

Introduction to Botany. Lecture 37

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Outline

- 1 Questions and answers
- 2 Basal angiosperms
 - Magnoliidae
- 3 Rosidae, or rosids
 - Rosidae in general
 - Ranunculaceae—buttercup family
 - Rosaceae—rose family

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Previous final question: the answer

Why angiosperms conquered the land?

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Why angiosperms conquered the land?

- They filled ecological niche of seed herbs because of optimized life cycle
- Then they expanded to the tree level again because they blocked succession pathways («cenophobe» theory)

Germination rate in non-angiosperms



Basal angiosperms

Magnoliidae

Archaeofructus

- Fossil water plant from lower Cretaceous of China
- Very primitive fructifications which are not yet compacted in flower
- Multiple free carpels, paired stamens

Archaeofructus reconstruction



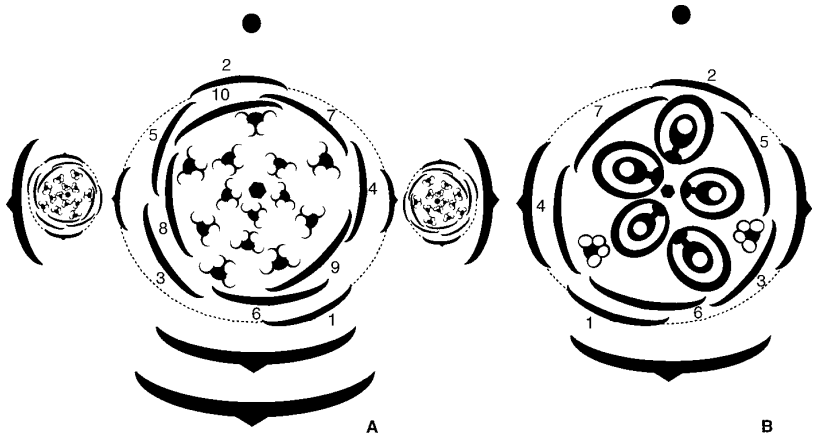
Amborella

- Small forest shrub of New Caledonia (big island in Pacific ocean)
- Have irregular flowers, stilar canal, unusual embryo sac (with three synergids and no antipods)

Amborella, branch with male flowers

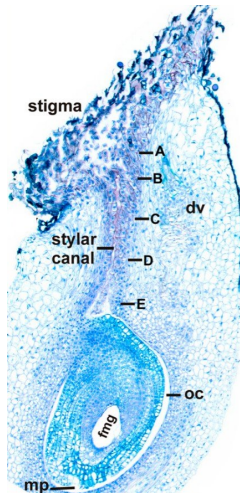


Amborella, diagram and formula



$\partial P_{9-11} A_{12-21}; \partial P_{7-8} St_2 \underline{G_{4-6}}$
(where “St” are staminodes, non-functional stamens)

Amborella styler canal



Trithuria

- Wetland and water plants from south Asia and Australia
- Have unusual structure of fructifications (“non-flowers”) where male organs typically positioned in the center of ?inflorescence/flower

Trithuria general view



Trithuria fructification



Rosidae, or rosids

Rosidae in general

Main features of rosids

- Pentamerous flowers
- Often diplostemony (two cycles of stamens)
- Often hypanthium (cup-like receptacle)
- Free petals
- Most are trees

Rosidae, or rosids

Ranunculaceae—buttercup family

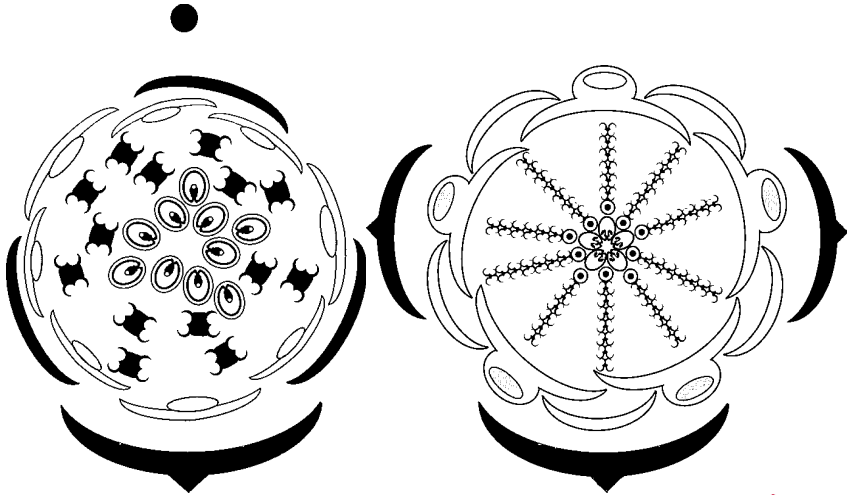
General features of Ranunculaceae

- $\approx 2,000$ 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*



*K₃₋₅C₀₋₅₋₈A_∞G_{1-∞}

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



Questions and answers
Basal angiosperms
Rosidae, or rosids

Rosidae in general
Ranunculaceae—buttercup family
Rosaceae—rose family

Blue anemones, *Anemone*



Columbine, *Aquilegia vulgaris*



Rosidae, or rosids

Rosaceae—rose family

Rosaceae

- $\approx 3,000$ species
- Nearly cosmopolitan, but more common to temperate and subtropical regions of Northern Hemisphere
- Forest and meadow plants, do not prefer dry places
- Compound or simple leaves with *stipules*
- Subfamilies (formulae simplified):
 - Rosoideae (rose, strawberry, raspberry): $*K_5C_5A_\infty G_{\underline{\infty}}$
 - Spiraeoideae (spiraea, cherry, plum): $*K_5C_5A_\infty G_{\underline{1}}$
 - Maloideae (apple, pear, hawthorn): $*K_5C_5A_\infty G_{\overline{(5)}}$

Summary

- Fossil *Archaeofructus*, *Amborella* and *Trithuria* are most primitive angiosperms
- Ranunculaceae is an example of flower stabilization

Final question (3 points)

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Why magnoliids are most primitive among flowering plants?

For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
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Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
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