

# Systematic Botany. Lecture 32–34

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# Outline

## Lamiales families

Labiatae—mint family

Scrophulariaceae (figwort family) alliance

Boraginaceae—borage family

## Ranunculales families

Ranunculaceae—buttercup family



# Outline

## Lamiales families

- Labiatae—mint family

- Scrophulariaceae (figwort family) alliance

- Boraginaceae—borage family

## Ranunculales families

- Ranunculaceae—buttercup family



# Lamiales families

## Labiatae—mint family



# General features of Labiatae

## Labiatae—mint family

- ▶  $\approx 3,200$  species
- ▶ Cosmopolitan, but better represented in Mediterranean region
- ▶ Prefer open spaces

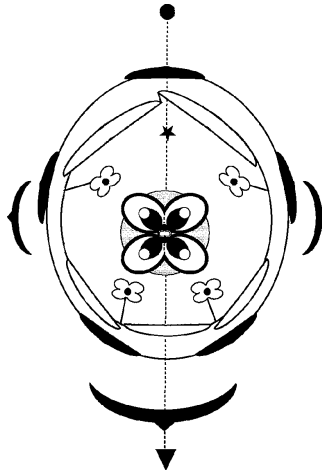


# Morphology of Labiatae

- ▶ Aromatic, often hairy, herbs or shrubs; epidermal glands contain ethereal oils; plants also contain iridoid compounds
- ▶ Young stems are typically quadrangular; leaves opposite, without stipules, simple, with pterodromous venation
- ▶ Flowers in axillary inflorescences, zygomorphic (monosymmetric)
- ▶ Calyx tubular, petals also fused, with two upper and one lower petals bigger than others, stamens in two pairs, attached to corolla
- ▶ Pistil with two carpels, but each carpel is secondary divided
- ▶ Fruit is schizocarp of four half-carpellary nutlets, seeds with little endosperm

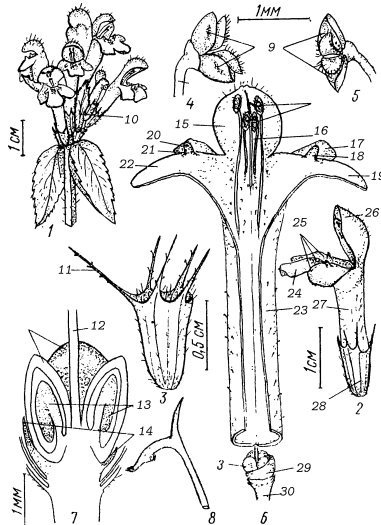


# Labiatae flower



$$\uparrow K_{(5)} [C_{(2,3)} A_{2,2}] \underline{G_{(2 \times 2)}}$$

# *Galeopsis* (hemp nettle) flower





# Representatives of Labiatae

Spices, ornamentals and medicinal plants

- ▶ *Lycopus*—hoarhound
- ▶ *Physostegia*—obedient plant
- ▶ *Monarda*—wild bergamot
- ▶ *Mentha*—mint
- ▶ *Thymus*—thyme



## *Mentha spicata* (mint)



# *Thymus* sp. (thyme)



# Lamiales families

## Scrophulariaceae (figwort family) alliance



# General features

## Scrophulariaceae (figwort family) alliance

- ▶  $\approx 5,000$  species
- ▶ Cosmopolitan, but occur mostly in Northern Hemisphere
- ▶ Prefer open spaces: meadows and grasslands



# Splitting the alliance

- ▶ Not a one, but multiple families
- ▶ The most important are: Scrophulariaceae s.str., Plantaginaceae s.l., Orobanchaceae s.l., Phrymaceae, Linderniaceae

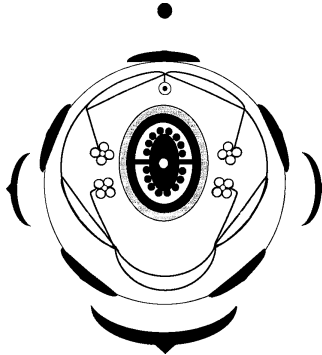


# Morphology of alliance

- ▶ Herbs; contain iridoid compounds
- ▶ Young stems are typically quadrangular or round; leaves opposite or alternate, without stipules, simple, with pterodromous venation
- ▶ Flowers in axillary or terminal inflorescences, zygomorphic (monosymmetric), but plantains (*Plantago*) have almost actinomorphic flower
- ▶ Calyx tubular, petals also fused, corolla often forms two lips, stamens 4 or 5, attached to corolla
- ▶ Pistil with two carpels
- ▶ Fruit is capsule, seeds with endosperm



