



Diversity and Evolution of Asterids

... mints and snapdragons ...

*Boraginaceae - borage family

Widely distributed, large family of alternate leaved plants. Typically hairy. Typically possess helicoid or scorpiod 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

*Boraginaceae - borage family



Echium vulgare
Blueweed, viper's bugloss

adventive



*Boraginaceae - borage family



Hackelia virginiana
Beggar' s-lice



Myosotis scorpioides
Common forget-me-not

*Boraginaceae - borage family



Lithospermum canescens
Hoary puccoon



Lithospermum incisium
Fringed puccoon

*Boraginaceae - borage family



Lithospermum canescens
Hoary puccoon



- *Lithospermum* (puccoon) - classic dimorphic heterostyly

*Boraginaceae - borage family



Mertensia virginica
Eastern bluebells

Botany 401 final field
exam plant!



*Boraginaceae - borage family



Leaves compound or lobed and “water-marked”



Hydrophyllum virginianum - Common waterleaf

Botany 401 final field exam plant!

**Oleaceae - olive family

CA (4) CO (4) or 0 A 2 G (2)

- Woody plants, opposite leaves
- 4 merous actinomorphic or regular flowers



Syringa vulgaris - Lilac
cultivated

**Oleaceae - olive family



Forsythia intermedia / suspensa
Goldenbell, forsythia
introduced

CA (4) CO (4) or 0 A 2 G (2)

- Woody plants, opposite leaves
- 4 merous actinomorphic or regular flowers



Ligustrum vulgare
European privet
planted, invasive

**Oleaceae - olive family

CA (4) CO (4) or 0 A 2 G (2)



- Ashes have compound leaves, other genera are simple
- Ashes have diamond-shaped furrows on the bark
- Ashes are unisexual, other genera are bisexual



Male flowers

Female flowers

Fraxinus pennsylvanica - Red, green ash

**Oleaceae - ash family



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

Fraxinus americana
White ash

**Lamiaceae - mint family

CA (5) CO (2+3) A 4,2 G (2)



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

**Lamiaceae - mint family

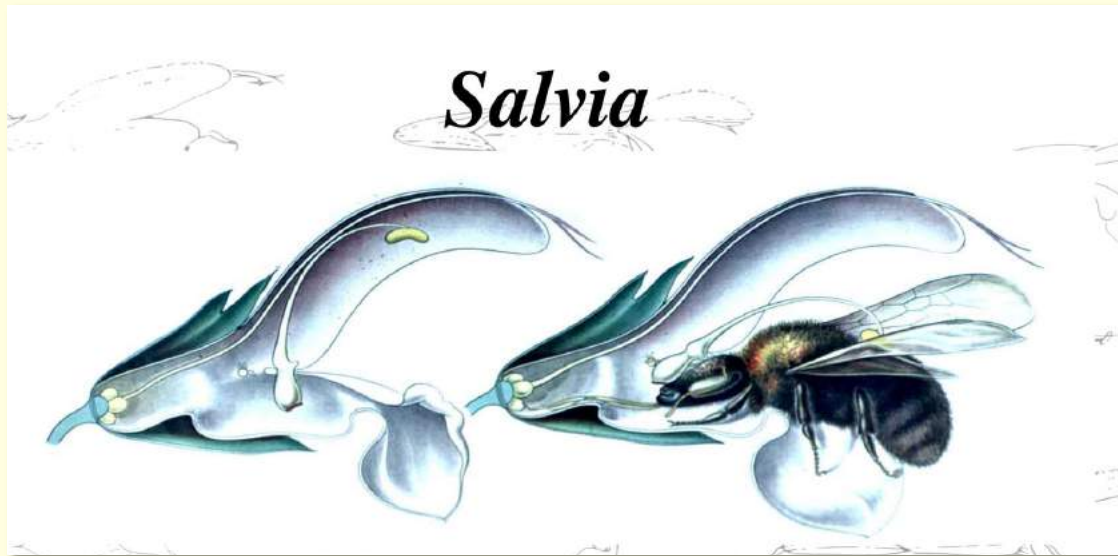
CA (5) CO (2+3) A 4,2 G (2)



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

**Lamiaceae - mint family

CA (5) CO (2+3) A 4,2 G (2)



