

Systematic Botany. Lecture 7

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Outline

Questions and answers

Caryophyllaceae—pink family

Polygonaceae—smartweed family

Rosaceae—rose family

Leguminosae, or Fabaceae—legume family

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Which families (studied so far) have three carpels in pistil?

Previous final question: the answer

Which families (studied so far) have three carpels in pistil?

- ▶ Polemoniaceae
- ▶ Campanulaceae (bellflower family)

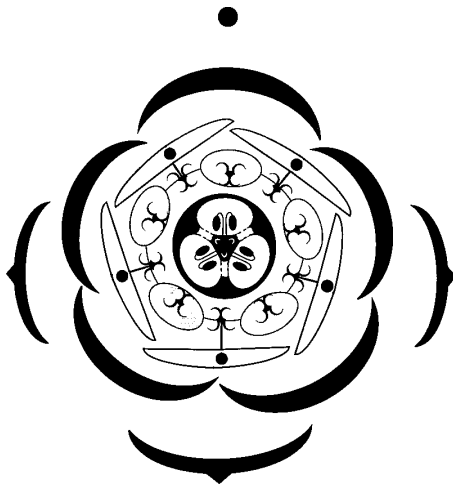
Caryophyllaceae—pink family

- ▶ $\approx 2,000$ 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 hyphodromous venation, usually without stipules
- ▶ Flower bisexual, pentamerous, in cymes; with free petals and sepals (sometimes sepals fuse), stamens 5 or 5+5,
- ▶ Pistil has 3 or 5 carpels, ovules in one camera, attached to the central placenta
- ▶ 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.



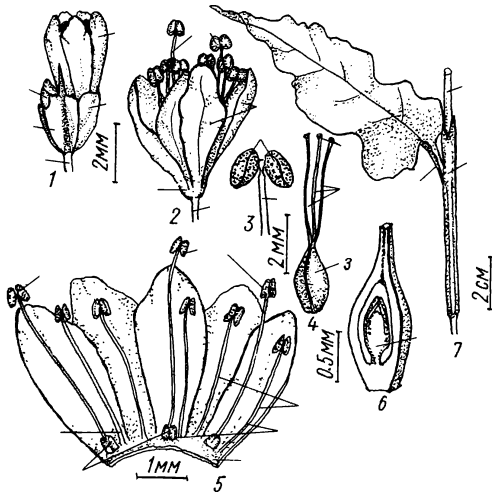
Polygonaceae—smartweed family

- ▶ $\approx 1,100$ species
- ▶ Distributed mostly in Northern hemisphere, prefer wetlands
- ▶ Life forms: herbs, sometimes shrubs and even trees (sea-grape, *Coccoloba*)
- ▶ Leaves alternate, simple, with ocrea—sheathing membranous stipule
- ▶ Flowers actinomorphic, often 3-merous, without sepals/petals, perianth calyx-like or corolla-like, androecium of 6–9 stamens
- ▶ Pistil with three carpels, one camera and one terminal ovule
- ▶ Fruit is a nut (1-seeded dry fruit), seed with perisperm

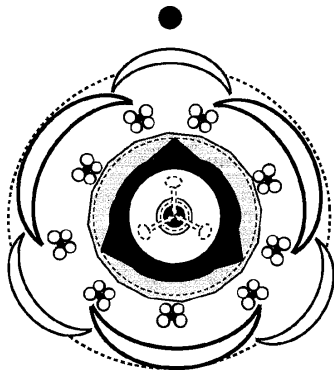
Ocrea



Persicaria, smartweed



Polygonaceae flower



$$*P_{\{3+3\}} \vee 5A_{3-9} \underline{G_{(3)}}$$

Representatives of Polygonaceae

Importance: food and ornamental plants

- ▶ *Polygonum, Bistorta, Persicaria, Fallopia*—smartweeds
- ▶ *Rumex*—sorrel
- ▶ *Rheum*—rubarb
- ▶ *Fagopyrum*—buckwheat
- ▶ *Coccoloba*—sea-grape