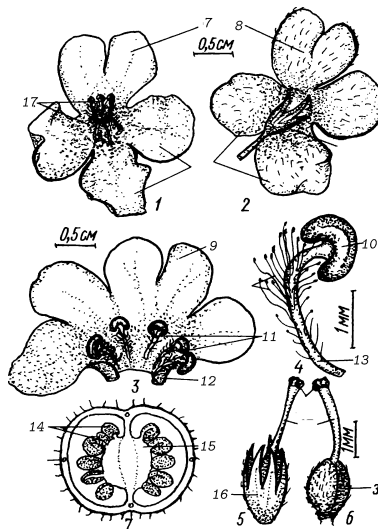
# Alliance flower



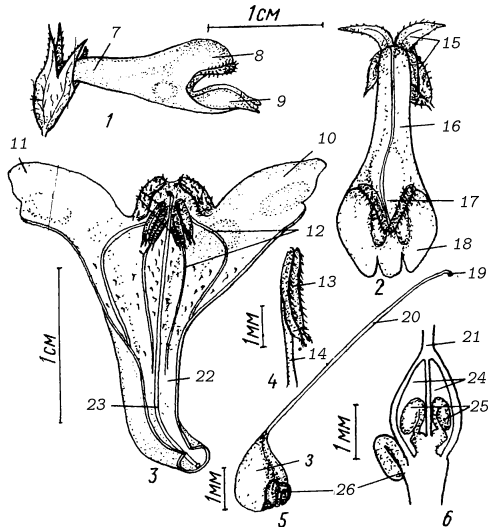
$$\uparrow K_{(5)} [C_{(2,3)} A_4] \underline{G_{(2)}}$$



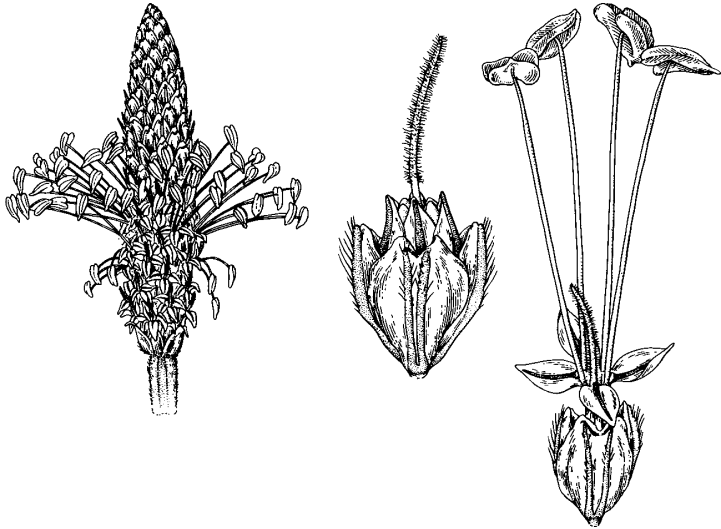
# *Verbascum* (mullein) flower



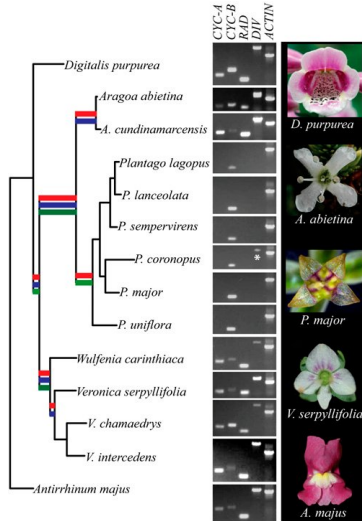
# Melampyrum flower



# *Plantago* (plantain) flowers



# Origin of *Plantago* actinomorphic flowers (Preston, 2011)



# Diversity of alliance

- ▶ Scrophulariaceae s.str. (figwort family in strict sense)
  - ▶ *Verbascum*—mullein
- ▶ Plantaginaceae s.l. (plantain family in wide sense)
  - ▶ *Veronica*—speedwell
  - ▶ *Plantago*—plantain
  - ▶ *Penstemon*—beardtongue



## Diversity of alliance (contd.)

- ▶ Orobanchaceae s.l. (broomrape family in wide sense)
  - ▶ *Castilleja*—painted cup
  - ▶ *Pedicularis*—lousewort
  - ▶ *Agalinis* (*Gerardia* nom.illeg.)—false foxglove
  - ▶ *Orobanche*—broomrape
- ▶ Phrymaceae—loopseed family
  - ▶ *Mimulus*—monkeyflower
  - ▶ *Phryma*—loopseed
- ▶ Verbenaceae—verbena family



# Lamiales families

## Boraginaceae—borage family



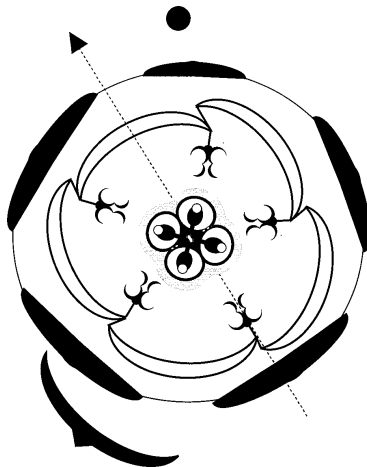
# Description of Boraginaceae

- ▶  $\approx 2,000$  species, cosmopolitan
- ▶ Herbs and even trees, with rough hairy alternate leaves
- ▶ Flowers in cymes (cincinnia); bell or funnel-shaped, symmetric, 5-merous
- ▶ Pistil with two carpels which are secondary divided (similarity to Labiatae)
- ▶ Fruit schizocarp with 4 nutlets



