

Introduction to Botany. Lecture 15

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1 Questions and answers

2 Life cycle

- Diversity of life cycles
- Evolution of life cycles



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Previous final question: the answer

In most organisms, cells participating in syngamy are unequal
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Why?



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In most organisms, cells participating in syngamy are unequal (male and female).

Why?

- This is a division of labor which saves resources. They are concentrated in one place (“female”) whereas the other gender (“male”) may increase in number to make fertilization more likely.
- It is easier to recognize different genotypes if they have phenotypic differences.



Two fundamental evolutionary ideas

DIVISION OF LABOR Split the work to make life easier. Examples: male and female, germ and somatic cells

ARMS RACE For every action, there is an opposite reaction. Examples: effective predation causes the growing of prey, that happens in the origin of eukaryotes and origin of multicellularity



Life cycle

Diversity of life cycles

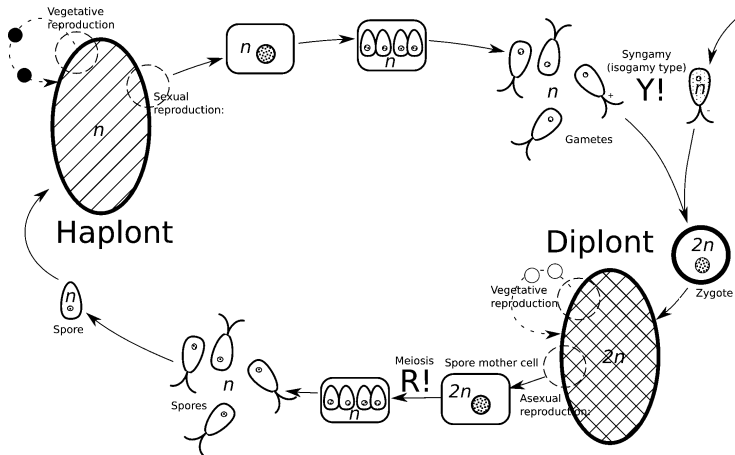


General life cycle: multicellular organism

Associated terms: mitosis, meiosis (R!), syngamy (Y!), reproduction, sexual reproduction, asexual reproduction, vegetative reproduction, isogamy, heterogamy, oogamy, zygote, gamete, male, female, spermatozoon, oocyte, haplont, diplont, spores, mitospores



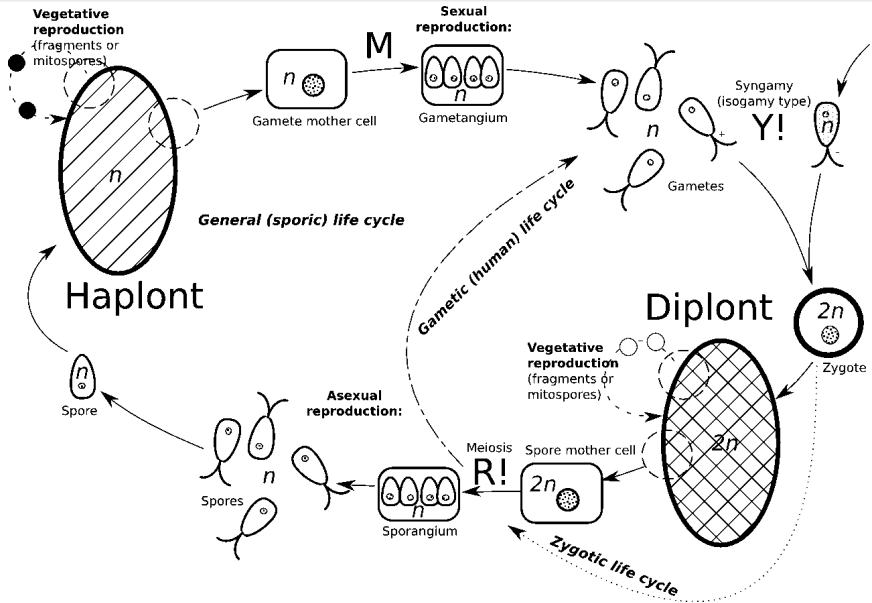
General life cycle: multicellular organism



