

Introduction to Botany. Lecture 11

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Outline

1 Questions and answers

2 Plant cell

- Protein synthesis
- Other cell structures

3 Mitosis and meiosis

- Mitosis



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Previous final question: the answer

List at least two differences between plant and animal cells.



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- Chloroplasts
- Vacuole
- Cell wall
- Plasmodesmata
- Almost no phagocytosis, only few sterols etc.



Plant cell

Protein synthesis



Nucleus structure

Nuclear envelope Double layered membrane, filaments of protein lamin line inner surface and stabilize structure, inner and outer membranes connect to form pores

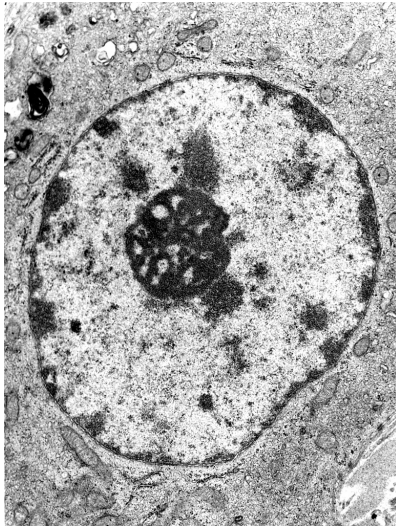
Nucleoplasm Portion inside the nuclear envelope

Nucleoli Dark staining bodies within nucleus, site for ribosome synthesis

Chromosomes Store genetic information in nucleotide sequences, each chromosome consists of chain of nucleosomes (long DNA molecule and associated histone proteins)



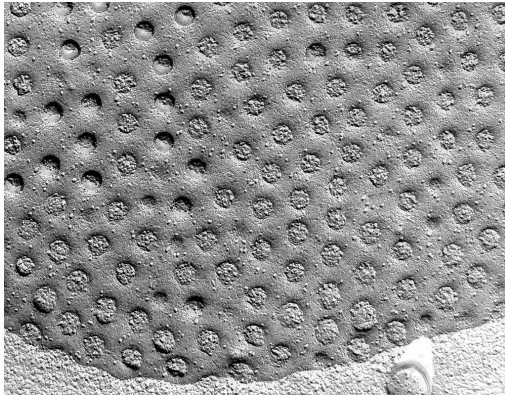
Nucleus



A typical nucleus with a prominent nucleolus (TEM).



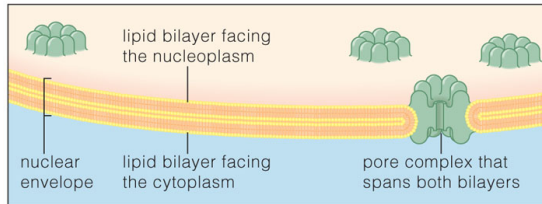
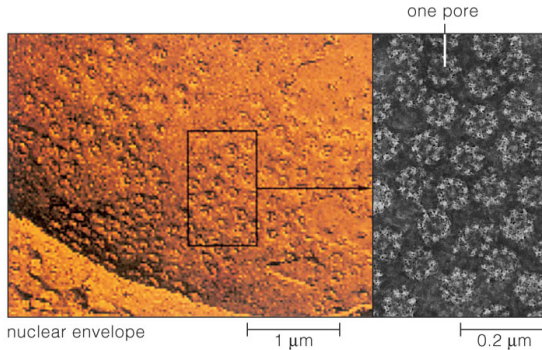
Nuclear pores



Freeze-fracture technique used to show nuclear pores. Nuclear pores are structures in the nuclear envelope that allow passage of certain materials between the cell nucleus and the cytoplasm (TEM $\times 100,000$)



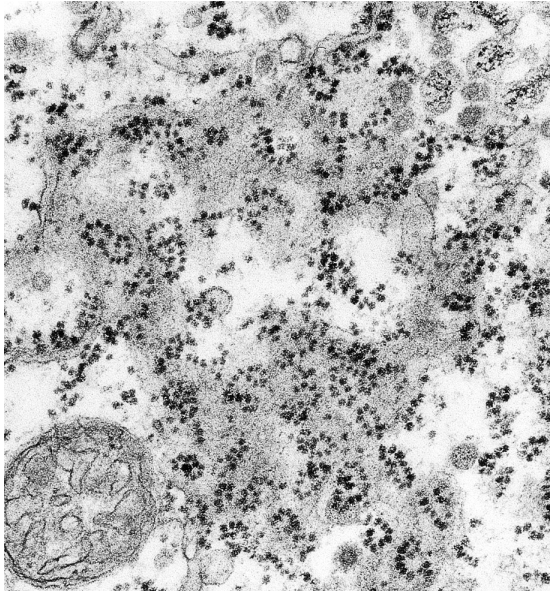
Nuclear pores and envelope



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Ribosomes



Plant cell

Other cell structures



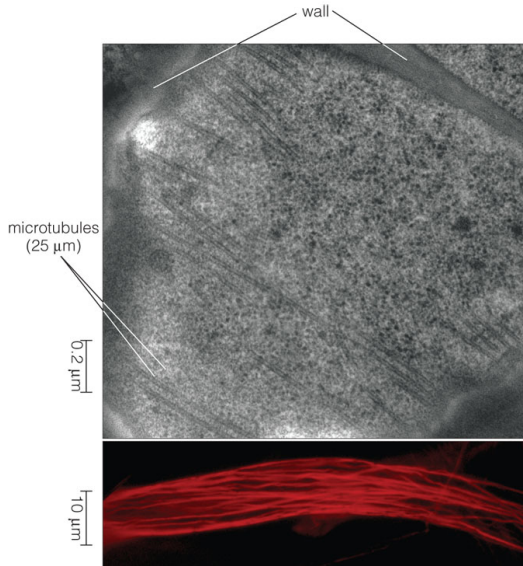
Cellular skeleton

Collection of long, filamentous structures within cytoplasm:

- **Microtubules.** Movement based on tubulin-kinesins interactions. They are key organelles in cell division, form basis of cilia and flagella, serve as guides for the construction of cell wall
- **Microfilaments.** Movement based on actin-myosin interactions. Serve as guides for movement of organelles within cell



Cytoskeleton



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Plant cell



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**



Final question (2 points)



Final question (2 points)

What is the difference between symplast and apoplast?



Summary

- **Nucleus** stores and expresses genetic information
- Three main stages of cell cycle are: interphase, mitosis and cytokinesis genetic information



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.

Chapters 3 and 12.

