

# Introduction to Botany. Lecture 32

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- 1 Questions and answers
- 2 Life cycles and diversity
  - Seed plants
  - Classes of seed plants



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# Previous final question: the answer

What are microphylls?



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What are microphylls?

- Small emergent leaves of lycophytes, originated from epidermis mostly



# Pteridophyta classes

	1	2	3	4	5	6	7	8	9	10
Lycopodiopsida	1	0	0	1	0	0	1	1	0	0
Equisetopsida	0	1	0	1	0	1	0	1	0	1
Psilotopsida	0	1	1	0	0	0	0	0	0	1
Ophioglossopsida	0	1	0	0	0	0	1	0	0	0
Marattiopsida	0	1	1	0	0	1	0	1	1	0
Pteridopsida	1	1	0	0	1	1	0	1	1	0

1 Big (> 1,000 species); 2 Megaphyllous; 3 Synangia; 4 Strobilus; 5 Leptosporangia; 6 Terrestrial gametophyte; 7 Biflagellate sperm; 8 Roots; 9 Fronds; 10 Reduced leaves (enatia and scales). Characters are not necessary relevant to all members of class.

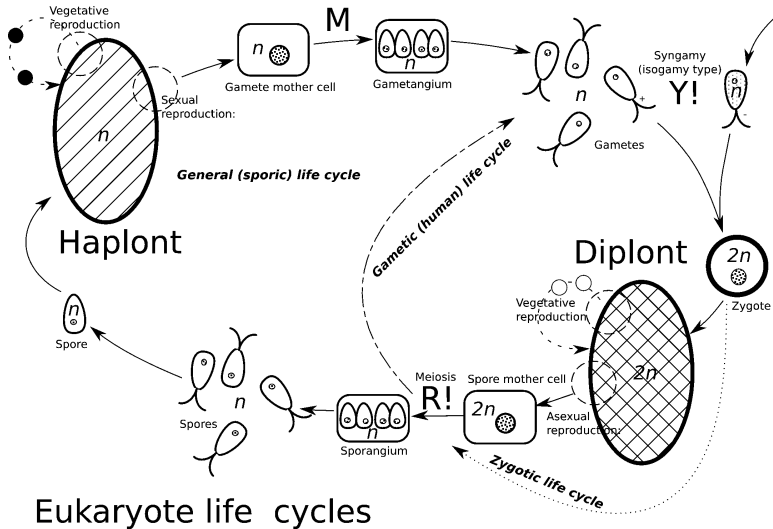


# Life cycles and diversity

## Seed plants

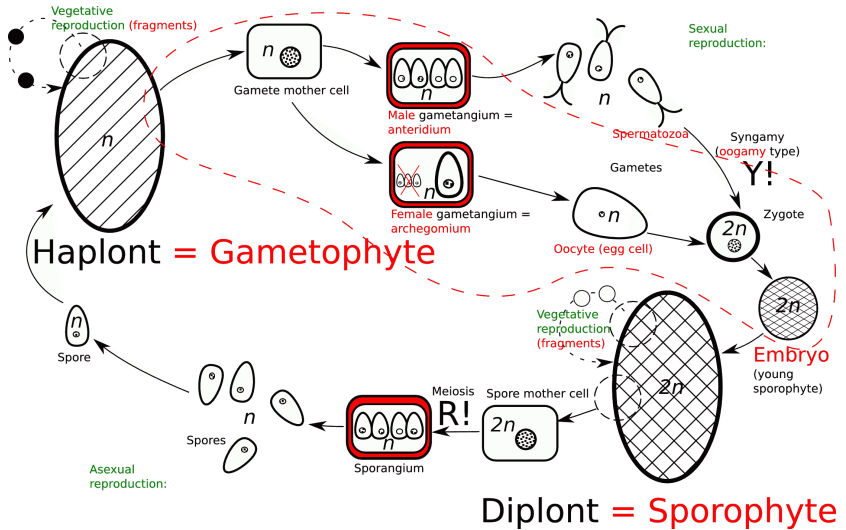


# General life cycle

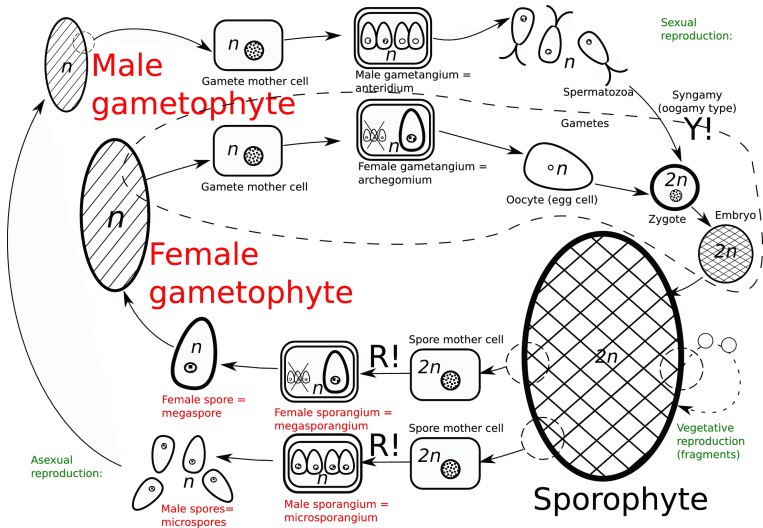




# Life cycle of land plants: differences



# Heterosporic cycle: differences



# Origin of seed

- **Seed is the result of enforced control of sporophyte over gametophyte**
- **Dinosaur problem:** without control on the *r*-strategic gametophyte, *K*-strategic tree sporophyte cannot guarantee its reproduction
- Growing of gametophytes, syngamy (fertilization) and growing of daughter sporophyte—everything happens **directly on mother sporophyte**



# Seed plant life cycle

## Terms covered:

- Ovule and integument
- Nucellus and pollen sac
- Pollen grains and endosperm
