

Introduction to Botany. Lecture 38

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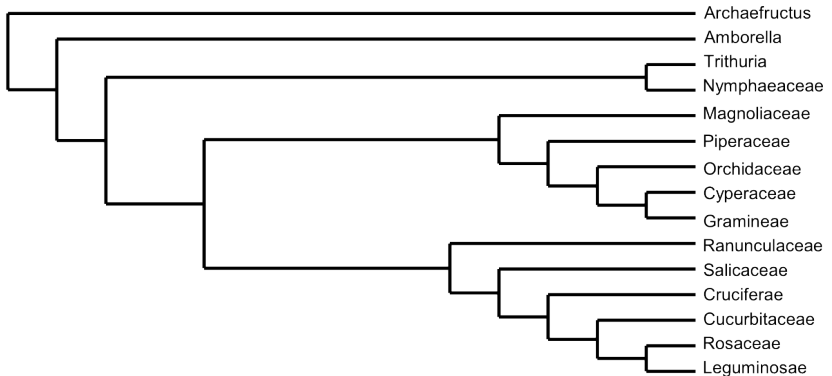
Minot State University

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Outline

- 1 Asteridae, or asterids (Part I)
 - Caryophyllaceae—pink family
 - Ericaceae—heath family
 - Umbelliferae, or Apiaceae—umbel family

Phylogeny of angiosperms so far



Plan of family description

- 1 Size (number of species)
- 2 Distribution (geography)
- 3 Ecology
- 4 Life form (herbs, trees, vines, parasites, succulents etc.)
- 5 Roots, shoots, leaves
- 6 Inflorescences, flower, pollination
- 7 Fruit, seed, seed dispersal
- 8 Internal classification and representatives
- 9 Affinities

Character table for families studied

	1	2	3	4	5	6	7	8	9	10
Nymphaeaceae	1	1	0	0	0					
Magnoliaceae	0	0	0	1	0					
Piperaceae	1	1	0	0	0					
Orchidaceae	1	1	0	0	0					
Cyperaceae	1	1	0	0	1					
Gramineae	1	1	0	0	1					
Ranunculaceae	0	1	0	0	0					
Salicaceae	1	0	0	1	1					
Cucurbitaceae	1	1	0	0	1					
Rosaceae	0	1	1	1	0					
Leguminosae	1	1	1	1	0					
Cruciferae	0	1	0	0	0					

1 Tropical; 2 Herbaceous; 3 Compound leaves; 4 Stipules; 5 Flowers unisexual; 6 Double perianth (calyx and corolla present); 7 Zygomorphic (monosymmetric) perianth; 8 5-merous perianth and stamens; 9 Carpels united; 10 Inferior ovary (epigynous flower).

Characters are not necessary relevant to all members of class!

Web site family manual

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Mode of access: http://herba.msu.ru/shipunov/chech/biol_154/index.htm

BIOL 154: Introduction to Botany

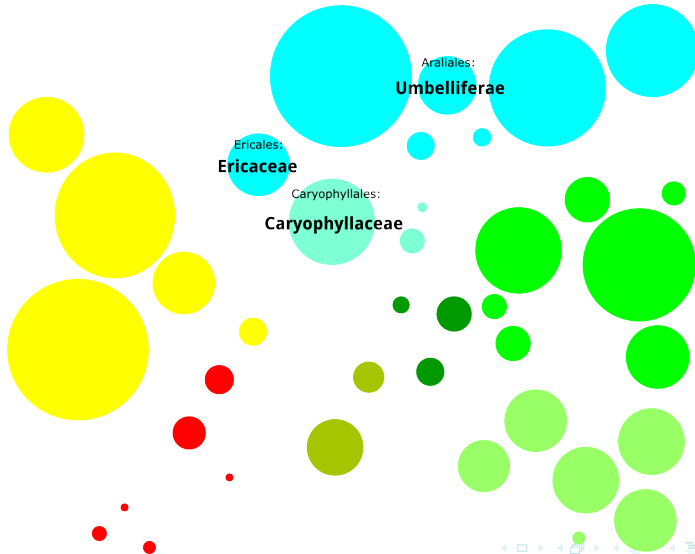


Course materials:

