Introduction to Botany. Lecture 11

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September 22, 2017

Outline

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Questions and answers

Quiz

Final question (2 points)

What is photorespiration?

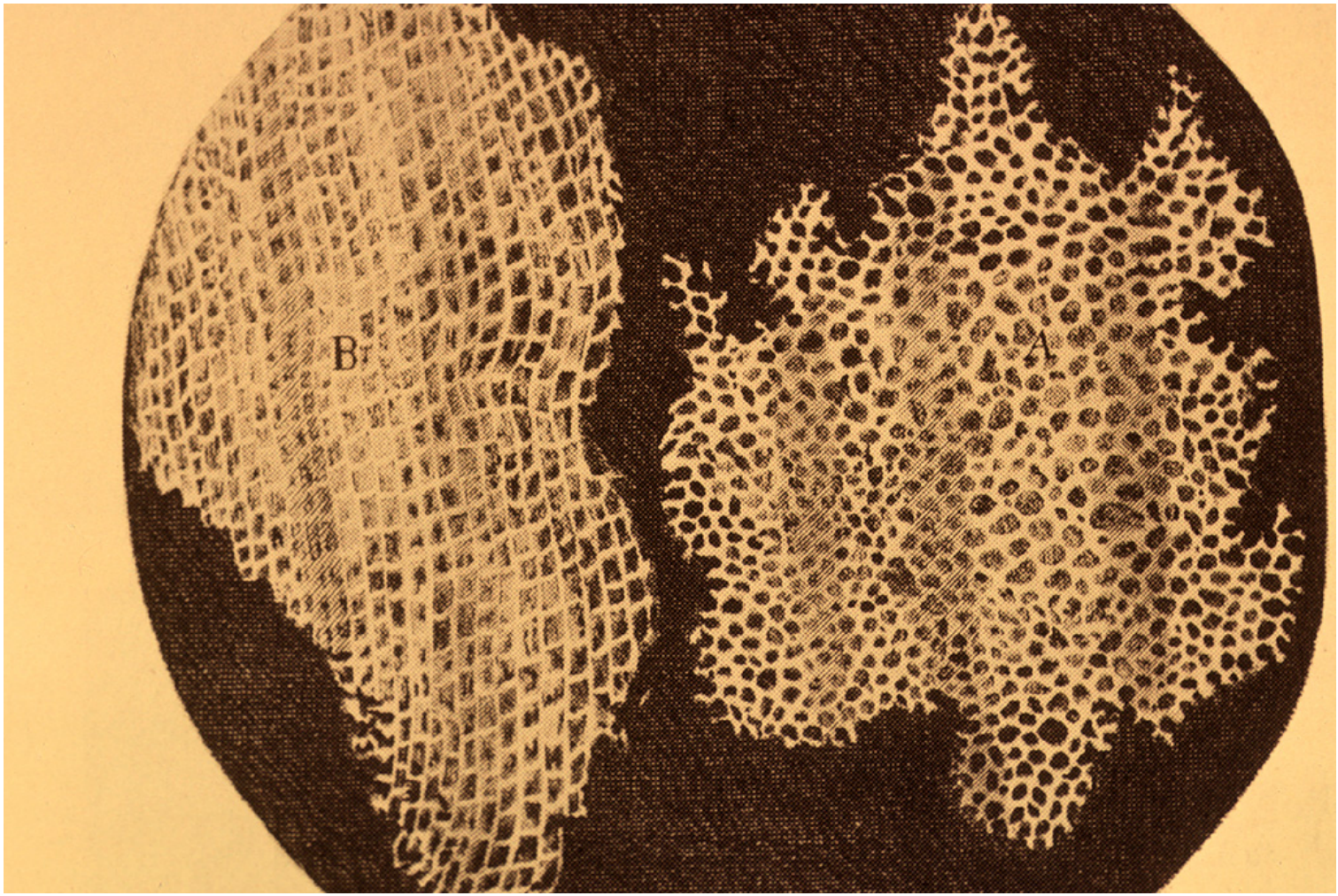
Final question (2 points)

What is photorespiration?

