

# Introduction to Botany

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Lecture 15

# Outline

## 1 Questions and answers

- Quiz

## 2 Life cycle

- Syngamy and meiosis
- Basics of life cycles

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# Questions and answers

## Quiz

# Quiz question (... points)

# Quiz question (... points)



# Life cycle

## Syngamy and meiosis

# Some useful terms: checklist

- Gene
- Protein
- Enzyme
- Genotype
- Phenotype
- Genome
- Population
- Mutation
- Syngamy



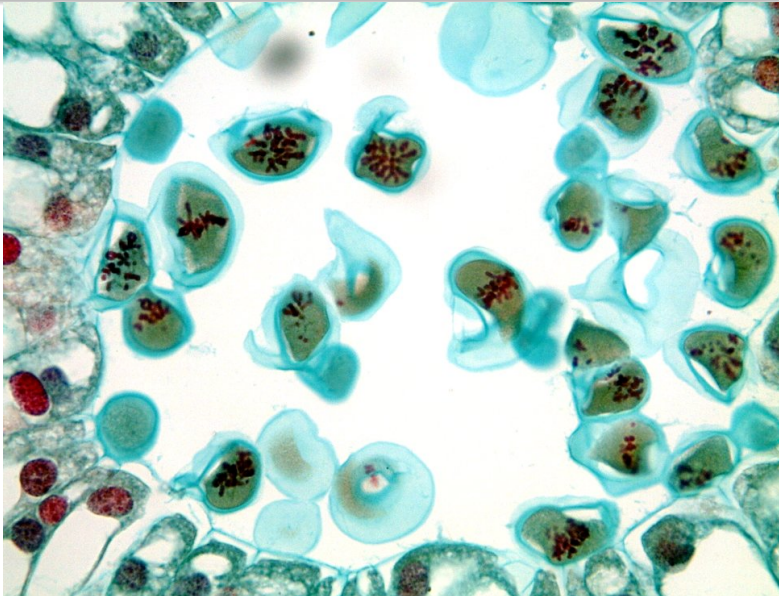
# Ploidy, or chromosome set

- In diploid ( $2n$ ) organisms, chromosomes form pairs
- Paired chromosomes (XX) are **homologous**
- In haploid ( $n$ ) organisms, all chromosomes are single
- In mitosis, ploidy will be the same:  $2n \longrightarrow 2n + 2n$
- In syngamy, ploidy will increase:  $n + n \longrightarrow 2n$
- In meiosis, ploidy will reduce:  $2n \longrightarrow n + n$

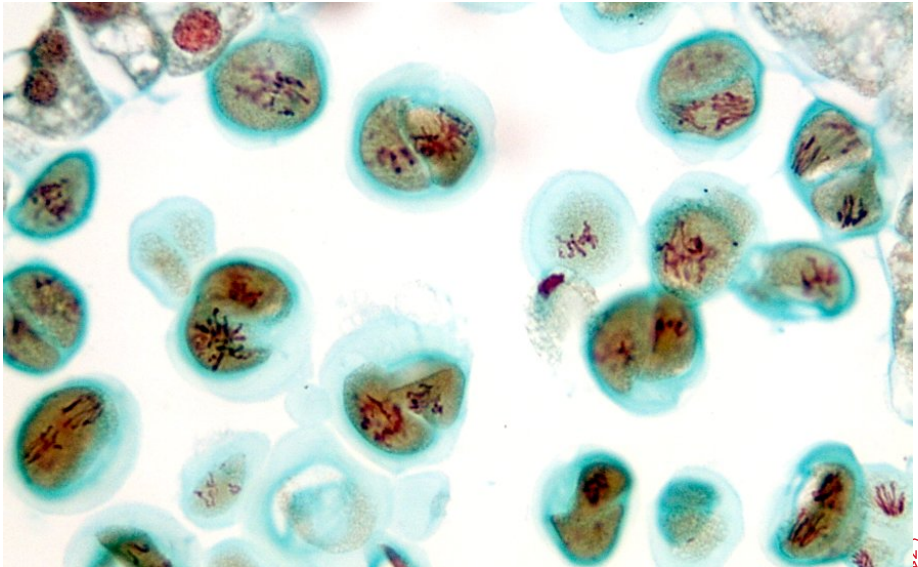
# Stages of meiosis

- First division: reductive part
  - Prophase I: homologous chromosomes form pairs (**synapses**) and start to exchange DNA (**crossing-over**)
  - Metaphase I
  - Anaphase I: homologous chromosomes will go *independently* to different poles
  - Telophase I becomes Prophase II, without interphase (and typically without cytokinesis)
- Second division: equal part (similar to mitosis)
  - Prophase II
  - Metaphase II
  - Anaphase II
  - Telophase II

# Real-world meiosis, 1st division



# Real-world meiosis, 2nd division



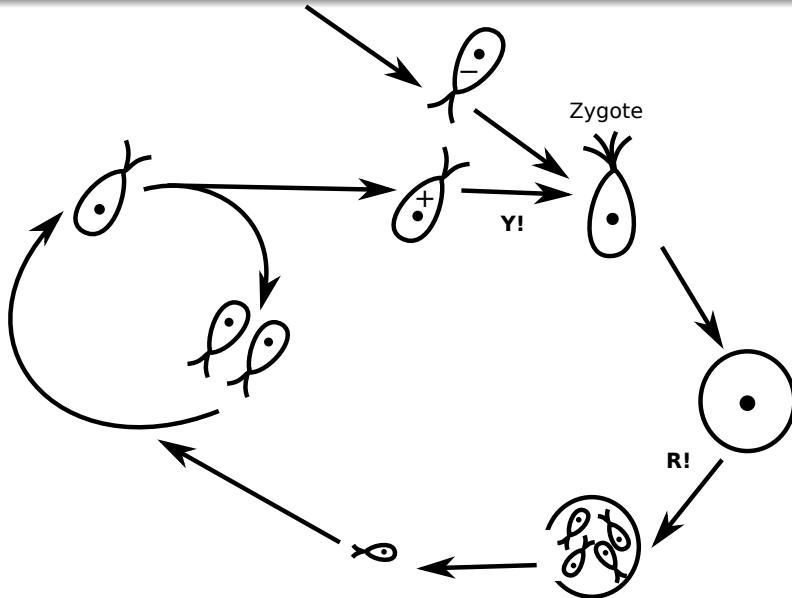
# Polyploids

- If for some reason, meiosis will not run correctly, one of resulted cells could receive double set of chromosomes ( $2n$  instead of  $n$ )
- If this cell goes to syngamy, resulted zygote will have  $3n$  chromosomes
- Cells with  $> 2n$  chromosomes are **polyploids**

# Life cycle

## Basics of life cycles

# Simple life cycle: unicellular organism



# Summary

- **Mitosis** is a equal division of DNA, **ploidy does not change**, **genotype does not change**
- **Syngamy** is a sexual process of cell fusion, **ploidy doubles**, **genotype changes**
- **Meiosis** is a process of reduction of DNA amount, **ploidy halves**, **genotype changes**
- Meiosis has two stages: first to reduce ploidy, second to split exact copies of DNA



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

Mode of access:

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