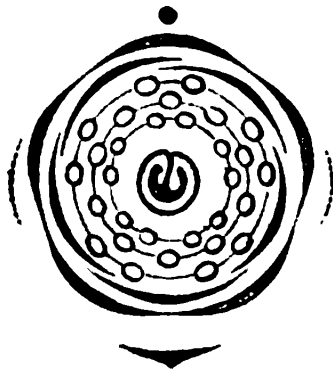
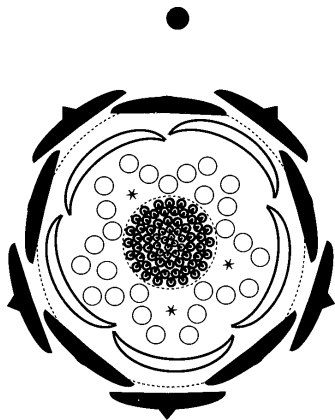
Rosaceae—rose family

- ▶ $\approx 3,000$ species
- ▶ Nearly cosmopolitan, but more common to temperate and subtropical regions of Northern Hemisphere
- ▶ Forest and meadow plants, do not prefer dry places

Morphology of Rosaceae

- ▶ Trees, shrubs and herbs
- ▶ Often accumulate cyanogenic compounds (contains $\text{—C} \equiv \text{N}$ group); some Rosaceae have nitrogen-fixing bacteria as symbionts
- ▶ Alternate, simple or dissected leaves with stipules
- ▶ Flowers with hypanthium; in Maloideae hypanthium fuses with pistils and produces inferior ovary
- ▶ Calyx with connected sepals, corolla with distinct petals
- ▶ Stamens numerous, typically in sets of 5 (or 10)
- ▶ Fruits diverse: multiple nuts/drupes in Rosoideae, multiple follicles or single drupes in Spiraeoideae, pomes in Maloideae
- ▶ Mature seeds without endosperm

Rosaceae flower: Rosoideae and Spiraeoideae



$*K_5C_5A_{5-10-\infty}G_{\underline{1-5-\infty}} \vee G_{\overline{(3-5)}} \text{ (Maloideae)}$

Representatives of Rosaceae

Several subfamilies, each with economically important members:

- ▶ Rosoideae (multiple one-seeded fruits)
 - ▶ *Rosa*—rose
 - ▶ *Fragaria*—strawberry and close genus *Potentilla*—cinquefoil
 - ▶ *Rubus*—blackberry, raspberry
- ▶ Spiraeoideae (fruits—follicles of solitary drupes)
 - ▶ *Prunus*—cherry, peach, apricot, plum
 - ▶ *Spiraea*—meadowsweet, important component of prairies
- ▶ Maloideae (now often inculded in Spiraeoideae; have inferior ovary, fruits are pomes)
 - ▶ *Pyrus*—apple, pear
 - ▶ *Crataegus* (hawthorn), *Sorbus* (mountain ash), *Amelanchier* (serviceberry), *Aronia* (chokeberry) and others

Spiraea tomentosa, prairie plant



Aronia × *mitchurinii*



Spontaneous hybrid between American chokeberry and
European *Sorbus aria*

Potentilla fruticosa, shrubby cinquefoil



Leguminosae, or Fabaceae—legume family

- ▶ Up to 17,000 species, third largest angiosperm family after Compositae (aster family) and Orchidaceae
- ▶ Widely distributed throughout the world but preferably in tropics
- ▶ Three subfamilies (Caesalpinioideae, Mimosoideae, Papilionoideae) often treated as separate families

Morphology of Leguminosae

- ▶ Have root nodules with nitrogen-fixing bacteria
- ▶ Leaves alternate, pinnately compound (once or twice), with stipules
- ▶ Sepals 5, united; petals 5, in Papilionoideae they are free, unequal and have special names (banner, keel and wing), in Mimosoideae they fuse and form tube
- ▶ Stamens often 10 with 9 fused and one free stamen; in Mimosoideae, stamens are numerous
- ▶ Single pistil with single carpel
- ▶ Fruit is a legume: dehiscent with one camera
- ▶ Mature seeds without endosperm

Final question (2 points)

What is common between Caryophyllaceae (pink family) and Polygonaceae (smartweed family)?

- ▶ Caryophyllaceae and Polygonaceae are in order Caryophyllales, they are lower (choripetalous) asterids
- ▶ Other today's families belong to rosids

For Further Reading



O. A.Stevens.

Handbook of North Dakota plants. 3rd edition.

NDSU, 1963.