

# Introduction to Botany. Lecture 2

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# Web site

© Shipunov, A. Introduction to Botany [Electronic resource]. 2010—onwards.  
Mode of access: [http://herba.msu.ru/shipunov/school/biol\\_154/index.htm](http://herba.msu.ru/shipunov/school/biol_154/index.htm)

## BIOL 154: Introduction to Botany



Course materials:

- [Syllabus](#) (PDF, 0.08 Mb)
- [First lecture presentation](#) (PDF, 9 Mb)

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

# Outline

- 1 Plants in general
  - Levels of organisation
  - Taxonomy
- 2 Plant cell
  - Structure of cell
  - Cell boundaries

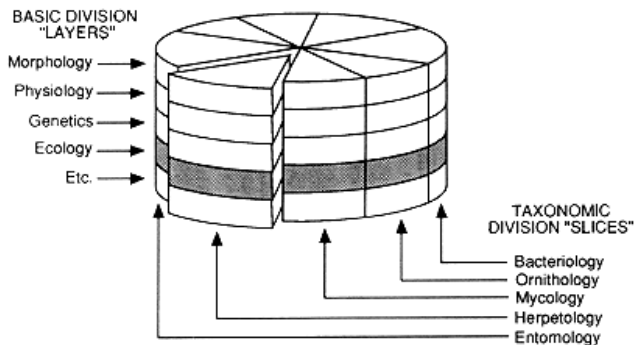
# Outline

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# Levels of organisation

- Molecules
- Organelles
- Cells
- Tissues
- Organs
- Organisms
- Populations
- Ecosystems OR Taxons

# Place of botany



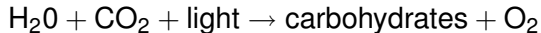
Layered cake of biology (Odum, 1971): botany is a  
“slice science”

# Definition of plants

- Taxonomy definition (based on the diversity)
- Ecology definition (based on the role in nature)

# Plants in ecology

Plants are primary photosynthetic organisms:





# Ranks

Most scientists accept seven main ranks\*:

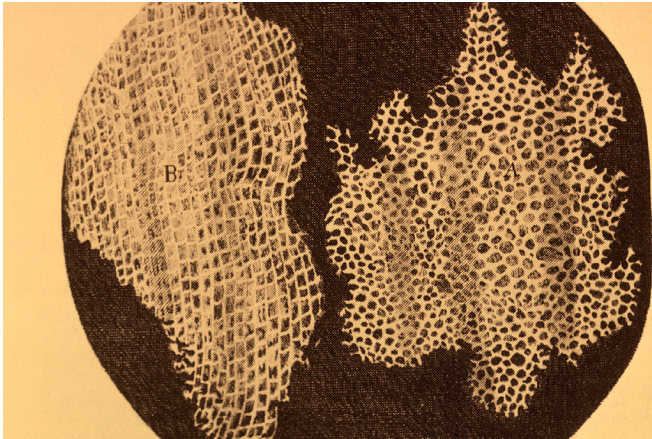
- Species
- Genus
- Family
- Order
- Classis
- Phylum
- Kingdom



# Overview of classification

- Prokaryotes (Monera)\*
  - Bacteria: include cyanobacteria, or “blue-green algae”
  - Archaea
- Eukaryotes (Eukaryota)
  - Protists (Protista): include algae, fungi and unicellular “animals”
  - Animals (Animalia)
  - Plants (Vegetabilia): multi-tissued green eukaryotes

# Discovery of cells



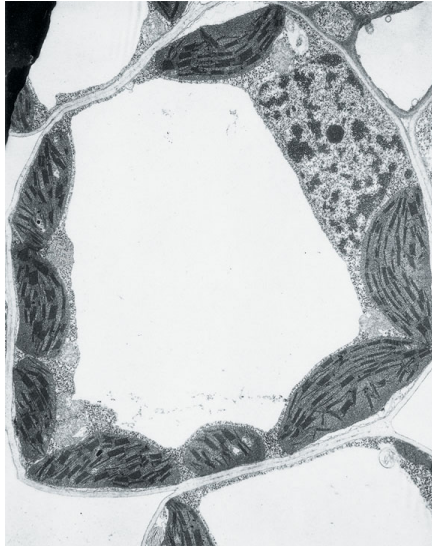
In 1665, Robert Hooke looked at cork tissue under microscope and found “little boxes or cells distinct from one another ... that perfectly enclosed air”\*