- Seed

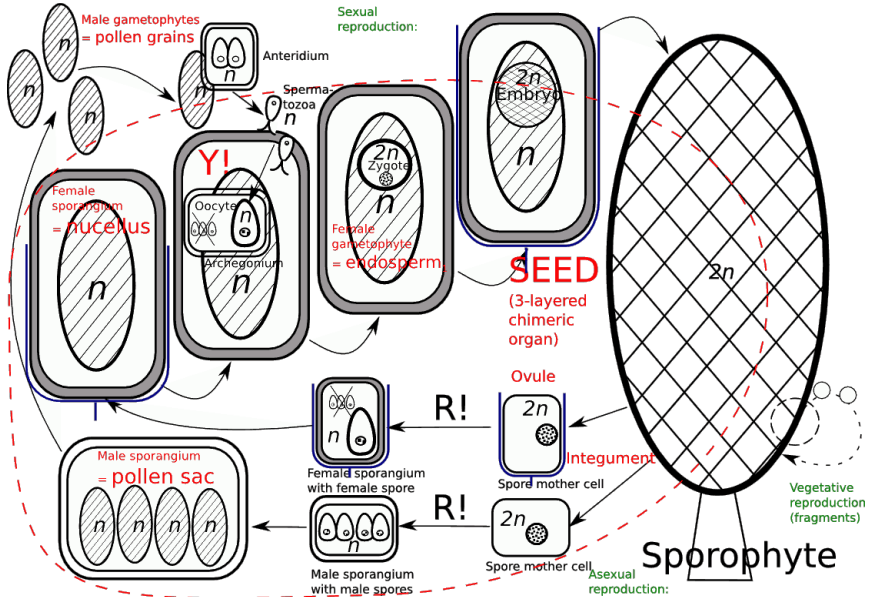


# The seed

- Seed is a **chimeric organ** with three layers: (1) mother sporophyte tissue (integument + nucellus), (2) female gametophyte tissue (endosperm) and (3) daughter sporophyte (embryo)
- Biggest disadvantages of having seed are: (a) low probability of fertilization (pollination needed) and (b) overall slowness of cycle



# Life cycle of seed plants: differences



# Life cycles and diversity

## Classes of seed plants



# Spermatophyta: seed plants

- $\approx$  600 species of non-angiosperms and  $\approx$  250,000 species of angiosperms
- Sporic life cycle with sporophyte predominance and **seed**
- Gametophyte is reduced to cells inside ovule or inside pollen grain. Minimum number of cells is 3 for male gametophyte (pollen grain) and 4 for female gametophyte (embryo sac of angiosperms). Antheridia are reduced. In angiosperms and Gnetales, archegonia are also reduced.
- Sporophyte always starts development from embryo located inside nutrition tissue, endosperm<sub>1</sub> (female gametophyte) or endosperm<sub>2</sub> (second embryo)
- Have axillary buds
- Homoiohydric plants (same as ferns)
- Have secondary thickening





# Final question (2 points)



# Final question (2 points)

What is seed?



# Summary

- Heterosporic plants have two kinds of spores: female (megaspores) and male (microspores)
- Seed plants have compact life cycle where almost all stages happen on mother sporophyte



# For Further Reading



J. E. Bidlack, Sh. H. Jansky.

*Stern's introductory plant biology*. 12th edition.

McGraw-Hill, 2011.

*Chapters 22.*



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

*Plant Biology*. 2nd edition.

Thomson Brooks/Cole, 2006.

*Chapters 24.*

