



## Solanales

- order within 'lamiids' or Asterid I group
- 5 families and nearly 5,000 species dominated by Solanaceae (nightshade) and Convolvulaceae (morning glory)
- no iridoids, alternate leaves, plicate corolla, calyx persistent in fruit

Solanaceae

Convolvulaceae

### \*Convolvulaceae- morning glory

Largely tropical family of 57 genera and 1600 spp. Twining herbs or woody with alternate leaves.

*Ipomoea purpurea*  
Morning-glory

### \*Convolvulaceae- morning glory

*Cuscuta* (Cuscutaceae) is actually part of the Convolvulaceae!

- Twining habit (for support) has gone one step further and species are now parasitic (support + food + water; no chlorophyll)

**\*Convolvulaceae- morning glory**



*Cuscuta gronovii*  
Common dodder



*Cuscuta glomerata*  
Rope dodder

**\*Convolvulaceae- morning glory**

CA (5) CO (5) A5 G (2)

Flowers strongly funnelform with plicate corolla tube (with fold lines). Calyx often unfused.



*Calystegia sepium*  
Hedge bindweed

**\*Convolvulaceae- morning glory**



*Calystegia sepium*  
Hedge bindweed  
Note: 2 large bracts

*Convolvulus arvensis*  
Field bindweed  
Note: no floral bracts



**\*Convolvulaceae- morning glory**



*Ipomoea stolonifera*



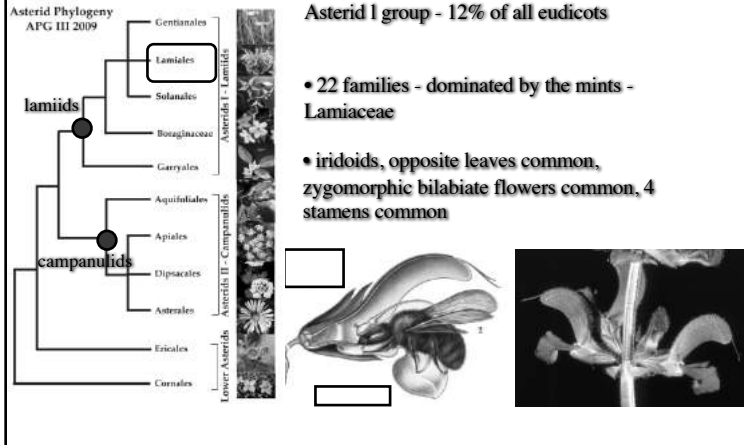
*Ipomoea batatas*  
Sweet potato

## Lamiales

• large order (23,000+ species) within 'lamiid' or Asterid I group - 12% of all eudicots

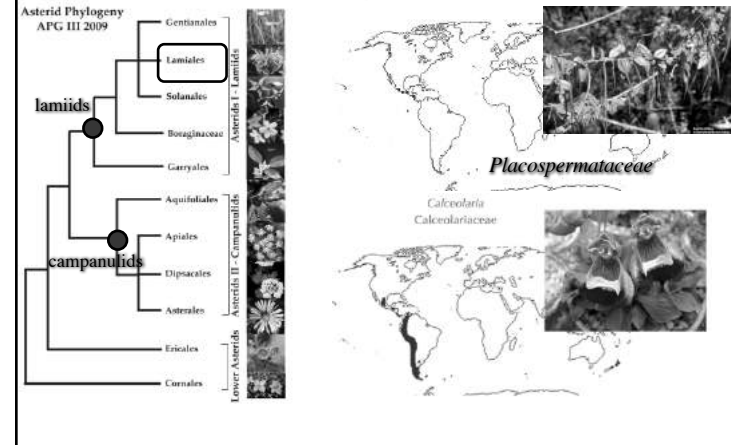
• 22 families - dominated by the mints - Lamiaceae

• iridoids, opposite leaves common, zygomorphic bilabiate flowers common, 4 stamens common



## Lamiales

• many small, isolated families



## Oleaceae - olive and ash

Cosmopolitan family of opposite-leaved shrubs and trees

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

- 4 merous flowers
- only 2 stamens



## Oleaceae - olive and ash

- olives are one-seeded drupes



## Oleaceae - olive and ash



*Forsythia suspensa*  
Goldenbell, forsythia

*Ligustrum vulgare*  
European privet



## Oleaceae - olive and ash



*Fraxinus pennsylvanica* -  
Red, green ash



Male flowers    Female flowers

- Ashes have compound leaves and diamond-furrowed bark
- Ashes are usually unisexual, other genera are bisexual