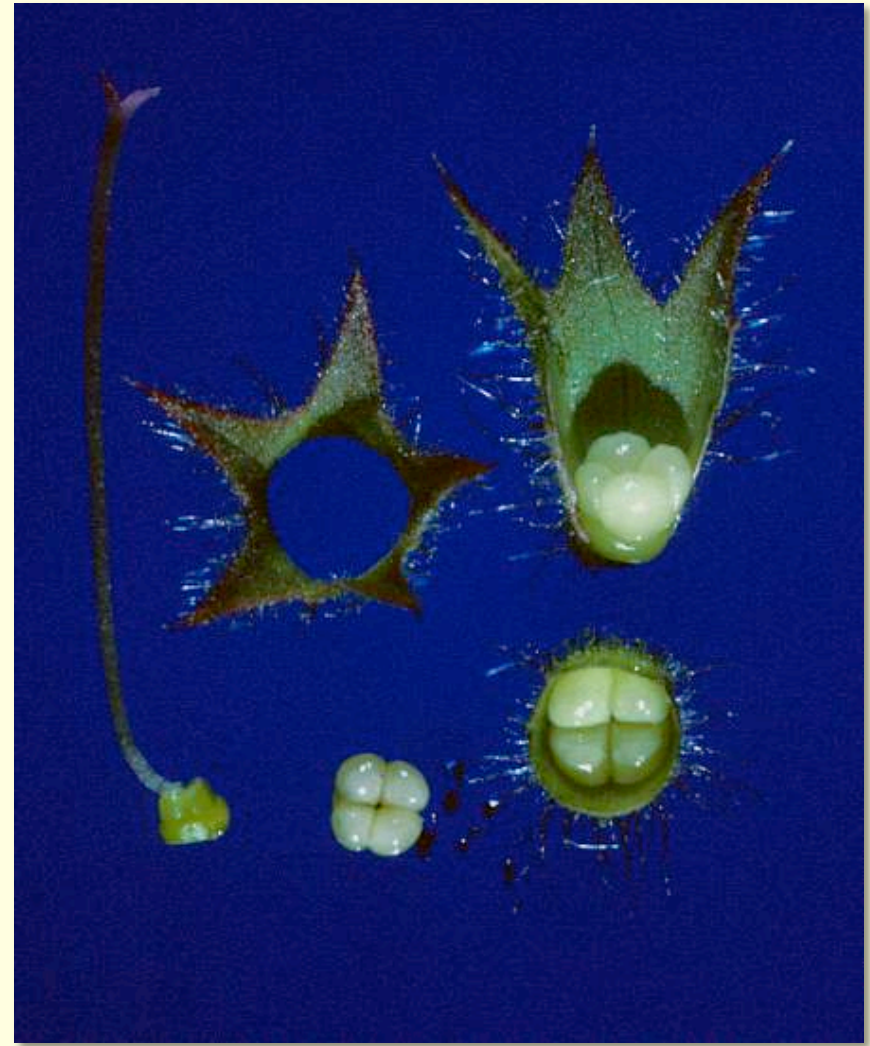
- Strongly 2-lipped corolla with 4 or 2 stamens inserted
- Bilabiate — family is called **Labiatae**
- Important for bee pollination - key innovation for *Salvia*?



