Introduction to Botany. Lecture 14

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Outline

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Previous final question: the answer

In the beginning of mitosis, cell has 10 ng of DNA. How much DNA has each of daughter cells in the end of mitosis?

- 5 ng

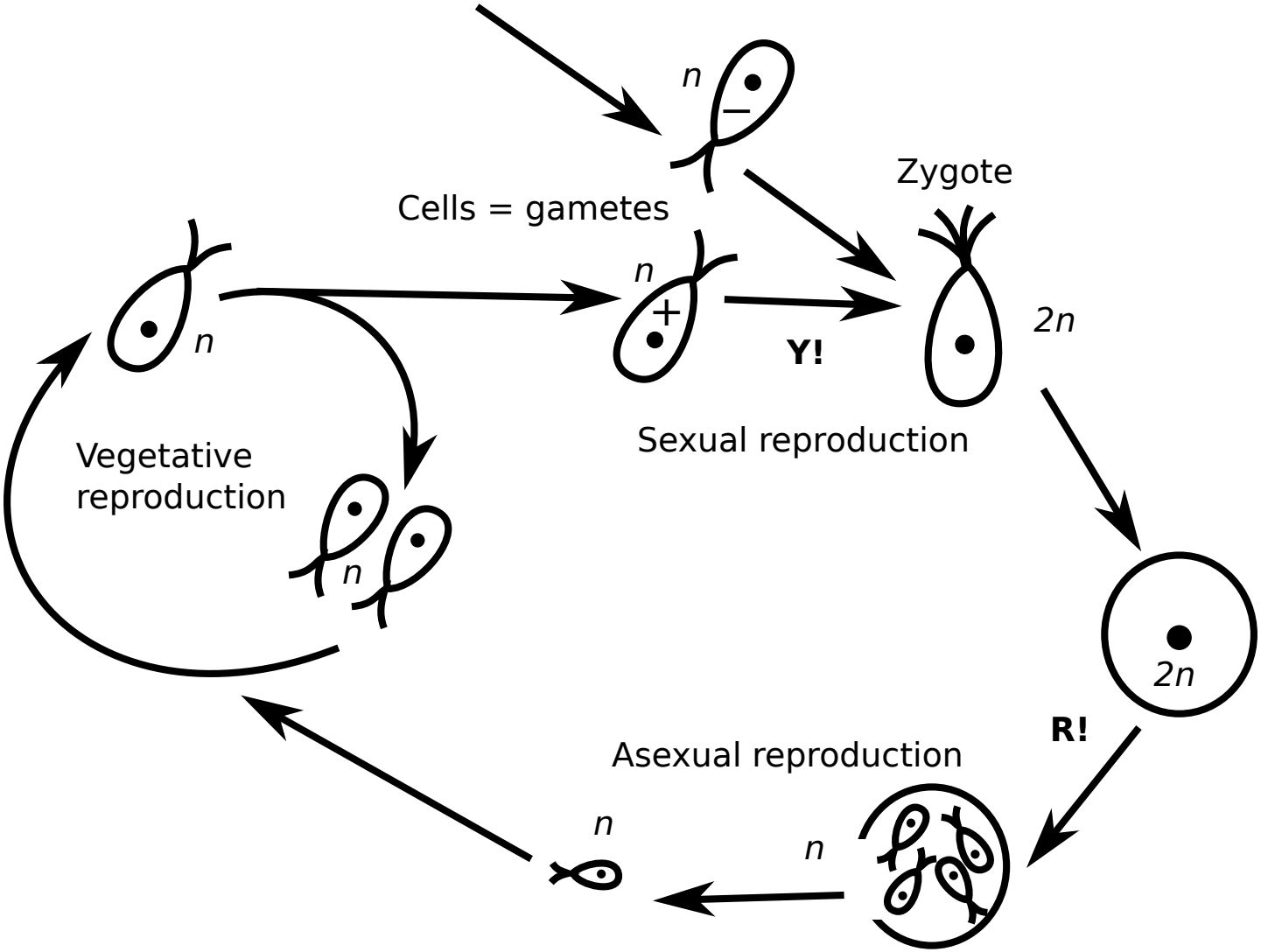
Life cycle

Basics

Simple life cycle: unicellular organism

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

Simple life cycle: unicellular organism



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Multicellularity, or Origin of Death