## Oleaceae - olive and ash



*Fraxinus americana* - White ash

- Ashes have 1-seeded samaras



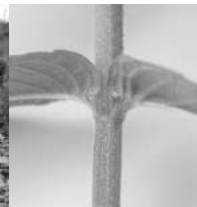
## \*Lamiaceae - mints

Huge cosmopolitan family of 267 genera and nearly 7000 species of herbs and sometimes shrubs or trees

- major family of Mediterranean climate regions
- strongly aromatic (mint, peppermint, sage, rosemary, thyme)
- square stems, opposite leaves
- flowers often congested in verticels or terminal heads



*Satureja* in Greece



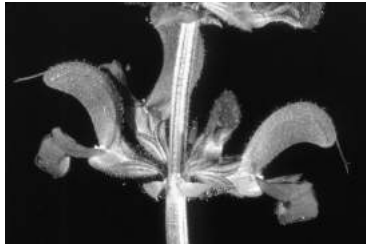
*Mentha longifolia*

## \*Lamiaceae - mints

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

- flowers two-lipped (bilabiate - called Labiatae)

*Stachys palustris* -  
hedge nettle



*Salvia* - sage



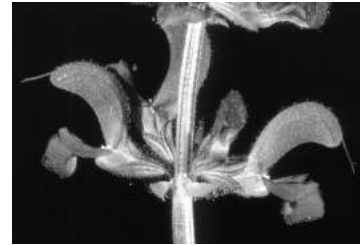
## \*Lamiaceae - mints

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

- flowers two-lipped (bilabiate)
- stamens 4 (or even 2)



*Clerodendrum*

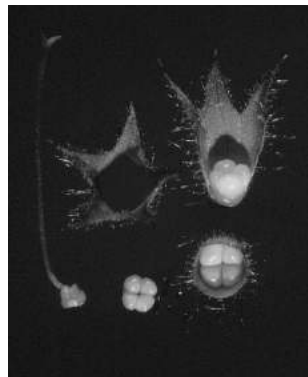


*Salvia* - sage

## \*Lamiaceae - mints

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

- flowers two-lipped (bilabiate)
- stamens 4 (or even 2)
- 2 carpels, gynobasic
- fruit - 4 nutlets



*Galeopsis*



## \*Lamiaceae - mints

*Prunella vulgaris* -  
selfheal

*Nepeta cataria* -  
catnip

*Glechoma hederacea* -  
creeping charlie



Botany 400 collections species!

**\*Lamiaceae - mints**

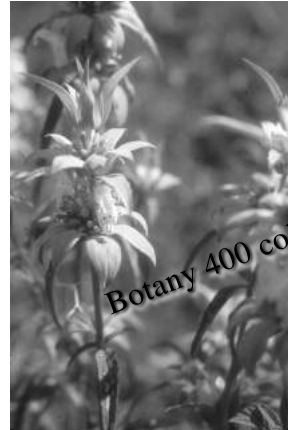


*Leonurus cardiaca* -  
motherwort



*Lycopus americanus*  
Water horehound

**\*Lamiaceae - mints**



*Monarda punctata* -  
horsemint

*Monarda fistulosa* -  
wild bergamot



Botany 400 collections species!

**\*Lamiaceae - mints**



*Clerodendrum*

• some woody members formerly placed in Verbenaceae now are mints



*Tectona grandis* - teak



*Vitex*

**Verbenaceae - vervains**

34 genera and 1175 species of aromatic herbs, vines, trees

- square stems
- opposite, serrate leaves
- flowers not lipped
- fruit often 1-2 seeded drupe, not gynobasic

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



*Lantana camara* - sage



*Verbena gracilencens*

## Verbenaceae - vervains



*Verbena hastata* - Blue vervain



*Verbena stricta* - Hoary vervain

Botany 400 collections species!

## \* "Scrophulariaceae"

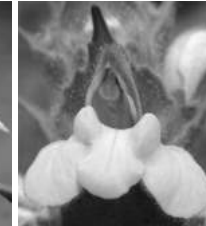
CA (4-5) CO (2+3) A 2+2 G (2)

The 'old' family is similar to mints, but . . .

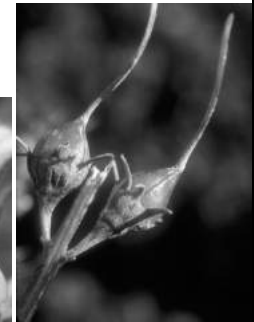
- alternate or opposite leaved
- round or squarish stems
- terminal style, many seeds, capsules



*Bellardia*



*Aureolaria* - false foxglove



## \* "Scrophulariaceae"

. . . and included normal as well as hemiparasitic species (green but with attachment to plants for additional food)