- [Syllabus](#) (PDF, 0.08 Mbit)
- [First lecture slides](#) (PDF, 9 Mbit)
- To enter to main series on PDF slides, you may want to download free [Eucy PDF Reader](#).
- [Lecture 2](#) (PDF, 4 Mbit)
- [Lecture 3](#) (PDF, 4.2 Mbit)
- [Lecture 4](#) (PDF, 1.7 Mbit)
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- [Lecture 35](#) (PDF, 3.6 Mbit)
- [Lecture 36](#) (PDF, 1.7 Mbit)
- [Lecture 37](#) (PDF, 1.9 Mbit)
- [Excerpt from Parke's "Synoptic classification..." families of angiosperms \(by A. Cronquist\) \(DJVu*, 4 Mbit\)](#)



Overview of asterid families (Part I)



General features of asterids

- Dimerous or pentamerous flowers
- Often haplostemony (one cycle of stamens)
- Petals fused
- Corolla monosymmetrical (zygomorphic)
- Most asterids are herbs

General features of Caryophyllaceae

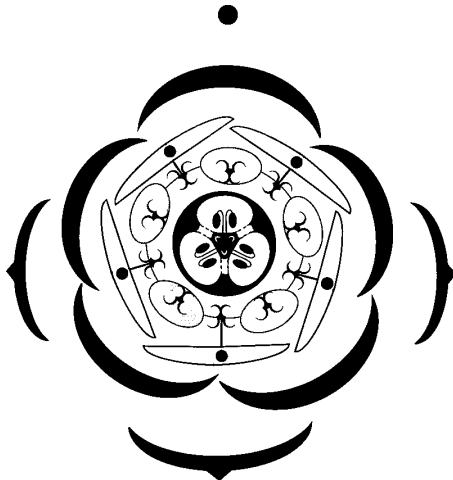
Caryophyllaceae—pink family

- $\approx 2,000$ species
- Distributed in temperate and warm temperate regions of Northern Hemisphere
- Forest, meadow and prairie plants

Morphology of Caryophyllaceae

- Mostly herbs
- Stems are usually swollen at nodes, leaves narrow, opposite, with hypodromous venation, usually without stipules
- Flower bisexual, pentamerous, in cymes; with free petals and sepals (sometimes sepals fuse), stamens 5 or 5+5, pistil typically with 3 or 5 carpels
- Fruit dehiscent, dry capsule
- Embryo curved around perisperm

Caryophyllaceae flower



*K₅C₅A₅+5G₍₃₋₅₎

Representatives of Caryophyllaceae

Mostly ornamental and weed plants

- *Dianthus*—pink
- *Stellaria*—chickweed
- *Cerastium*—mouse-ear chickweed

Garden cultivar of *Dianthus*



Cerastium



Stellaria sp.



General features of Ericaceae

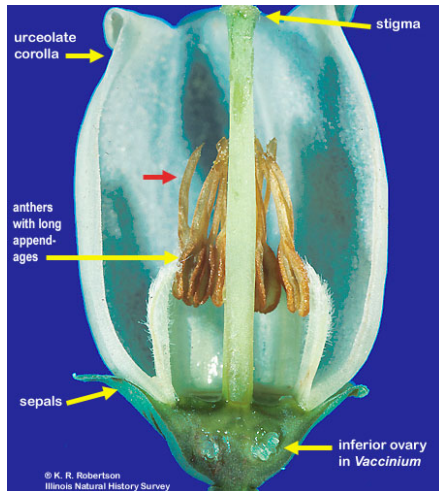
Ericaceae—heath family

- $\approx 3,500$ species
- Distributed mostly in temperate and Arctic regions, also in tropical mountains
- Forest plants, also petrophiles and wetland plants