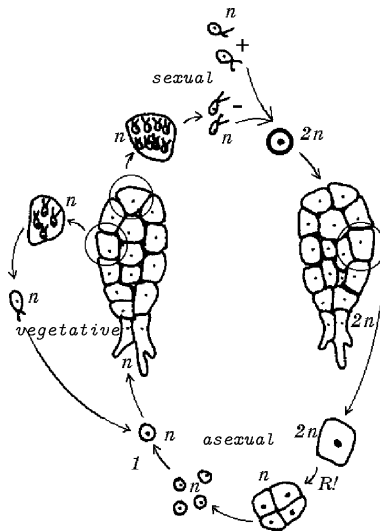
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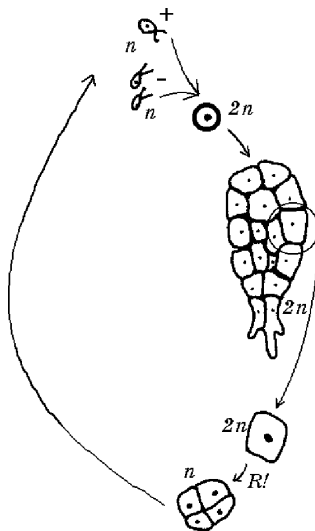
Diversity of life cycles



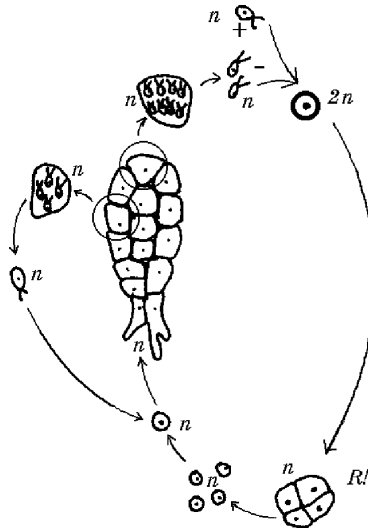
Sporic life cycle: plants



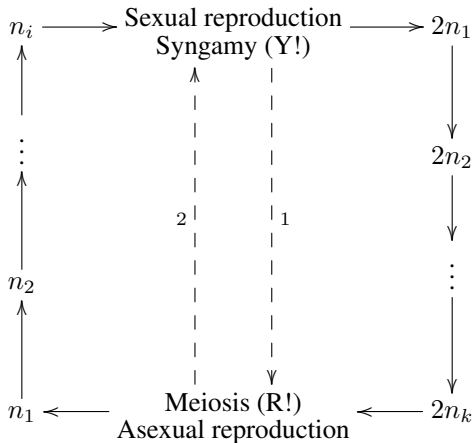
Gametic life cycle: animals



Zygotic life cycle: protists



Life cycle math



1 — zygotic cycle (Y!→R!);

2 — gametic cycle (R!→Y!).

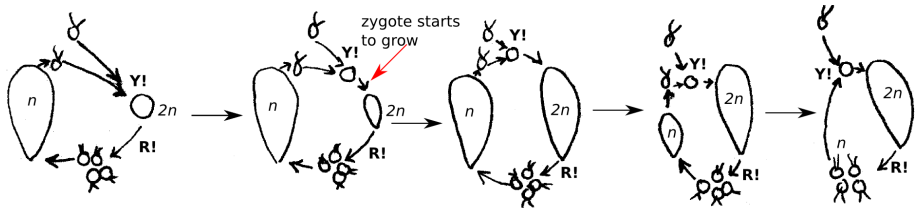


Life cycle

Evolution of life cycles



Diplonts grow, haplonts reduce



Why diplonts are better?

They have two variants of each gene!

- 1 **Dominance:** if one gene is deadly mutated, there is the second working variant
- 2 **Protein production:** two genes will give more protein
- 3 **Diversity:** if one gene is producing protein adapted to $+5...+30^{\circ}\text{C}$ and other—to $+10...+35^{\circ}\text{C}$, the organism may live under $+5...+35^{\circ}\text{C}$



Final question (2 points)



Final question (2 points)

What is the difference between zygotic and gametic life cycles?



Summary

- **Zygotic** life cycle has no *diplont*, **gametic** life cycle has no *haplont*, **sporic** life cycle has both *haplont* and *diplont*
- The evolution of life cycles goes from zygotic to sporic and then to gametic because diplonts are preferred in the evolution



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.

Plant Biology. 2nd edition.

Thomson Brooks/Cole, 2006.

Chapter 12 (skip the angiosperm life cycle!).

