

Introduction to Botany. Lecture 12

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Outline

1 Questions and answers

2 Mitosis and meiosis

- Mitosis
- Meiosis



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Previous final question: the answer

What is the difference between symplast and apoplast?



Previous final question: the answer

What is the difference between symplast and apoplast?

- Symplast: cytoplasm of different cells connected with plasmodesmata
- Apoplast: cell walls connected side-by-side



Mitosis and meiosis

Mitosis



Definition of mitosis

- *Equal cell division, where each of daughter cells receives the same number of chromosomes as a mother cell*
- Chromosome formula: $X \longrightarrow I + I$
- **The goal of mitosis** is the equal distribution of pre-synthesized DNA
- Mitosis does not change genotype of cells



Mitosis, karyokinesis and cytokinesis

- Mitosis is the kind of karyokinesis
- Cytokinesis is a different process, the part of **cell cycle**

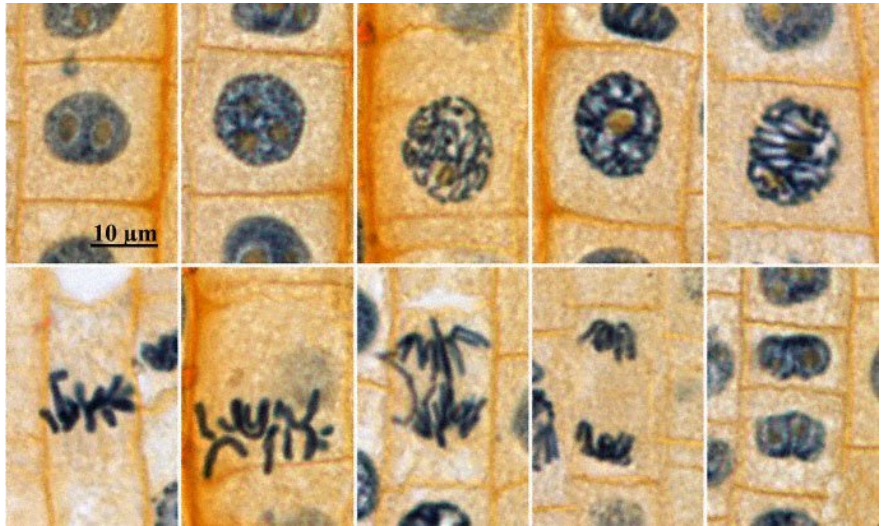


Stages of mitosis

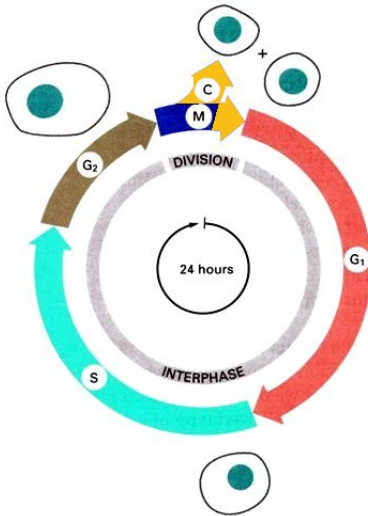
- Prophase
- Metaphase
- Anaphase
- Telophase



Which stage?



Cell cycle



- Interphase
 - Pre-synthetic stage (G_1)
 - Synthetic stage (S): DNA duplicated
 - Post-synthetic stage (G_2)
- Mitosis
- Cytokinesis

Mitosis and meiosis

Meiosis



Exchange and renovation of DNA

- To sustain with the ever-changed environment, organisms must evolve
- To evolve, they need a genetic diversity: different genotypes in different organisms
- To be genetically diverse, they need a process of genetic exchange
- One of ways of exchange is a sexual process in a form of **syngamy**
- However, constant syngamy will result in constant increase of DNA amount
- Meiosis is a counterbalance to syngamy



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) chromosomes are **recombined** and (2) chromosomes exchange their genetic material



Final question (2 points)



Final question (2 points)

Why do organisms have sexual process?



Summary

- **Mitosis** is a process of cell multiplication, **ploidy stays constant**, **genotype does not change**
- **Meiosis** is a process of reduction of DNA amount, **ploidy halves**, **genotype changes**



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!.