- This is a “wrong turn” of Calvin cycle when there are too many oxygen molecules
- Instead of carbon dioxide, Rubisco takes oxygen and then many efforts (and ATP) required to restore everything back to normal

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

National Library of Medicine

Cell theory

A. All plants and animals are composed of cells (1839, Matthias Schleiden and Theodor Schwann)
B. Cell is most basic unit (atom) of life (1839, Matthias Schleiden and Theodor Schwann)
C. All cells arise by reproduction from previous cells (1858, Rudolf Virchow)

Miscroscopes

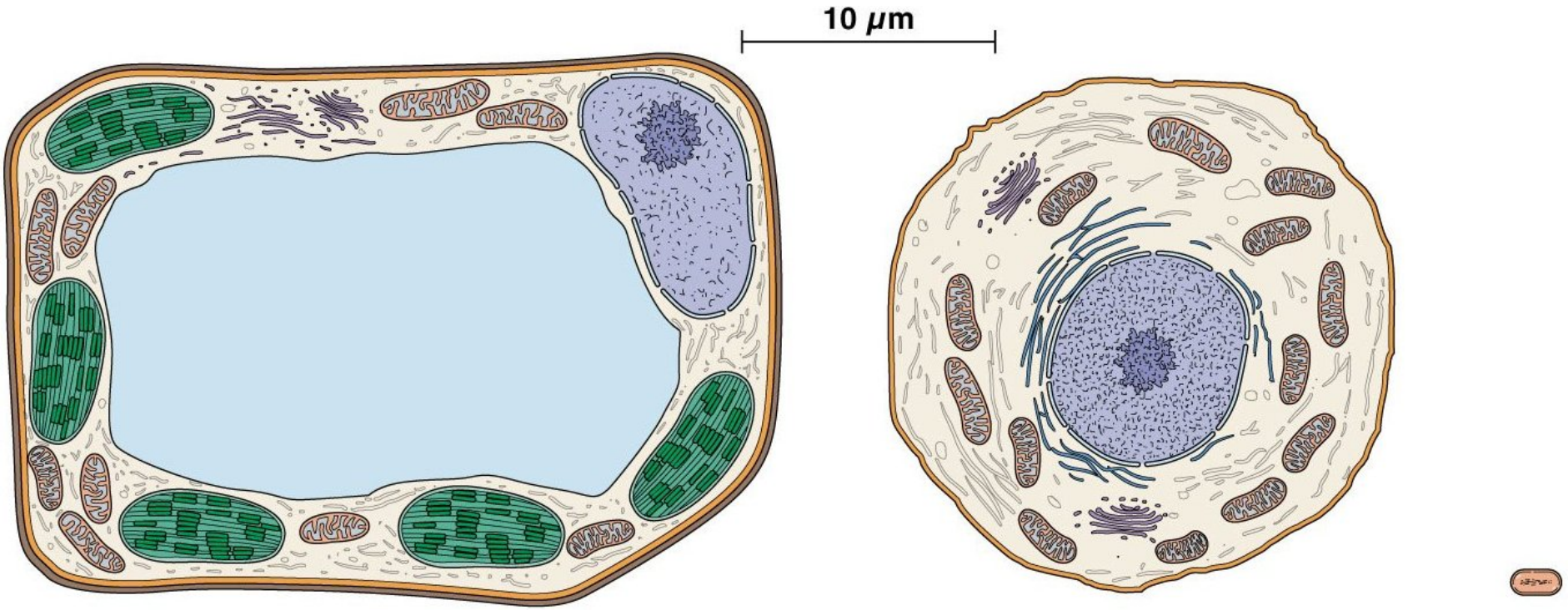
Light microscopy was an early technological breakthrough that contributed to our understanding of cell structure. Dissectiscopes use reflected light, microscopes use translucent light. Magnification is of 10^3 order.

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

Plant cell

Final question (2 points)

Final question (2 points)

TBA

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**

Chloroplasts and mitochondria are both results of symbiogenesis

Summary

- Eukaryotic and prokaryotic cells are cells of different levels of organization
- Eukaryotic cell is a “second-level” cell, cell from cells, ecosystems
- Chloroplasts and mitochondria are both results of symbiogenesis

For Further Reading

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