

# Introduction to Botany. Lecture 8

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## 1 Questions and answers

## 2 Plant cell

- Discovery of cell
- Structure of cell



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# Previous final question: the answer

Photorespiration increases when concentration of oxygen grows. Why is photorespiration so intensive at high temperatures?



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Photorespiration increases when concentration of oxygen grows. Why is photorespiration so intensive at high temperatures?

- When temperature is high, light stage makes more oxygen
- When temperature is high, plants close stomata to avoid water loss. As a side result, concentration of oxygen in leaf tissues grows

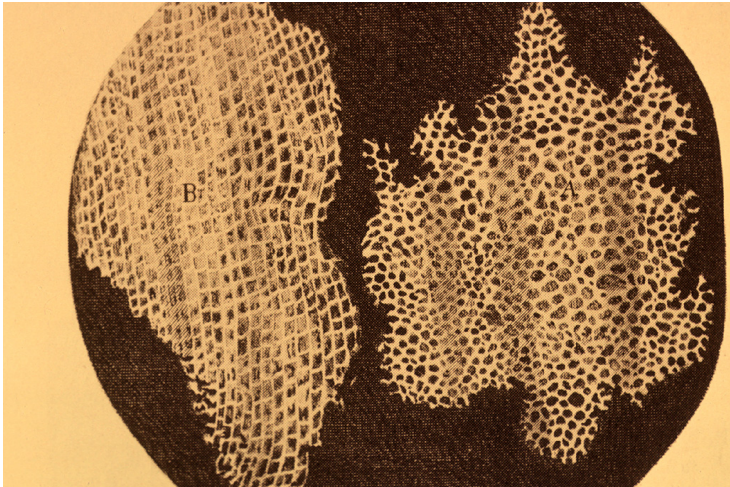


# Plant cell

## Discovery of cell



# Discovery of cells



In 1665, Robert Hooke looked at cork tissue under microscope and found “little boxes or cells distinct from one another ... that perfectly enclosed air”



# Hooke's microscope

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# Cell theory

- 1 All plants and animals are composed of cells (1838, Matthias Schleiden and Theodor Schwann)
- 2 Cells reproduce themselves (1858, Rudolf Virchow)
- 3 All cells arise by reproduction from previous cells (1858, Rudolf Virchow)



# Microscopes

**Light microscopy** was an early technological breakthrough that contributed to our understanding of cell structure. Dissectiscopes use reflected light, microscopes use translucent light. Magnification is of  $10^3$  order.

**Transmission electron microscopy** (TEM) allows us to see the internal organization of cells and organelles. Use translucent electronic “light” (electronic beam) which kills objects. Objects are often stained with osmium (Os). Magnification if of  $10^7$  order.

**Scanning electron microscopy** (SEM) provides an image of the surface of cells and organisms. Use reflected electronic “light” (electronic beam). Objects are covered with thin layer of gold (Au). Magnification if of  $10^6$  order.

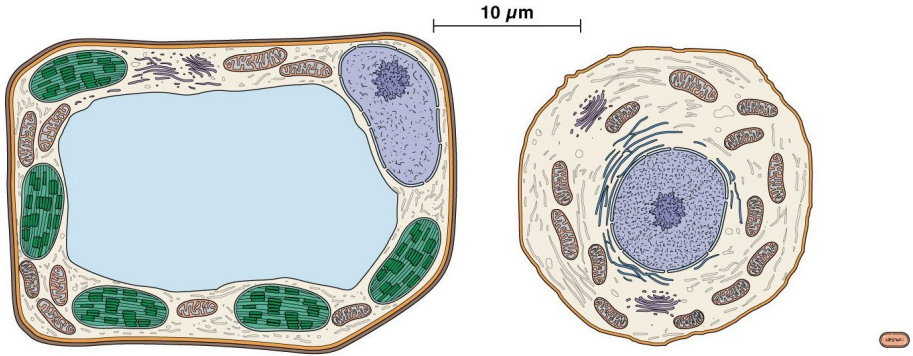


# Plant cell

## Structure of cell



# Cells and cells



Eukaryotic and prokaryotic cells are fundamentally different

# *Cells*

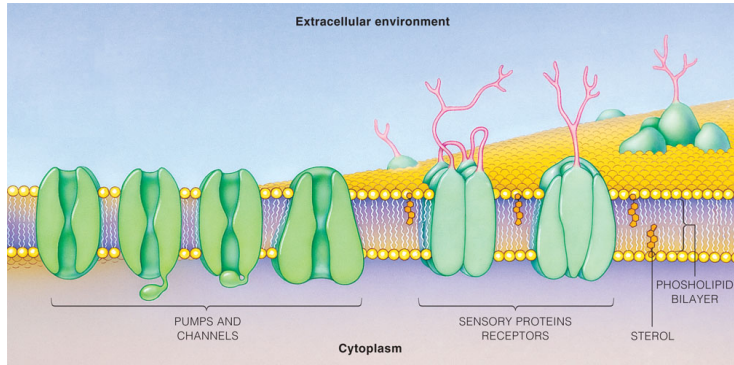


# List of cell structures

- Cell membrane
- Cytoplasm
- Nucleus, nuclear pore, nucleolus, chromatine
- Chloroplast, thylakoids
- Mitochondrion, cristae
- ER (endoplasmatic reticulum/network)
- Goldgi apparatus (AG)
- Vacuoles, lysosomes, peroxisomes
- Ribosomes
- Cell wall



# Plasma membrane



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Phospholipids, sterols, proteins: pumps, receptors, channels

# Final question (2 points)





# Final question (2 points)

What is the symbiogenesis?



# Summary

- Eukaryotic and prokaryotic cells are cells of different levels of organization; eukaryotic cells are ecosystems
- Chloroplasts and mitochondria are both results of symbiogenesis



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

2010—onwards.

Mode of access:

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



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.

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Thomson Brooks/Cole, 2006.

*Chapter 3.*