# Cell theory

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

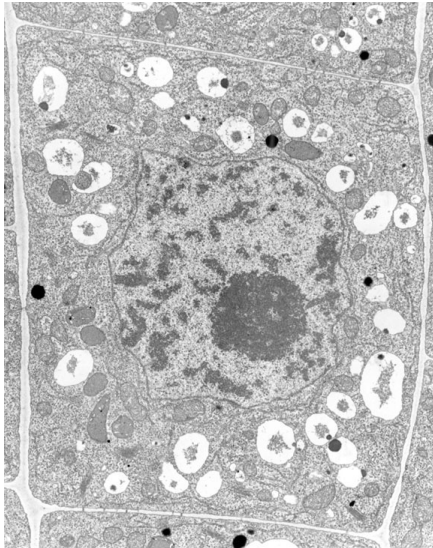


# Leaf cell (TEM)



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# Root cell (TEM)



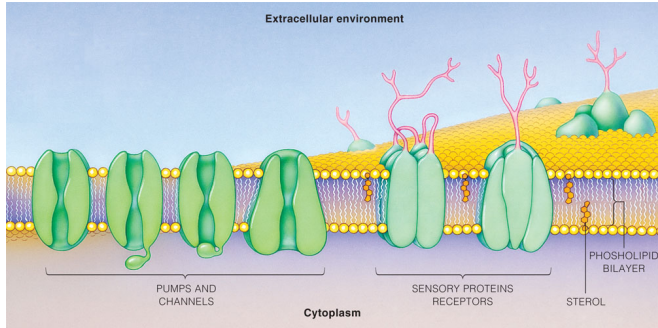
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# Cell

Draw cell\*

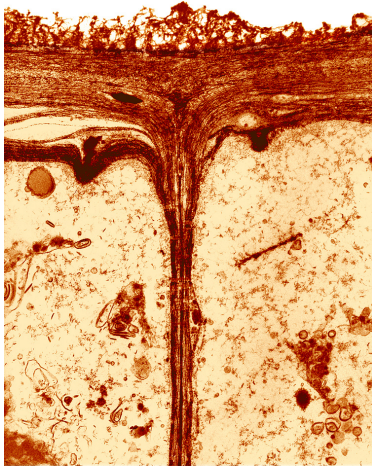
# Plasma membrane



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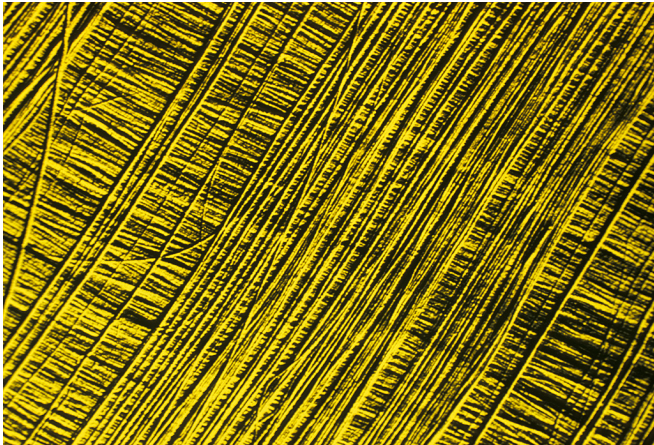
Phospholipids, sterols, proteins: pumps, receptors, channels\*

# Cell wall 1



Root cells of an onion showing the cell wall (TEM  $\times 47,000$ )

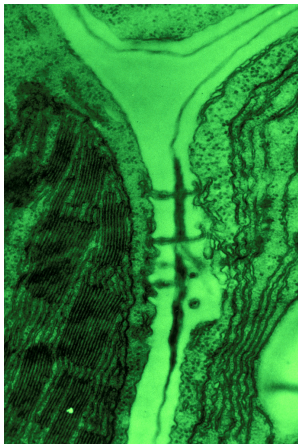
# Cell wall 2



Cellulose fibers in the plant cell wall (SEM)

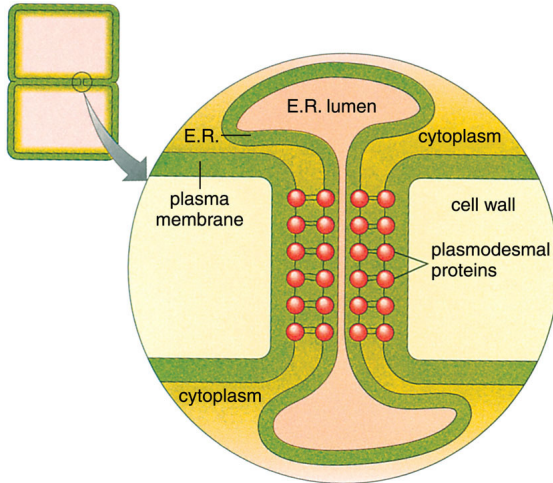


# Plasmodesmata 1



Plasmodesmata in a corn leaf between a mesophyll cell and a bundle sheath cell (TEM)

# Plasmodesmata 2



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E.R. = endoplasmic reticulum (endoplasmic network)





# For Further Reading



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.  
*Plant Biology*. 2nd edition.  
Thomson Brooks/Cole, 2006.  
**Chapters 3.1–3.3.**