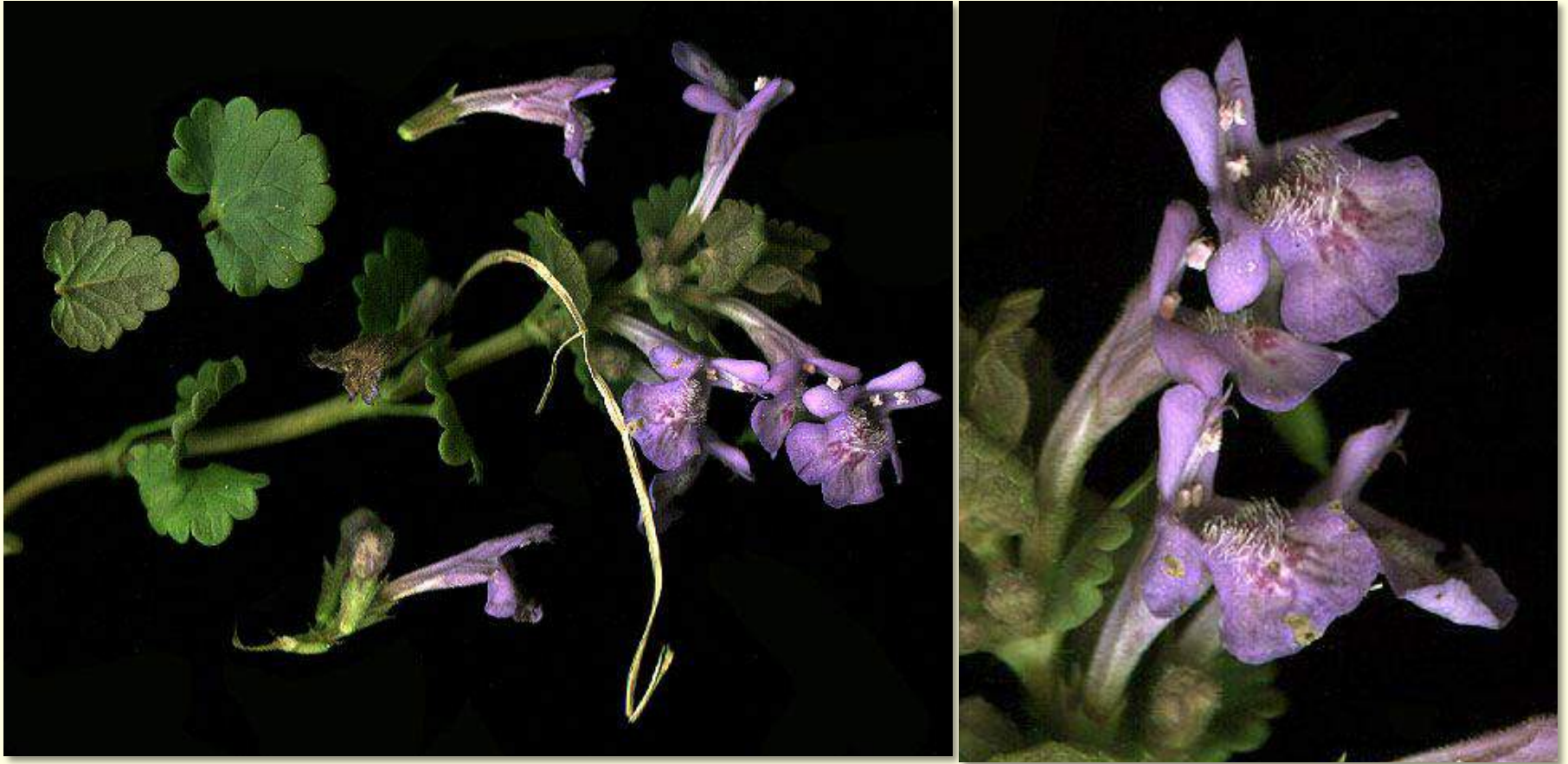
**Lamiaceae - mint family

CA (5) CO (2+3) A 4,2 G (2)

- 2 carpels but **gynobasic** as in Boraginaceae
- 4 nutlets



**Lamiaceae - mint family



Glechoma hederacea - creeping charlie
Naturalized and invasive

**Lamiaceae - mint family



Leonurus cardiaca - motherwort, naturalized
Cardiac glycosides such as leonuridin

