

Introduction to Botany. Lecture 30

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- 1 Questions and answers
- 2 Plant diversity
 - Pteridophyta
 - “Ferny” ferns
- 3 Thickening and branching
 - Branching



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Previous final question: the answer

Why does heterospory help ferns to be more adapted for the life on land?



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Why does heterospory help ferns to be more adapted for the life on land?

- Male spores → more spores (100,000 male spores vs. 1 female)
- More spores → denser gametophytes
- Denser gametophytes → higher chance to fertilize when water is scarce



Plant diversity

Pteridophyta

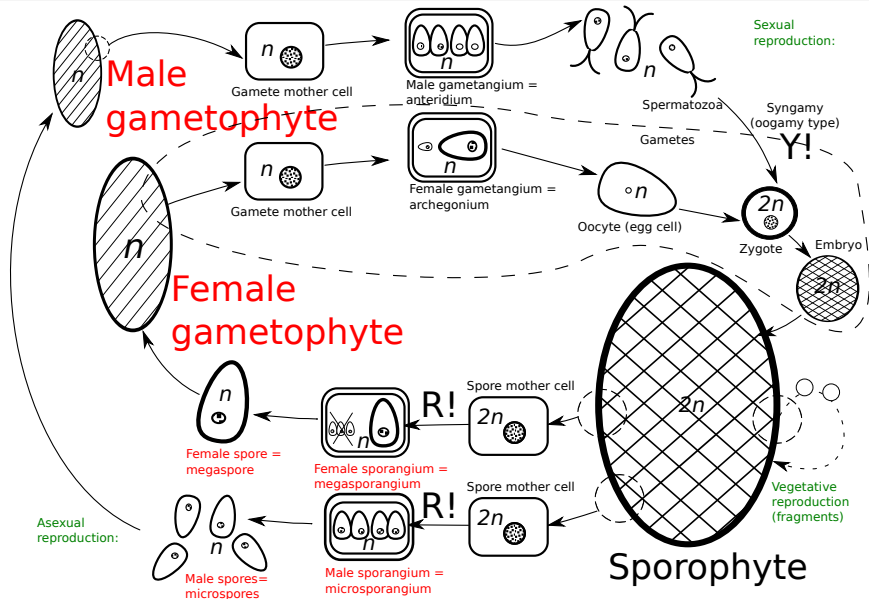


Pteridophyta classes

- Subphylum Lycopodiophytina (lycophytes)
 - Class **Lycopodiopsida**
- Subphylum Pteridophytina (monilophytes)
 - Class **Equisetopsida** (horsetails)
 - Class **Psilotopsida** (whisk ferns)
 - Class **Ophioglossopsida** (ophioglossalean ferns)
 - Class **Marattiopsida** (giant, or marattialean ferns)
 - Class **Pteridopsida** (“true” ferns)



Heterosporic cycle: differences



Plant diversity

"Ferny" ferns



Marattiopsida

- Tropical ferns, several genera with \approx 100 species
- Biggest ferns, one leaf (frond) could be 6 m length, but stems are smaller. Leaves with stipules.
- Sporangia (**eusporangia** like in all other Pteridophyta except "true" ferns) usually unite in **synangia**, gametophytes 1-2 cm in diameter, photosynthetic, terrestrial, usually long-lived.
- In a past, also were dominants of Carboniferous swamp forests.



Angiopteris sp. (Marattiopsida)



Synangia of *Danaea nodosa* (Marattiopsida)

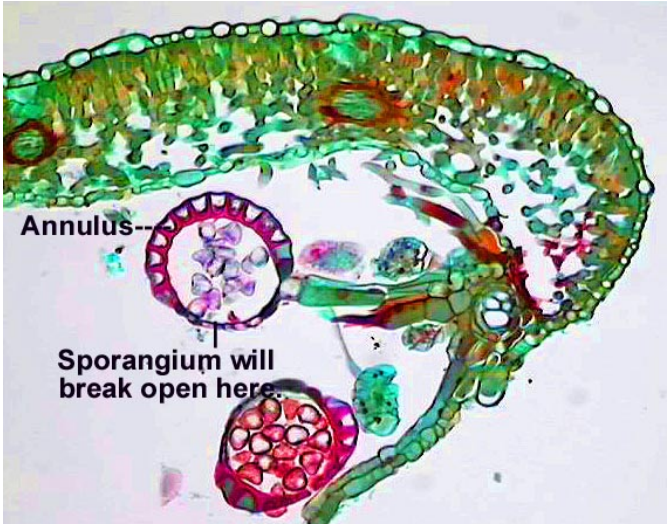


Pteridopsida

- "True" ferns, more than 10,000 species
- Leaves are fronds, with apical growth. Young leaves are coiled in **fiddleheads**.
- Sporangia have one-celled wall (**leptosporangia**) and grouped in sori (often covered with indusium)
- Gametophyte minute, grow aboveground. Some genera of ferns are heterosporous
- Bracken fern, *Pteridium aquilinum*, is the most widespread plant
- Many ferns have vegetative reproduction originated from asexual (**apospory**) or sexual (**apogamy**)



Sorus, indusium, leptosporangium and annulus



Heterosporous fern *Marsilea quadrifolia*, the Shamrock. Well, almost...



Young leaves of bracken fern: Korean "gosari"



Thickening and branching

Branching

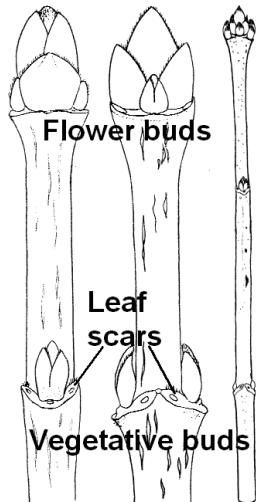


Winter shoot

- 1 Vegetative, flower, and mixed buds
- 2 Leaf and bud scars
- 3 Leaf traces



Winter shoot of maple (*Acer platanoides*)

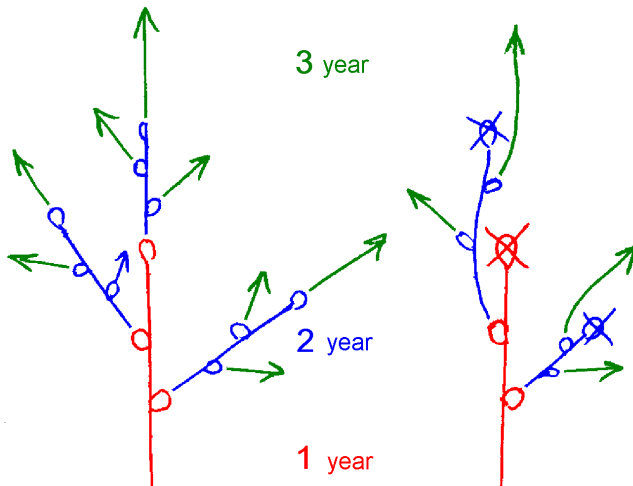


Types of branching

- **Monopodial:** buds do not degrade, all shoots continue to grow
- **Sympodial:** terminal buds degrade, the lateral shoot closest to terminal bud becomes terminal shoot



Monopodial (left) and sympodial branching



Final question (2 points)



Final question (2 points)

What are leptosporangia?



Summary

- Heterosporous plants have two kinds of spores: female (megaspores) and male (microspores)
- Pteridophyta consist of two lineages (subphyla): microphyllous **lycophytes** and megaphyllous **molinophytes**
- Leptosporangiate ferns (“true” ferns) have thin sporangia with annulus



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2010—onwards.

Mode of access:

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



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.

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