

Outline

Questions and answers

Liliaceae alliance—lily family alliance

Orchidaceae—orchid family

Previous final question: the answer

Chocolate is making from plant of ... family?

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Chocolate is making from plant of ... family?

- Malvaceae s.l., mallow family

Theobroma cacao, Malvaceae s.l.



Leguminosae classification

- ▶ Three subfamilies: Caesalpinioideae, Mimosoideae and the biggest is Papilionoideae (Faboideae)
- ▶ Caesalpinioideae:
 - ▶ *Gleditsia*—gleditsia
 - ▶ *Bauhinia*—orchid tree
 - ▶ *Cercis*—redbud
 - ▶ *Delonix*—royal poinciana
- ▶ Mimosoideae:
 - ▶ *Desmanthus*—prairie mimosa
 - ▶ *Prosopis*—mesquite
 - ▶ *Acacia*—acacia

Delonix regia in flower



Desmanthus illinoensis



Representatives of Papilionoideae (Faboideae)

- ▶ Swartzioids (*Swartzia*: highly unusual, but only in tropics)
- ▶ Genistioids
 - ▶ *Lupinus*—lupinus
- ▶ Dalbergioids
 - ▶ *Amorpha*—false indigo
 - ▶ *Petalostemon*, or *Dalea*—prairie-clover
 - ▶ *Arachis*—peanut
 - ▶ *Desmodium*—tick-trefoil
- ▶ Millettoids
 - ▶ *Apios*—ground nut
 - ▶ *Phaseolus*—beans
 - ▶ *Glycine*—soybeans
 - ▶ *Psoralea*—breadroot

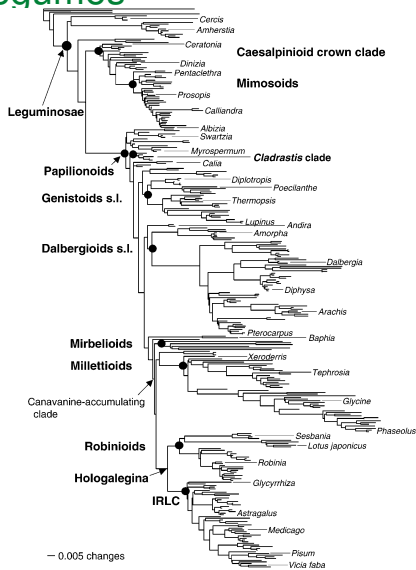
Swarzia sp.



Representatives of Papilionoideae (Faboideae) (contd.)

- ▶ Robinioids
 - ▶ *Lotus*—trefoil
 - ▶ *Robinia*—locust
- ▶ IRLC (“inverted repeat-lacking”) group
 - ▶ *Caragana*—Siberian peashrub
 - ▶ *Astragalus*—milkvetch
 - ▶ *Oxytropis*—loco-weed
 - ▶ *Trifolium*—clover
 - ▶ *Vicia*, *Lathyrus*—vetch
 - ▶ *Medicago*—alfalfa
 - ▶ *Melilotus*—sweet clover
 - ▶ *Pisum*—pea

Phylogeny of legumes



— 0.005 changes

Cruciferae classification

- ▶ In some recent classifications, this family is fused with neighbor Capparaceae (containing large and outstanding genus *Cleome* and other genera)
- ▶ In this case, it will have three subfamilies: Capparoidae, Cleomoidae and Brassicoidae and *less stable characters*—for example, Capparoidae are often trees, have multiple stamens and gynophore.
- ▶ Main groups of Brassicoidae:
 - ▶ Cardamineae–Lepidieae–Descurainieae group
 - ▶ Arabideae–Thlaspidaeae–Brassicaceae group
 - ▶ Hesperideae group

Cleome serrulata



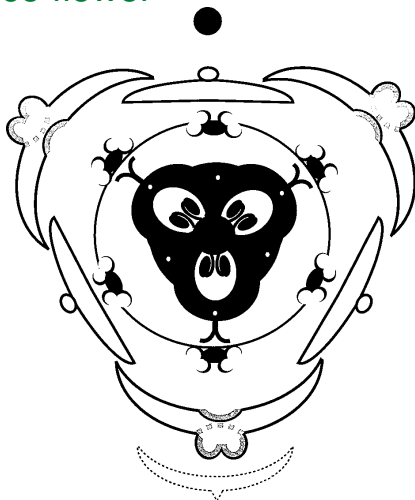
Representatives of Brassicoideae

- ▶ Cardamineae–Lepidieae–Descurainieae group
 - ▶ *Cardaria*, *Lepidium*—peppergrass
 - ▶ *Descurainia*—flixweed
 - ▶ *Rorippa*—yellow cress
 - ▶ *A Armoracia*—horseradish
 - ▶ *Wasabia*—wasabi
 - ▶ *Cochlearia*—cress
 - ▶ *Erysimum*—erysimum
 - ▶ *Capsella*—shepherd's purse
- ▶ Arabideae–Thlaspidiae–Brassicaceae group
 - ▶ *Systembrium*—hedge mustard
 - ▶ *Brassica*—cabbage, mustard
 - ▶ *Arabis*—rockcress
 - ▶ *Draba*—whitlowwort
- ▶ Hesperideae group
 - ▶ *Hesperis*—sweet rocket