****Lamiaceae - mint family**



Lycopodium americanus
Water horehound



Lycopodium uniflorum
Water horehound

**Lamiaceae - mint family



Monarda punctata - horsemint,
spotted bee-balm

Monarda fistulosa - bee-balm, wild bergamot



**Lamiaceae - mint family

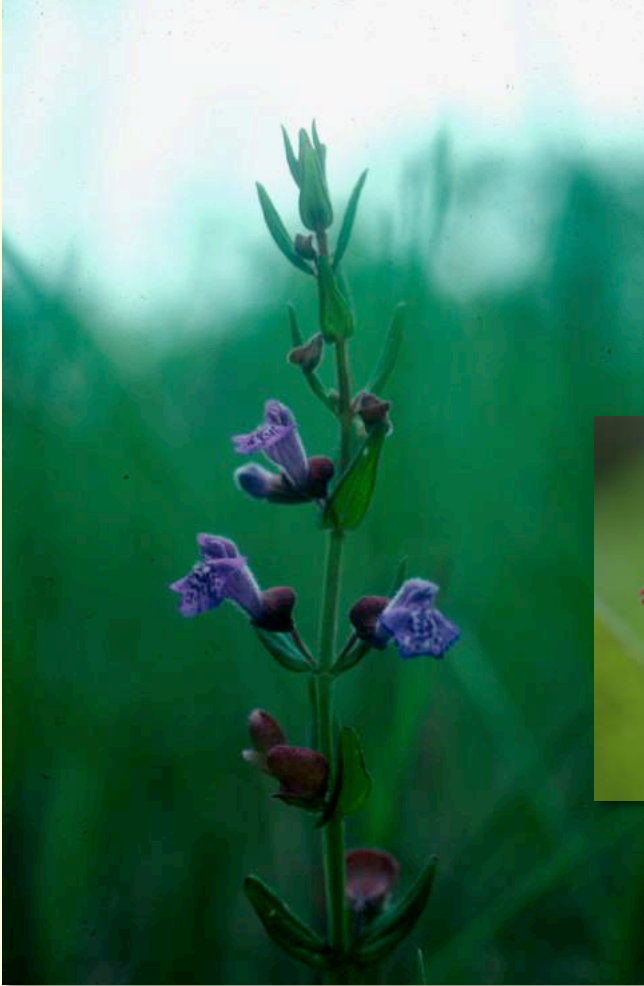


Nepeta cataria - catnip



Prunella vulgaris - selfheal

**Lamiaceae - mint family



Scutellaria parvula
skullcap



Salvia -sage
(ornamental)



*Verbenaceae - vervain family

CA (5) CO (5) A 4 G (2)



- 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

Verbena hastata
Blue vervain



*Verbenaceae - vervain family



Verbena stricta - Hoary vervain



Phyla lanceolata - fogfruit

Phrymaceae – lopseed family



Phyrma leptostachya
lopseed



Scrophulariaceae - figwort family



Verbascum blattaria - moth mullein

Scrophularia marilandica -
eastern figwort, carpenter's-
square

Scrophulariaceae - figwort family



Verbascum thapsus - common mullein weedy biennial (1st year as a rosette)

*Plantaginaceae - plantain family

- Large family
- Zygomorphic flowers
- Capsules



Chelone glabra - turtlehead



Veronicastrum virginicum
Culver' s-root

*Plantaginaceae - plantain family



Linaria vulgaris - butter and eggs



*Plantaginaceae - plantain family



Veronica catenata - water speedwell



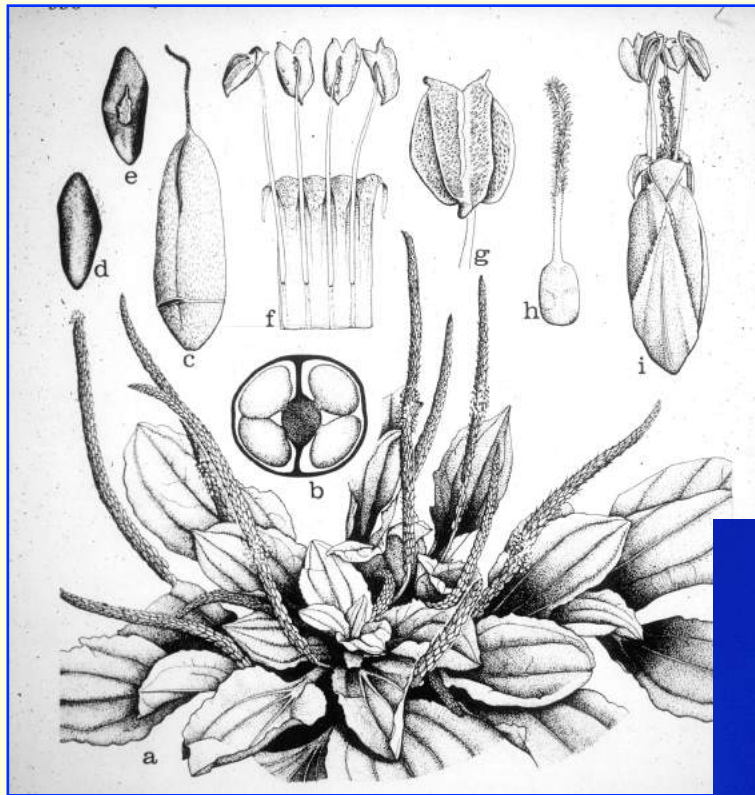
*Plantaginaceae - plantain family



Veronica persica
Bird' s-eye speedwell



*Plantaginaceae - plantain family



Plantago (plantains) are wind pollinated derivatives within this animal pollinated family. Leaves are basal and with strongly arcuate venation. Note the circumscissile capsule below.



