

# Introduction to Botany. Lecture 28

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- 1 Questions and answers
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  - Phylum Bryophyta: mosses
  - Pteridophyta



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# Previous final question: the answer

What is a gametangium?



# Previous final question: the answer

What is a gametangium?

- The part of plant where gametes develop.



# Kingdom Vegetabilia

## 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 in the “evolutionary dead end”

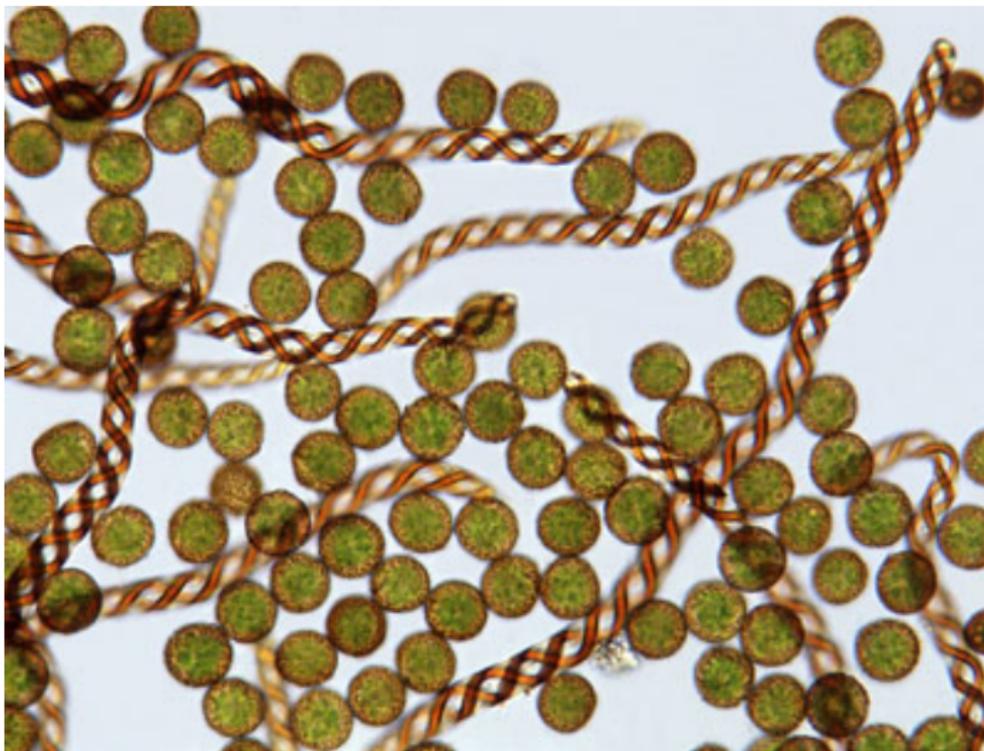
- They resolved “skyscrapers problem” via gametophyte, not sporophyte
- Gametophyte needs water fertilization, which restricts the size and also requires the dense growing
- Also, root system is absent: this is an additional size restriction
- If sexual organs appear on the bottom of leafy shoot, sporogon (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



# Kingdom Vegetabilia

## 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*)



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

2015.

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[http://ashipunov.info/shipunov/school/biol\\_154](http://ashipunov.info/shipunov/school/biol_154)