Liliaceae alliance—lily family alliance

- ▶ Now former Liliaceae is broken into dozens of families, that was done **before** “molecular era”
- ▶ Most important are: Liliaceae s.str., Smilacaceae, Melanthiaceae, Amaryllidaceae and Asparagaceae
- ▶ $\approx 3,000$ species
- ▶ Distributed thorough the world
- ▶ Life forms: perennial bulbous or rhizomatous herbs, sometimes tree-like plants (*Dracaena*, *Aloë*)
- ▶ Leaves simple, alternate (rarely verticillate), with acrodromous venation
- ▶ Flowers solitary or in racemes, 3-merous, with simple perianth of 6 free (sometimes fused) tepals, 6 stamens in 2 whorls
- ▶ Pistil with 3 carpels, ovary superior (sometimes also inferior)

Liliaceae alliance flower



*P₃+3A₃+3G₍₃₎

Representatives of Liliaceae alliance

Importance: many ornamental plants, some are vegetables and pharmaceuticals

- ▶ Liliaceae s.str.
 - ▶ *Fritillaria*—bell lily
 - ▶ *Lilium*—lily
 - ▶ *Tulipa*—tulip
- ▶ Smilacaceae
 - ▶ *Smilax*—greenbriar, carrion flower
- ▶ Melanthiaceae
 - ▶ *Zigadenus*—death camas
 - ▶ *Trillium*—trillium, wake robin

Representatives of Liliaceae alliance (contd.)

- ▶ Amaryllidaceae
 - ▶ *Allium*—onion, garlic
 - ▶ *Galanthus*—snowdrops
- ▶ Asparagaceae
 - ▶ *Maianthemum*—false lily-of-the-valley
 - ▶ *Asparagus*—asparagus
 - ▶ *Smilacina*—smilacina
 - ▶ *Uvularia*—bellwort
 - ▶ *Yucca*—yucca
 - ▶ *Aloë*—aloe

- ▶ $\approx 30,000$ species—the biggest family of angiosperms
- ▶ Mostly tropical groups with amazingly complex flowers and pollination systems
- ▶ Depend on mycorrhizal fungi

Morphology of orchids

- ▶ Epiphytes or vines, with aerial roots; roots with velamen. Terrestrial forms also have thick roots.
- ▶ Often have bulbs originated from stems or even leaves
- ▶ Thick leaves, usually with no visible veins
- ▶ Flowers in pendent racemes
- ▶ Flowers bilaterally symmetric, with big lip which goes downwards in epiphytic species (terrestrial species have resupination)
- ▶ One stamen fuses with pistil
- ▶ Pollen in pollinia
- ▶ Seeds are dust-like, millions per flower

Dactylorhiza flower

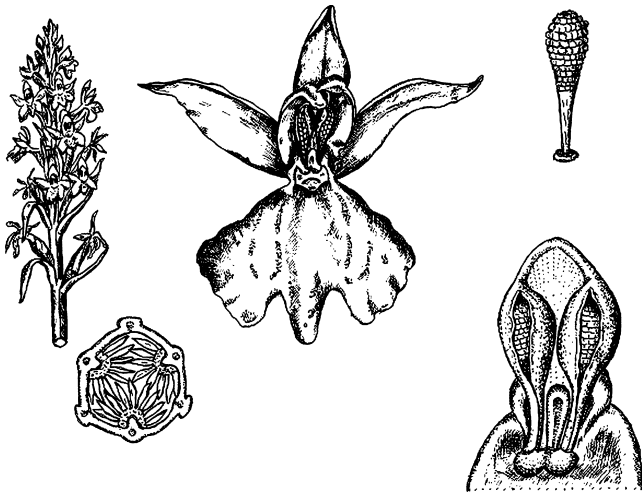
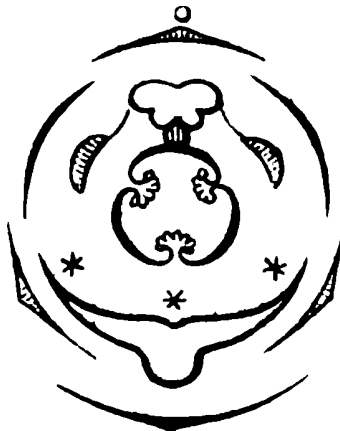


Diagram of Orchidaceae flower



$$\uparrow P_{3+2,1} [A_1 G_{(3)}]$$

Representatives of orchids

- ▶ One economically important, *Vanilla* produces famous spices
- ▶ Lots of very popular ornamentals
- ▶ In temperate regions of America, *Habenaria* is the most species-rich group; in Eurasia—*Dactylorhiza*

Vanilla sp. (Mexico)



Dactylorhiza sp. (Eurasia)



Epipogium aphyllum (Eurasia)



Habenaria dilatata, North American temperate orchid



Final question (2 points)

Flower formula of lily family alliance

For Further Reading



O. A.Stevens.

Handbook of North Dakota plants. 3rd edition.

NDSU, 1963.