

Outline

Questions and answers

Umbelliferae, or Apiaceae—umbel family

Polemoniaceae—phlox family

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Umbelliferae, or Apiaceae—umbel family

Polemoniaceae—phlox family

Previous final question: the answer

Write a flower formula for any family from today's lecture

Previous final question: the answer

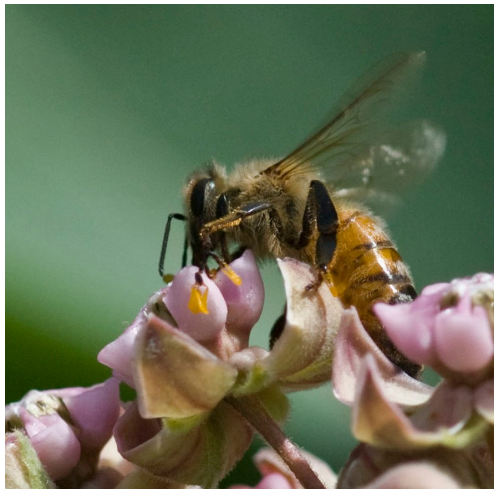
Write a flower formula for any family from today's lecture

- ▶ Rubiaceae: $\ast K_4 [C_4 A_4] \overline{G_{(2)}}$
 - ▶ Oleaceae: $\ast K_{(4 \vee 5)} [C_{(4)} A_2] \underline{G_{(2)}}$
- etc.

Exam topics:

- ▶ General plant structure: roots, stem, leaves etc.
- ▶ Flower and flower terms (see poster)
- ▶ Flower diagram and formula
- ▶ Prairie and ruderal (weedy) communities, native and invasive plants
- ▶ 10 + 3 plant families and their comparison

Asclepias (milkweed) pollinia-based pollination: step 1



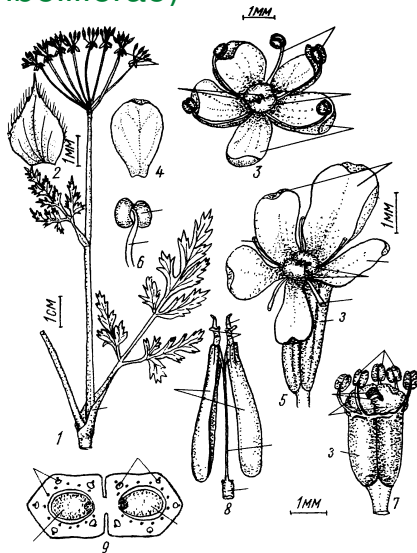
Asclepias (milkweed) pollinia-based pollination: step 2



Morphology of Umbelliferae

- ▶ $\approx 3,000$ species
- ▶ Cosmopolitan, but mostly in north temperate regions and deserts
- ▶ 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 is a dry schizocarp, breaks in two halves—mericarps; seed with oily endosperm


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Anthriscus (Umbelliferae)

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



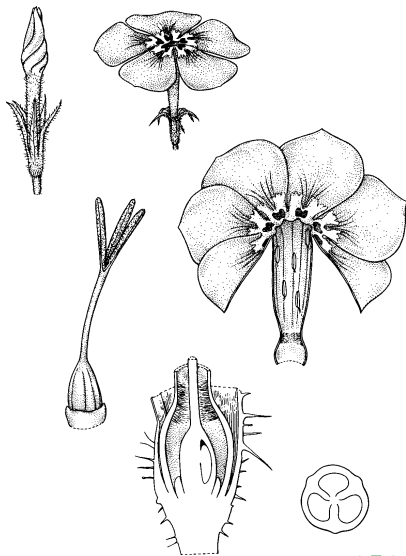
Daucus carota: central flower mimic a fly