*Pedicularis canadensis* - wood betony



*Castilleja coccinea* - Indian paintbrush

## \* "Scrophulariaceae"

Status of 3 "old" unrelated families

1. Plantaginaceae – wind pollinated
2. Orobanchaceae – holoparasites
3. Scrophulariaceae – the rest + hemiparasites

*Plantago*-  
plantain



*Conopholis*-  
cancer-root



*Verbascum*-  
mullein



*Linaria*-  
butter-eggs



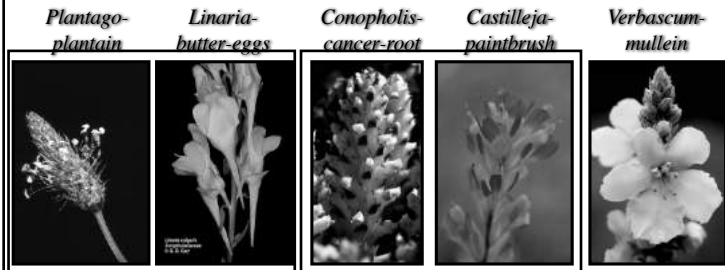
*Castilleja*-  
paintbrush



## \* "Scrophulariaceae"

Status of 3 "new" unrelated families – DNA story!

1. Plantaginaceae – wind pollinated + most genera
2. Orobanchaceae – holoparasites + hemiparasites
3. Scrophulariaceae – only *Scrophularia* + *Verbascum*



## Scrophulariaceae - figworts



*Verbascum thapsus* - mullein

New Scrophulariaceae is small with 24 genera but retains type genus

*Scrophularia marilandica* -  
figwort, carpenter's-square

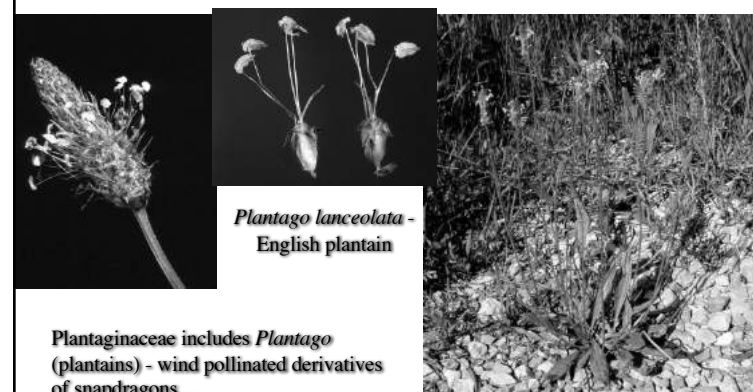


## Scrophulariaceae - figworts



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

## Plantaginaceae - plantains



*Plantago lanceolata* -  
English plantain

Plantaginaceae includes *Plantago*  
(plantains) - wind pollinated derivatives  
of snapdragons . . .

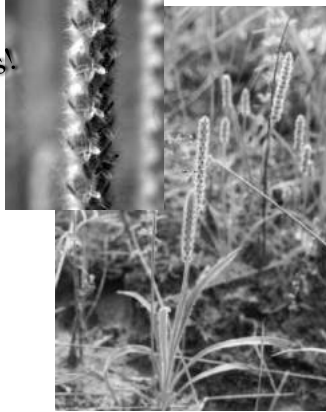


## Plantaginaceae - plantains



*Plantago major* - common plantain

Plantaginaceae includes *Plantago* (plantains) - wind pollinated derivatives of snapdragons . . .



*Plantago patagonica* - woolly plantain

## Plantaginaceae - plantains



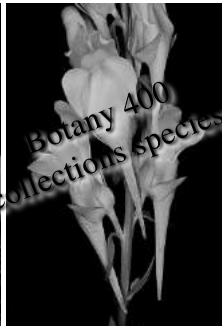
*Chelone glabra* - turtlehead

. . . but also most of non-hemiparasitic members of former Scrophulariaceae



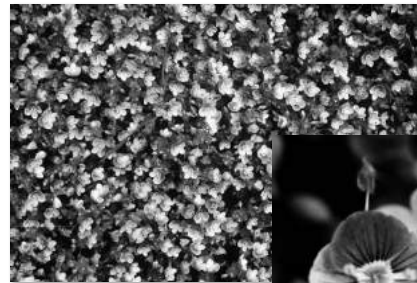
*Veronicastrum virginicum* - Culver's-root

## Plantaginaceae - plantains



. . . but also most of non-hemiparasitic members of former Scrophulariaceae

## Plantaginaceae - plantains



*Veronica persica* - Bird's-eye speedwell



## Orobanchaceae - broomrape

Orobanchaceae contains holo-parasites (non-green)



*Conopholis americana* (cancer-root)



