Introduction to Botany. Lecture 12

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Outline

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Previous final question: the answer

Why do chromosomes (DNA) consense before mitosis?

- To make equal splitting faster and more error-proof

Mitosis and meiosis

Meiosis

Definition of meiosis

- *Reductive cell division, where each of daughter cells receives the half of mother cell chromosomes*
- Chromosome formula: XX $\longrightarrow$ X + X $\longrightarrow$ I + I + I + I
- **The goal of meiosis** is to counterbalance the syngamy
- Meiosis changes genotype of cells because: (1) number of chromosomes reduced, (2) chromosomes are **recombined** and (3) chromosomes exchange their genetic material

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

Summary

- **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

For Further Reading

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