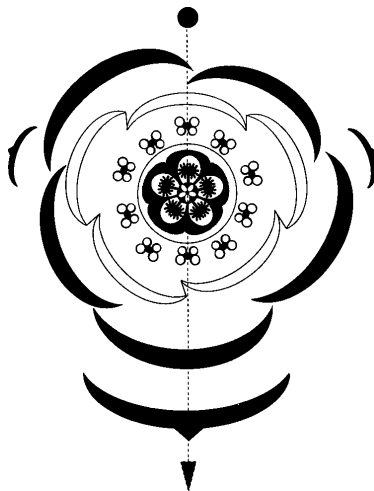
Morphology of Ericaceae

- Shrubs or small trees
- Mycorrhizal, often growing on acid soils, producing iridoid compounds
- Leaves simple, alternate or opposite, with pterodromous venation; stipules absent
- Flowers are borne in racemes, 4-5-merous, corolla sympetalous (petals fused), stamens often attached to corolla tube, anthers with appendages, open by pores, pollen in tetrads
- Pistil has 5 carpels, ovary may be inferior and superior
- Fruit is a capsule or berry; seed with small embryo and endosperm

Flower of blueberry (*Vaccinium* sp.)



Ericaceae flower



* or $\uparrow K_{4-5} C_{(4-5)} A_{5+5} \underline{G_{(5)}}$ or $G_{(\overline{5})}$ (Vaccinioideae)

Representatives of Ericaceae

Ornamental and fruit plants, group in at least two subfamilies:

- Ericoideae—ovary superior
 - *Rhododendron*
 - *Erica*—heath
 - *Kalmia*—mountain laurel
- Vaccinioideae—ovary inferior
 - *Vaccinium*—blueberry
 - *Oxycoccus*—cranberry

Rhododendron sp.



Erica sp. (garden form)



Kalmia laurifolia



Oxycoccus microcarpa, European cranberry



General features of Umbelliferae

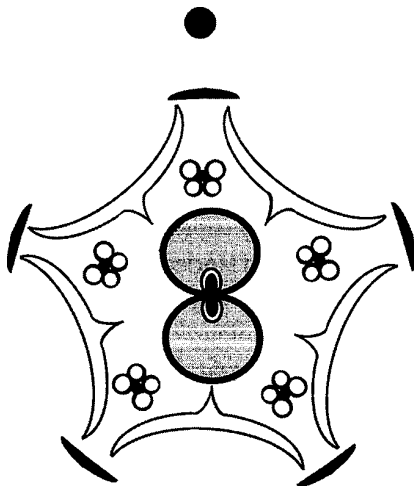
Umbelliferae, or Apiaceae—umbel family

- $\approx 3,000$ species
- Cosmopolitan, but mostly in north temperate regions and deserts
- Prefer open spaces

Morphology of Umbelliferae

- Aromatic herbs, often poisonous (due to coumarins)
- Stems often hollow, tissues contain secretory canals with monoterpenes; leaves complexly compound, sometimes very large, usually without stipules
- Flowers in compound umbels; actinomorphic (polysymmetric), sepals represented by teeth only, petals 5, fused on early stages of development (early sympetaly); stamens in single circle
- Pistil with two carpels, ovary inferior
- Fruit dry schizocarp, breaks in two halves—mericarps; seed with oily endosperm

Umbelliferae flower



* $K_5C_{|5|}A_5\overline{G_{(2)}}$ (“||” designate early sympetaly)

Representatives of Umbelliferae

Economically important spices and vegetables:

- *Apium*—celery
- *Anethum*—dill
- *Daucus*—carrot
- *Petroselinum*—parsley
- *Foeniculum*—fennel
and also famous poisonous
- *Cicuta*—hemlock, agent of Greek philosopher Socrates suicide

Cicuta virosa, water hemlock



David (1787): Death of Socrates



Daucus carota: central flower mimic a fly



Purple and white carrots of Afghanistan origin



Summary

- Three “lower” asterid families, Caryophyllaceae, Ericaceae and Umbelliferae demonstrate first stages of a transition to more compact, sympetalous flower

For Further Reading



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 25.