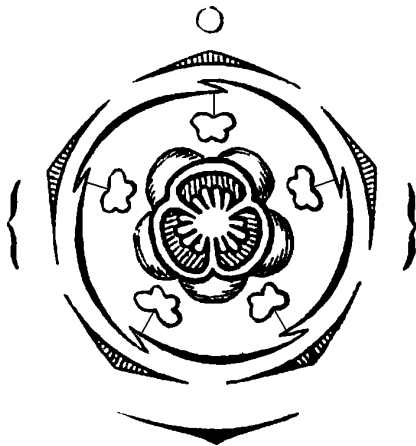
Polemoniaceae characters

- ▶ \approx 300 species
- ▶ Cosmopolitan, but mostly in North America
- ▶ Annual or perennial herbs, often with conspicuous flowers, store inulin (like Compositae)
- ▶ Leaves alternate or opposite, simple, entire or dissected
- ▶ Flowers in different inflorescences; actinomorphic (polysymmetric), 5-merous, sepals and petals 5, forming a short tube; stamens 5
- ▶ Pistil with three carpels, ovary superior
- ▶ Fruit is a capsule

Phlox flower



Polemoniaceae flower



$*K_{5v(5)}[C_{(5)}A_5]\underline{G_{(3)}}$

Representatives of Polemoniaceae

Widespread wild flowers of U.S.:

- ▶ *Phlox*—phlox
- ▶ *Gilia*—gilia
- ▶ *Collomia*—collomia

Phlox hoodii, moss phlox



Families (10 + 3) and orders

- ▶ Asterales
 1. Compositae (Asteraceae)
 2. Campanulaceae
- ▶ Lamiales
 1. Labiatae (Lamiaceae)
 2. Scrophulariaceae, Plantaginaceae, Orobanchaceae, Phrymaceae
 3. Boraginaceae
 4. Oleaceae
- ▶ Gentianales
 1. Apocynaceae
 2. Rubiaceae
- ▶ Apiales
 1. Umbelliferae (Apicaceae)
- ▶ Ericales
 1. Polemoniaceae

Comparing families

- ▶ Compositae (Asteraceae): $*K_{\infty}C_{(5)}A_{(5)}G_{\overline{(2)}}$ (tubular flower), or $\uparrow K_{\infty}C_{(3\vee 5)}A_{(5)}G_{\overline{(2)}}$ (ligulate flower)
- ▶ Campanulaceae: $*\vee \uparrow K_{(5)}C_{(5)}A_{(5)}G_{\overline{(3)}}$
- ▶ Labiatae (Lamiaceae): $\uparrow K_{(5)}[C_{(2,3)}A_{2,2}]G_{\underline{(2 \times 2)}}$
- ▶ Scrophulariaceae, Plantaginaceae, Orobanchaceae, Phrymaceae: $\uparrow K_{(5)}[C_{(2,3)}A_4]G_{\underline{(2)}}$
- ▶ Boraginaceae: $*K_{(5)}[C_{(5)}A_5]G_{\underline{(2 \times 2)}}$
- ▶ Oleaceae: $*K_{(4\vee 5)}[C_{(4)}A_2]G_{\underline{(2)}}$
- ▶ Apocynaceae: $*K_{(5)}[C_{(5)}A_{(5)}]G_{\underline{2}}$
- ▶ Rubiaceae: $*K_4[C_4A_4]G_{\overline{(2)}}$
- ▶ Umbelliferae (Apiceae): $*K_5C_{|5|}A_5G_{\overline{(2)}}$
- ▶ Polemoniaceae: $*K_{5\vee(5)}[C_{(5)}A_5]G_{\underline{(3)}}$

Final question (2 points)

Which families have three carpels in pistil?

Summary

- ▶ Families from Asterales, Lamiales and Gentianales orders (and also Polemoniaceae) are “truly” sympetalous whereas Umbelliferae (from Apiales order) is a choripetalous family with “early sympetaly”
- ▶ All families studied do far belong to Asteridae subclass of flowering plants (angiosperms)

For the Exam 1:



O. A.Stevens.

Handbook of North Dakota plants. 3rd edition.

NDSU, 1963.

Introduction and families characteristics.