- Sometimes, cells do not part after mitosis. These simple cell aggregates may benefit from their size (e.g., harder to swallow) and putative division of labor (e.g., capture light from different sides and share products of photosynthesis)
- Next step is to separate *germ cells* and *somatic cells*. Somatic cells with eventually die whereas germ cells may give an offspring.
- This is the beginning of **multicellularity**.
- Life cycles of multicellular organisms are based on interleaving **gaplont** and **diplont**, the second is making **spores**

General life cycle: multicellular organism

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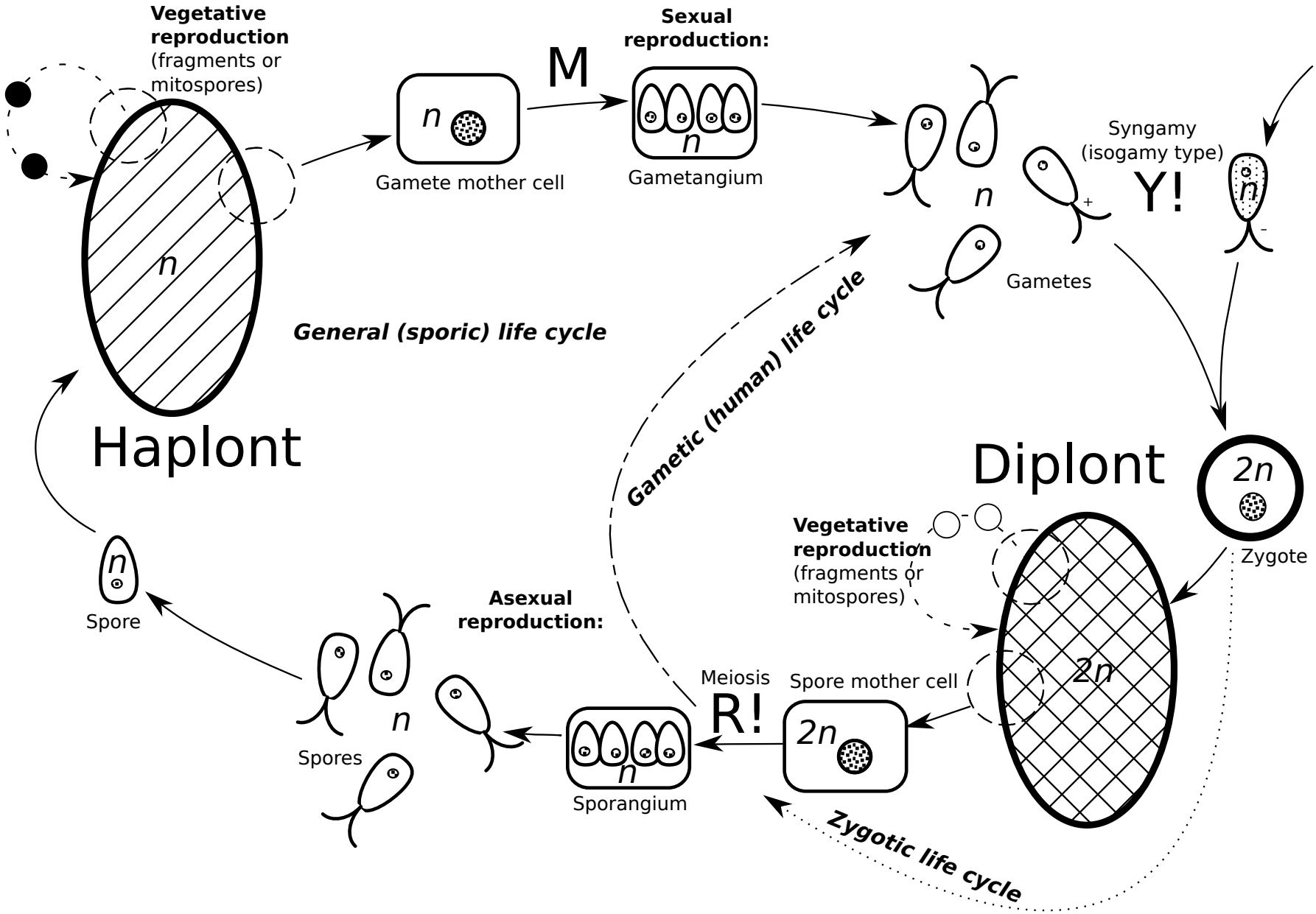
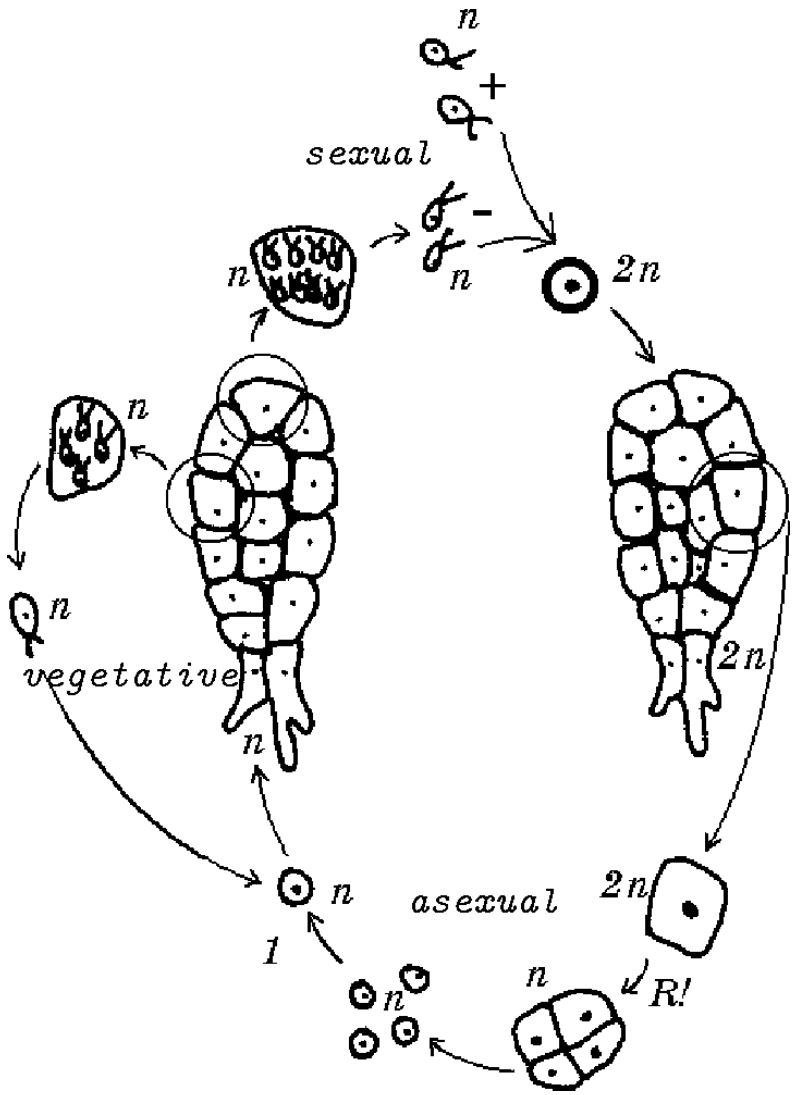