Plantago - plantain

*Plantaginaceae - plantain family



Plantago lanceolata - English plantain

*Plantaginaceae - plantain family



Plantago major - common plantain

*Plantaginaceae - plantain family



Plantago patagonica- woolly plantain

**Orobanchaceae – broomrape family

CA (4-5) CO (2+3) A 5, 2+2, 2 G (2)

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

Group C of hemi-parasites related to Orobanchaceae

**Orobanchaceae – broomrape family



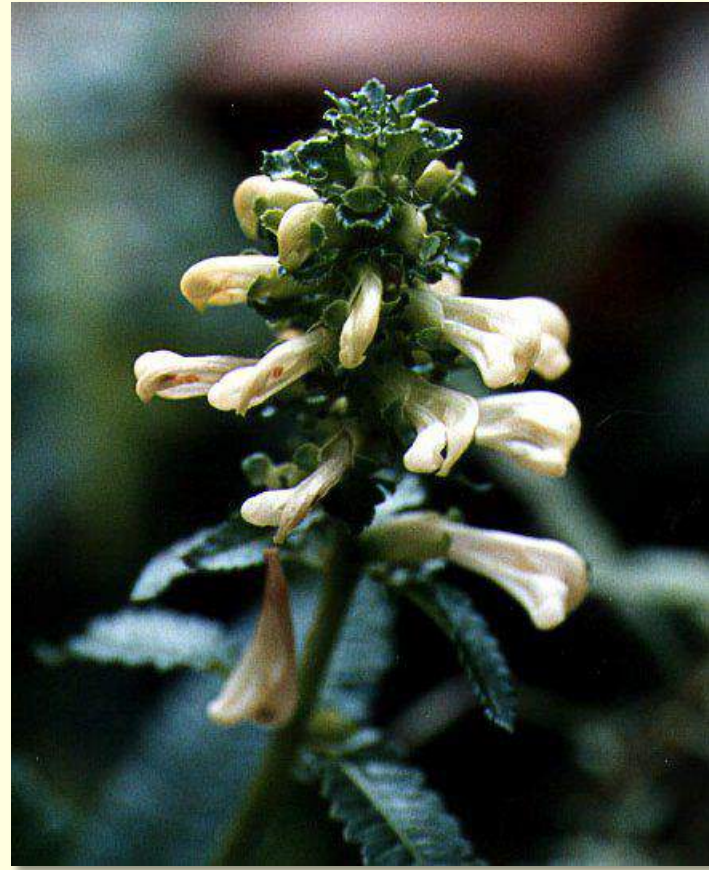
Castilleja sessiflora - downy paintbrush



**Orobanchaceae – broomrape family



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



Conopholis americana (squaw-root)



