

Introduction to Botany. Lecture 28

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Outline

1 Questions and answers

2 Plant diversity

- Phylum Bryophyta: mosses
- Pteridophyta



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Previous final question: the answer

What is archegonium?



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What is archegonium?

- Female gametangium of Vegetabilia



Plant diversity

Phylum Bryophyta: mosses



Bryophyta

- $\approx 20,000$ species
- Sporic life cycle with gametophyte predominance*
- Sporophyte reduced to sporogon (sporangium with seta), usually achlorophyllous, parasitic
- No roots, only rhizoid cells (long hairy dead cells capable for apoplastic transport)
- Poikilohydric plants
- Gametophyte starts development from protonema



Protonema



Life cycle of mosses

Covers: sporogon, biflagellate spermatozoa, the conflict between water cross-fertilization and wind distribution of spores which may be considered as “evolutionary dead end”.



Three main groups (subphyla)

- **Hepaticae**—liverworts. Three classes, most primitive are Haplomitriopsida. Body leafy or thalloid, usually has dorsal and ventral parts, sporogon bag-like, without columella, spores with elaters.
- **Bryophytina**—true mosses. Six classes, most important are Sphagnopsida (peat mosses), Polytrichopsida (haircap mosses) and Bryopsida. Body radial, sporogon long, with columella, spores without elaters.
- **Anthocerotophytina**—hornworts. One class. Body flattened (thallus), sporogon long, green, sometimes branched, with columella and stomata, spores with elaters.



Mosses (Bryophytina) in the “evolutionary dead end”

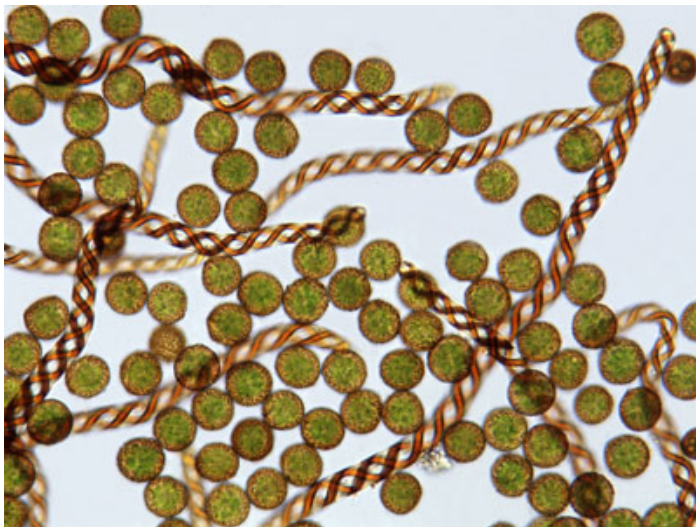
- They resolved “skyscrapers problem” via gametophyte, not sporophyte
- Gametophyte needs water fertilization, which restricts the size and also requires the dense growing
- Also, root system is absent: this is an additional size restriction
- If sexual organs appear on the bottom of leafy shoot, sporogon (sporophyte) could not distribute spores with a wind
- The only way out is to “start over” from thallus and make sporophyte (which was highly specialized for the spore distribution) a main stage and reduce gametophyte



Haplomitrium gibbsiae, primitive liverwort



Elaters of liverworts (*Lepidozia* sp.)



Sphagnum sp. (Bryophyta, Sphagnopsida) with sporogons



Dawsonia superba (Bryophyta, Polytrichopsida)—the largest moss with vascular system



Bryum capillare (Bryophyta, Bryopsida)



Leiosporoceros dussii (Bryophyta, Anthocerotopsida)—primitive hornwort



Plant diversity

Pteridophyta



Pteridophyta: ferns and allies

- \approx 12,000 species and six classes
- Sporic life cycle with sporophyte predominance
- Gametophyte is often reduced to **prothallium** (small hornwort-like plant), some Pteridophyta have male and female gametophytes
- Have true roots (only whisk ferns, Psilotopsida are exception)
- Homoiohydric plants (same as seed plants)
- Sporophyte always starts development from embryo located on gametophyte
- Have true xylem and phloem, but do not have secondary thickening (exceptions: fossils and extant *Isoëtes* and *Botrychium*)



Final question (3 points)



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Why are ferns more advanced than mosses?



Summary

- **Bryophyta** are only plants₂ with gametophyte predominance.
- Among **Bryophyta**, Hepaticae is a most primitive group closest to green algae.



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2010—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_154



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