## Orobanchaceae - broomrape

Orobanchaceae contains holo-parasites



haustoria

*Epifagus virginiana* - beech drops

## Orobanchaceae - broomrape

Orobanchaceae contains holo-parasites



*Orobanche fasciculata* - fascicled broomrape



obligate host: *Artemisia campestris* - wormwood



*Orobanche uniflora* - One-flowered broomrape

## Orobanchaceae - broomrape

... and hemi-parasites of old Scrophulariaceae



*Pedicularis lanceolata* - swamp lousewort



*Castilleja sessiflora* - downy paintbrush

## Lentibulariaceae - bladderworts

Cosmopolitan (3 genera/320 species) - vegetatively diverse, insectivorous herbs of wetlands



*Pinguicula* - butterwort



*Utricularia* - bladderwort



## Bignoniaceae - catalpa

Tropical (some temperate) trees and lianas with opposite, compound leaves and large flowers (bat, bird, bee)

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

- long capsule (berry) with winged seeds



*Catalpa bignonioides*  
trumpet catalpa

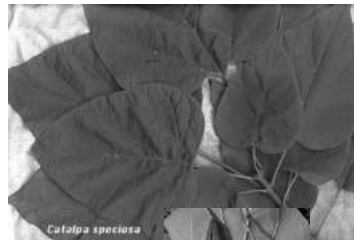


*Spathodea campanulata*



*Jacaranda*

## Bignoniaceae - catalpa



*Catalpa speciosa*



*Catalpa speciosa*  
Catalpa

Elongated capsules  
appearing like  
legumes



## Acanthaceae - acanthus

Tropical (some temperate) herbs, shrubs, lianas with opposite, simple leaves and thick nodes

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

- showy bracts
- explosively dehiscent capsules



*Aphelandra*



*Acanthus illicifolius*

## Acanthaceae - acanth



1 endangered species in Wisconsin prairies

*Ruellia humilis* - hairy ruellia



## Gesneriaceae - African violets

Pantropical herbs and epiphytes or weak shrubs

CA (5) CO (2+3) A 2+2  $\overline{C}$  (2)

• ovary inferior or superior



*Columnea*



*Saintpaulia* - African violet



*Solenophora*

## Gesneriaceae - African violets

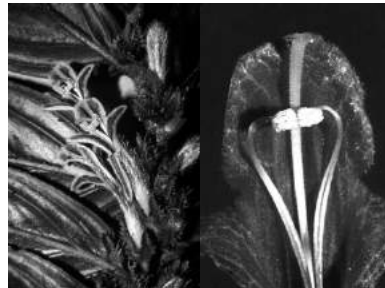
Pantropical herbs and epiphytes or weak shrubs

CA (5) CO (2+3) A 2+2  $\overline{C}$  (2)

• ovary inferior or superior  
• anthers fuse at maturity



*Columnea*



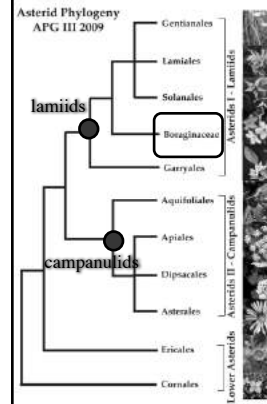
*Columnea*

*Streptocarpus*

## Boraginaceae - borage

• unplaced family within 'lamiid' or Asterid I group

• large family of herbs to trees, 148 genera and 2740 species



*Cordia* - geiger tree



*Myosotis* - forget me not

## Boraginaceae - borage

- typically hairy plants
- scirpoid cyme inflorescences - compound monochasium



*Pulmonaria*



*Borago*



*Mertensia virginica* - Eastern bluebells

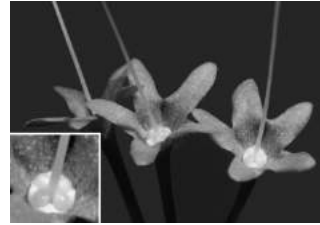
## Boraginaceae - borage

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

- Gynobasic style - independently derived relative to Lamiaceae
- fruit typically 4 nutlets or drupe like



- *Lithospermum* (puccoon) - classic dimorphic heterostyly



*Myosotis* - forget me not

## Boraginaceae - borage



*Echium vulgare*  
Blueweed



*Echium wildpreti*  
- tower of jewels  
Canary Islands



## Boraginaceae - borage



*Hackelia virginiana*  
Beggar's-lice



*Myosotis scorpioides*  
Common forget-me-not

## Boraginaceae - borage



*Lithospermum canescens*  
Hoary puccoon



*Lithospermum incisum*  
Fringed puccoon

## Boraginaceae - borage



*Mertensia virginica*  
Eastern bluebells



## Boraginaceae - borage



*Hydrophyllum virginianum* -  
Common waterleaf

• formerly Hydrophyllaceae