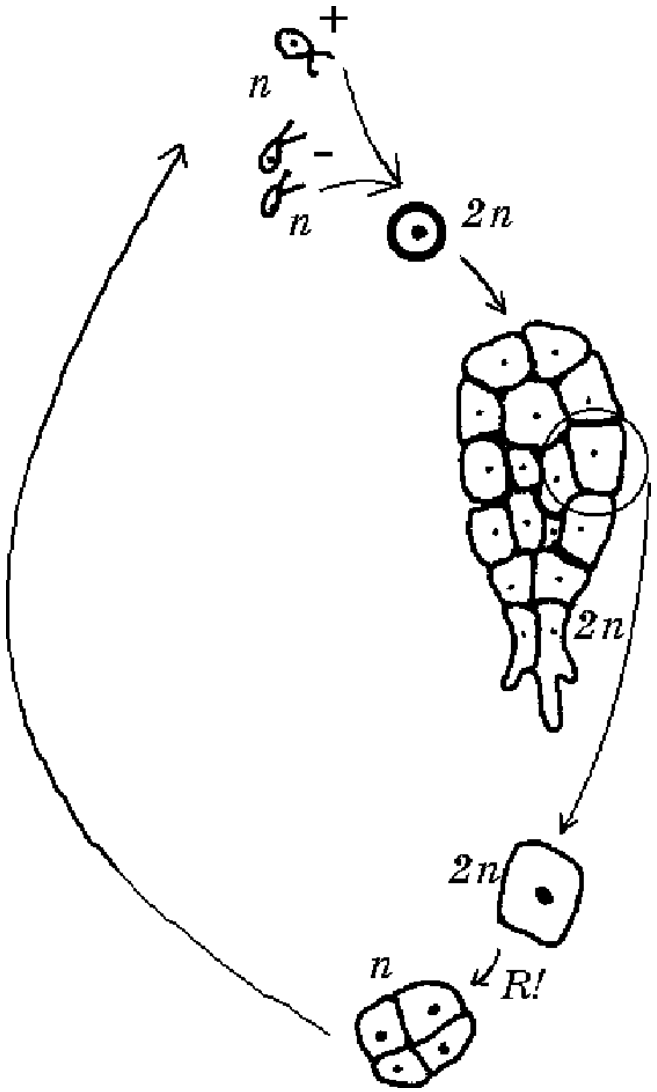
Life cycle

Diversity of life cycles

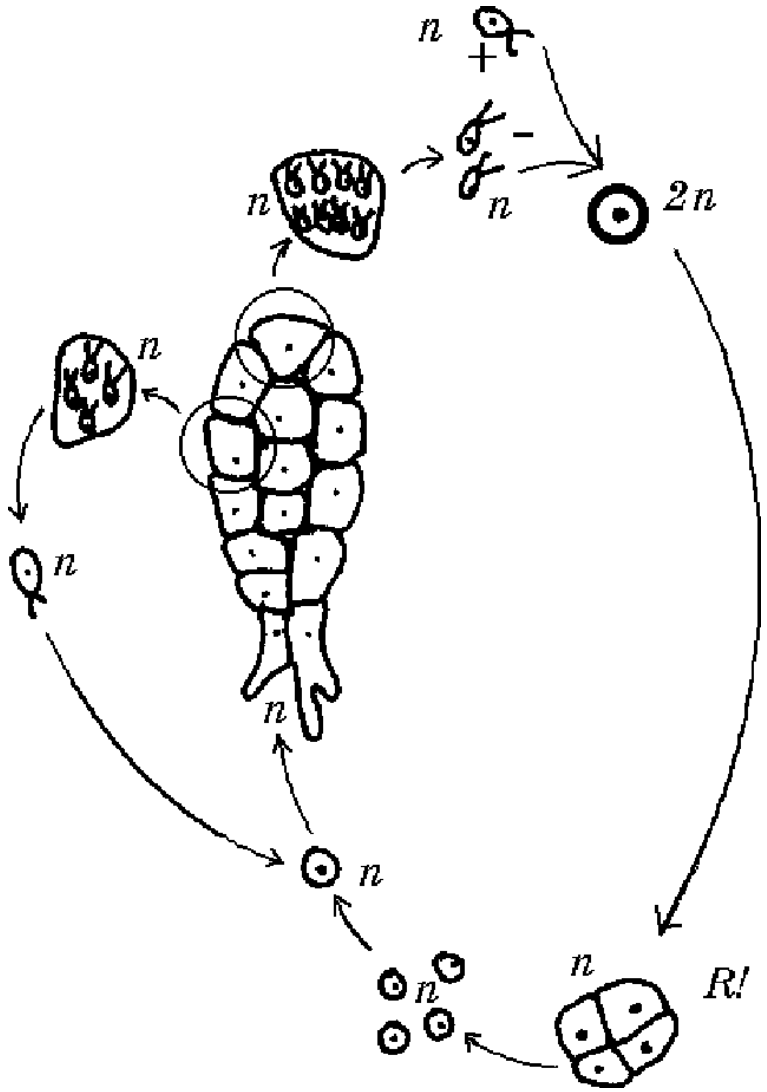
Sporic life cycle: plants



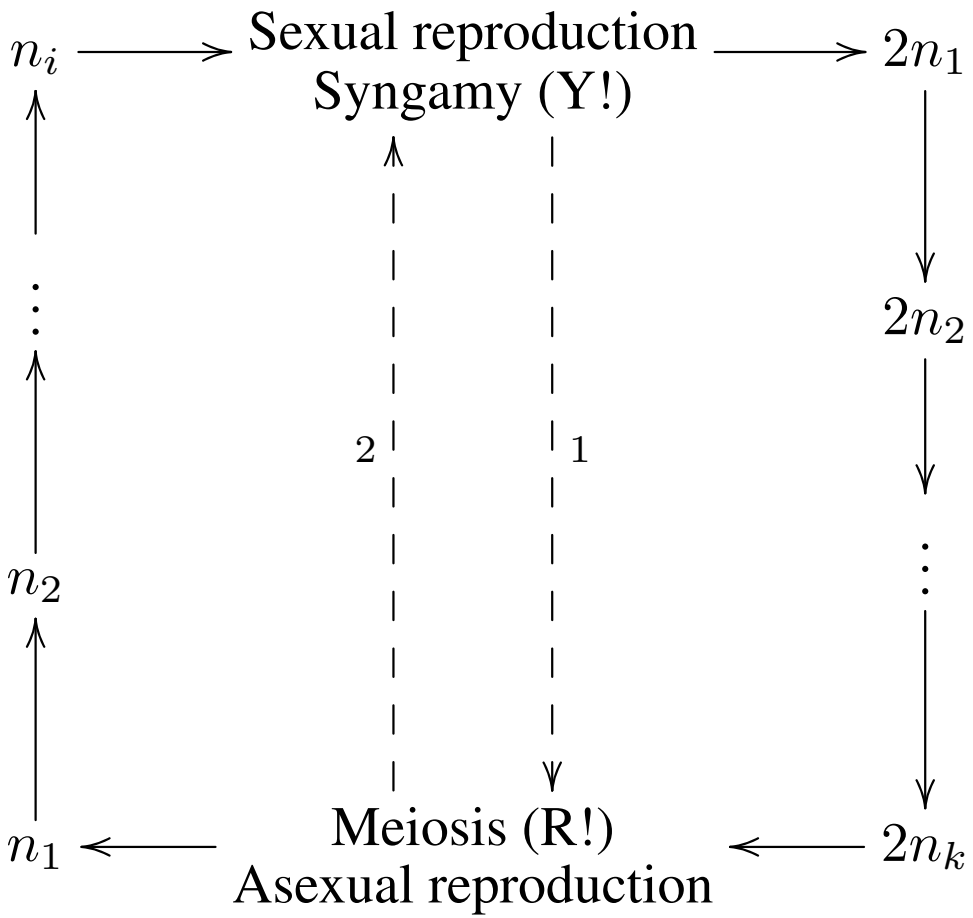
Gametic life cycle: animals