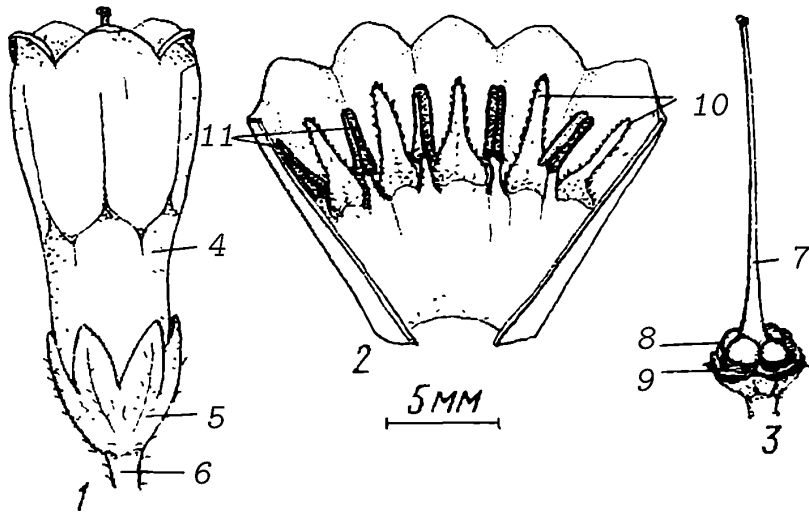


# Boraginaceae flower



$$*K_{(5)}[C_{(5)}A_5]\underline{G_{(2 \times 2)}}$$

# Flower of *Symphytum* (Boraginaceae)



# Representatives of Boraginaceae

Often includes some close groups like “Hydrophyllaceae”, waterleaf family

- ▶ *Lithospermum*—puccoon
- ▶ *Cynoglossum*—hound's tongue
- ▶ *Cryptantha*—cryptantha
- ▶ *Hydrophyllum*—waterleaf



# Ranunculales families

## Ranunculaceae—buttercup family



# General features of Ranunculaceae

- ▶  $\approx 2,000$  species
- ▶ Distributed mostly in temperate regions of both Northern and Southern Hemispheres
- ▶ Generally, forest or meadow plants

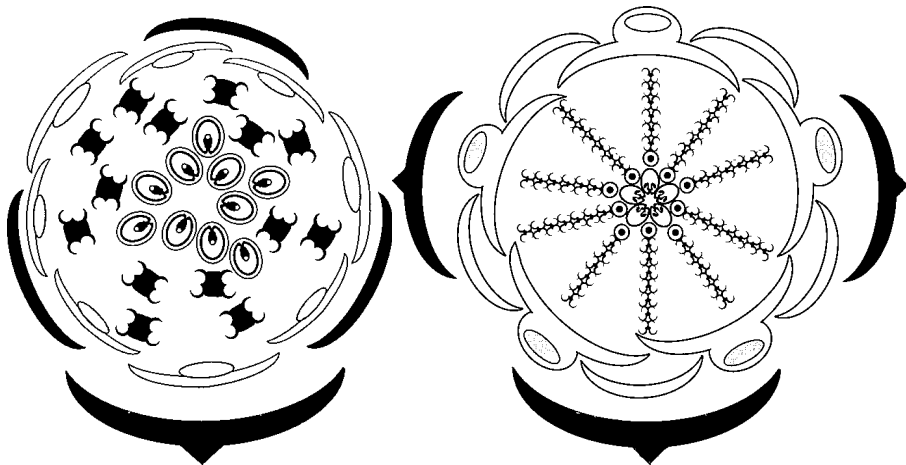


# Morphology of Ranunculaceae

- ▶ Mostly herbs
- ▶ Vascular bundles sometimes scattered (as in monocots)
- ▶ Leaves are complicatedly dissected or compound, alternate, without stipules
- ▶ Flowers solitary or in different raceme-like inflorescences; bisexual, mostly with infinite ( $> 12$ , irregular) number of stamens and pistils
- ▶ Petals originate from stamens, sometimes absent
- ▶ Carpels free, form multiple pistils
- ▶ Fruit is multiple follicle or multiple nut
- ▶ Embryo very small, sometimes has one cotyledon



# Ranunculaceae: *Ranunculus* and *Aquilegia*



\*K<sub>3-5</sub>C<sub>0-5-8</sub>A<sub>∞</sub>G<sub>1-∞</sub>



# Representatives of Ranunculaceae

- ▶ Many ornamental plants, e.g., *Ranunculus* (buttercup), *Aquilegia* (columbine), *Anemone*
- ▶ *Ranunculus* and other genera are important component of wet grasslands





*Ranunculus ficaria*

# Blue anemones, *Anemone*



# Columbine, *Aquilegia vulgaris*



# For Further Reading



A. Shipunov.

*Systematic Botany* [Electronic resource].

2011—onwards.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_448](http://ashipunov.info/shipunov/school/biol_448)



Van Bruggen, Th.

*The vascular plants of South Dakota.*

1996. 3rd ed.

University of South Dakota, Vermillion, SD.

