper’s bugloss

adventive
*Boraginaceae - borage family

* Hackelia virginiana
  Beggar's-lice

* Myosotis scorpioides
  Common forget-me-not

* Lithospermum canescens
  Hoary puccoon

* Lithospermum incisium
  Fringed puccoon

* Lithospermum canescens
  Hoary puccoon

* Mertensia virginica
  Eastern bluebells

Botany 401 final field exam plant!
Hydrophyllum virginianum - Common waterleaf

Leaves compound or lobed and "water-marked"

*Boraginaceae - borage family

*Syringa vulgaris - Lilac

*Cultivated

**Oleaceae - olive family

*C. A. M. (4)

**Forsythia intermedia / suspensa

Goldenbell, forsythia introduced

**Ligustrum vulgare

European privet planted, invasive

**Fraxinus pennsylvanica - Red, green ash

Male flowers

Female flowers

Ashes have compound leaves, other genera are simple

Ashes have diamond-shaped furrows on the bark

Ashes are unisexual, other genera are bisexual

**Oleaceae - olive family

Woody plants, opposite leaves

4 merous actinomorphic or regular flowers

*Syringa vulgaris - Lilac
cultivated
**Oleaceae - ash family**

- Ashes have 1-seeded samaras
- Note opposite, compound leaves and furrowed bark

*Fraxinus americana*
White ash

**Lamiaceae - mint family**

- Strong odors (mint, peppermint, sage, rosemary)
- Squarish stems with opposite leaves
- Flowers in verticils = clustered flowers at a node

**Lamiaceae - mint family**

- Strongly 2-lipped corolla with 4 or 2 stamens inserted
- Bilabiate — family is called Labiatae

**Lamiaceae - mint family**

- Strongly 2-lipped corolla with 4 or 2 stamens inserted
- Bilabiate — family is called Labiatae
- Important for bee pollination - key innovation for *Salvia*?
**Lamiaceae - mint family**

CA (5)  CO (2+3)  A 4.2  G (2)

- 2 carpels but gynobasic as in Boraginaceae
- 4 nutlets

Glechoma hederacea - creeping charlie
Naturalized and invasive

**Lamiaceae - mint family**

Leonurus cardiaca - motherwort, naturalized
Cardiac glycosides such as leonuridin

Lycopus americanus
Water horehound

Lycopus uniflorus
Water horehound
**Lamiaceae - mint family**

- *Monarda punctata* - horsemint, spotted bee-balm
- *Monarda fistulosa* - bee-balm, wild bergamot

**Lamiaceae - mint family**

- *Nepeta cataria* - catnip
- *Prunella vulgaris* - selfheal

**Lamiaceae - mint family**

- *Scutellaria parvula* - skullcap
- *Salvia* - sage
  (ornamental)

**Verbenaceae - vervain family**

- *Verbena hastata* - Blue vervain

• Like Lamiaceae

• Squarish stems with opposite, serrate leaves

• Inflorescence often spike-like

• Flowers with terminal style, not lipped

• Fruits usually nutlets (but not gynobasic) or drupes

CA (5) CO (5) A 4 G (2)
*Verbenaceae - vervain family

Verbena stricta - Hoary vervain

Phyla lanceolata - fogfruit

Phrymaceae – lopseed family

Phyurma leptostachya

lo seeded

Scrophulariaceae - figwort family

Verbascum blattaria - moth mullein

Scrophularia marilandica - eastern figwort, carpenter’s square

Scrophularia thapsus - common mullein, weedy biennial (1st year as a rosette)
• *Plantaginaceae - plantain family
  - Large family
  - Zygomatic flowers
  - Capsules

Chelone glabra - turtlehead
Veronicastrum virginicum - Culver’s-root

• Linaria vulgaris - butter and eggs

• *Plantaginaceae - plantain family

Veronica catenata - water speedwell
Veronica persica - Bird’s-eye speedwell
Plantago (plantains) are wind pollinated derivatives within this animal pollinated family. Leaves are basal and with strongly arcuate venation. Note the circumscissile capsule below.

*Plantaginaceae - plantain family

- *Plantago lanceolata* - English plantain
- *Plantago major* - common plantain
- *Plantago patagonica* - wooly plantain
Stamens 5, or 2 sets of 2, or reduced to 2. Gynoecium bi-carpellate, axile placentation, and usually producing many seeded capsules.

**Orobanchaceae – broomrape family**

- Castilleja coccinea - Indian paintbrush
- Castilleja sessiliflora - downy paintbrush
- Pedicularis canadensis - wood betony
- Pedicularis lanceolata - swamp lousewort
**Orobanchaceae – broomrape family**

Holo-parasitic family (totally non-green) with snapdragon like flowers

Now shown to be closely related to the hemi-parasitic genera of Scrophulariaceae only

**Orobanchaceae – broomrape family**

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**Orobanchaceae – broomrape family**

Orobanche fasciculata - fascicled broomrape

Threatened: grows only on Artemisia campestris - wormwood

Orobanche uniflora - One-flowered broomrape

**Orobanchaceae – broomrape family**

Epifagus virginiana - beech drops

Grows only on roots of beech (Fagus)

haustoria

**Lentibulariaceae - bladderwort family**

Insectivorous herbs, aquatic or of wetlands. Wisconsin has 2 of the 3 genera — *Utricularia* (bladderworts) with mouse-trap like modified leaves and *Pinguicula* (butterwort) with sticky fly-paper modified leaves. Plants are rootless.

*Pinguicula - butterwort*

*Utricularia - bladderwort*
**Lentibulariaceae - bladderwort family**

Flowers strongly zygomorphic and often spurred. Many of the species are threatened or endangered.

*Utricularia intermedia* - flat leaved bladderwort

*Utricularia cornuta* - horned bladderwort

*Utricularia vulgaris* - common bladderwort

Bladderworts separated based on habitat, floral color, and position of bladders.

*Utricularia cornuta* - horned bladderwort

*Utricularia intermedia* - flat leaved bladderwort

*Utricularia vulgaris* - common bladderwort

Endangered in WI and found only in Apostle Islands on exposed, bare rock (right). Far more common in MI and found in various habitats (above).

*Utricularia purpurea* - purple bladderwort

*Utricularia resupinata* - resupinate bladderwort

*Pinguicula vulgaris* - butterwort
**Lentibulariaceae - bladderwort family**

*Pinguicula vulgaris* - Butterwort

Sticky "fly-paper" leaves – vs. "vacuum-trap" of *Utricularia*

**Bignoniaceae - trumpet creeper family**

Tropical family of trees, shrubs, and woody vines consisting of 113 genera and 800 species.

Leaves mostly compound (exception is catalpa from North America).

- **Campsis radicans** - trumpet creeper
  - Cultivated; from eastern North America

- **Catalpa speciosa**
  - Introduced from eastern North America and often escaped

- Leaves mostly compound (exception is catalpa from North America).

- Flowers 5 merous, +/− 2 lipped, 4 stamens with a 5th staminode

- Fruit either capsule or berry

- Catalpa speciosa
  - Catalpa Introduced from eastern North America and often escaped