Zygotic life cycle: protists



Life cycle math

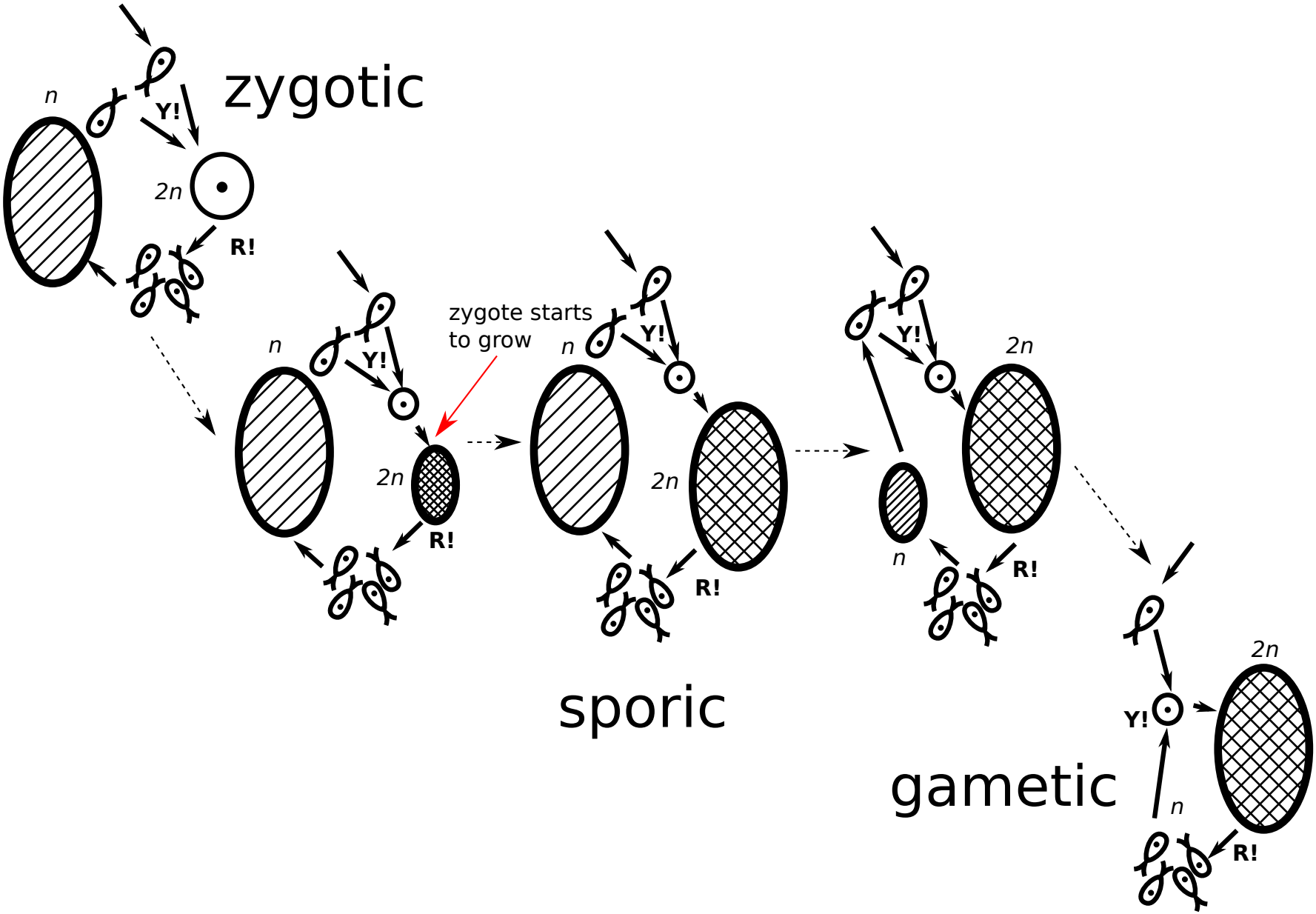


1 — zygotic cycle (Y!→R!);
2 — gametic cycle (R!→Y!).

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°C and other—to +10...+35°C, the organism may live under +5...+35°C

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 better”

For Further Reading

A. Shipunov.
Introduction to Botany [Electronic resource].
2015.
Mode of access:
http://ashipunov.info/shipunov/school/biol_154