**Orobanchaceae – broomrape family



Orobanche fasciculata -
fascicled broomrape

Threatened: grows only on *Artemisia campestris* -
wormwood

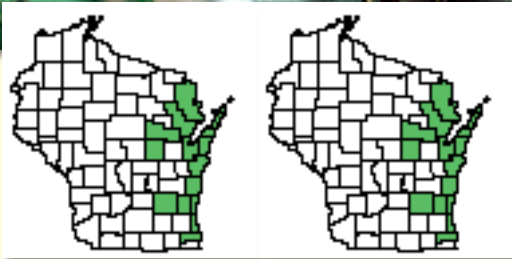


Orobanche uniflora
One-flowered broomrape

**Orobanchaceae – broomrape family



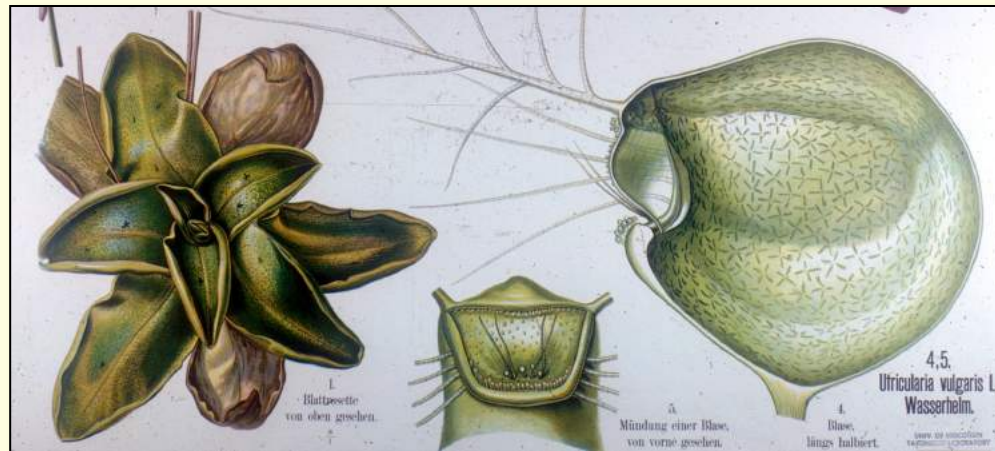
haustoria



Epifagus virginiana - beech drops
Grows only on roots of beech (*Fagus*)

*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



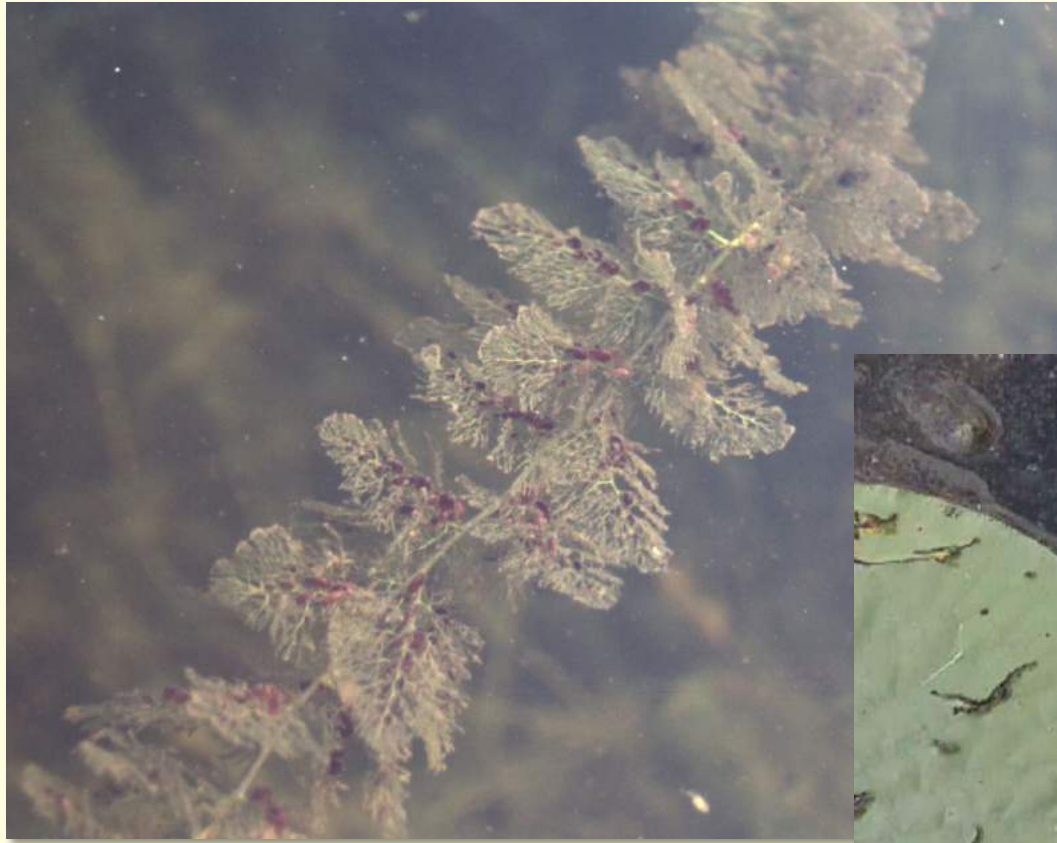
Utricularia cornuta
horned bladderwort

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



Utricularia intermedia
flat leaved bladderwort

*Lentibulariaceae - bladderwort family



Utricularia vulgaris - common bladderwort

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



*Lentibulariaceae - bladderwort family



Utricularia purpurea - purple bladderwort



Utricularia resupinata - resupinate bladderwort

*Lentibulariaceae - bladderwort family



Pinguicula vulgaris
Butterwort



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).



*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).

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

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

Fruit either capsule or berry

Campsis radicans - trumpet creeper
Cultivated; from eastern North America

*Bignoniaceae - trumpet creeper family



Elongated capsules
appearing like
legumes



Catalpa speciosa

Catalpa

Introduced from eastern North American
and often escaped