Introduction to Zoology

Lecture 2

The History of Cell Biology

Meaning & definition

- Cell = from Latin *cella*, meaning "small room".
- Cell is the basic structural, functional and biological unit of all known living organisms.
- Cells are the smallest unit of life that can replicate (divide) independently and are often called the "building blocks of life".
- The science which studies cells is called cell biology or cytology.

What is cell biology?

By studying cell biology, we will learn about:

- Cell structure: nuclei, mitochondria, cytoskeleton, etc.
- Cell function: Energy transformations, movement, getting the right protein to the right place, etc.

Structure of cell

- Cells consist of protoplasm inside a membrane.
- Cell contains biomolecules such as proteins and nucleic acid.
- Organisms classified as unicellular (bacteria) or multicellular (plant and animal).
- The number of cells in plants and animals varies from species to species.
- Human body contains about 100 trillion (10^{14}) cells.
- Animal & plant cells are microscopic with dimensions (1 - 100 micrometres).

Properties of cells

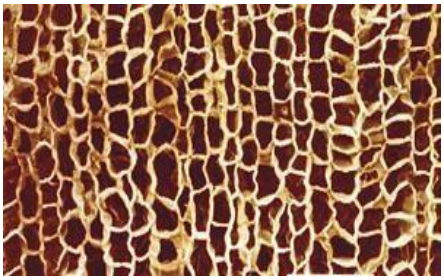
- Cells are highly complex and organised.
- Cells possess a genetic program (DNA) and know how to use it.
- All cells can reproduce- "Simple" (binary fission) in bacteria and much more "complex" - mitosis in plant and animal.
- Cells acquire and use energy: Autotrophs or Heterotrophs
- Lots of mechanical activity in cells, also the movement of cells, movement of things within cells.

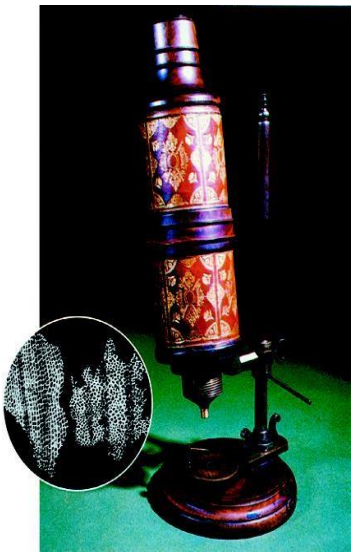
History of cell biology

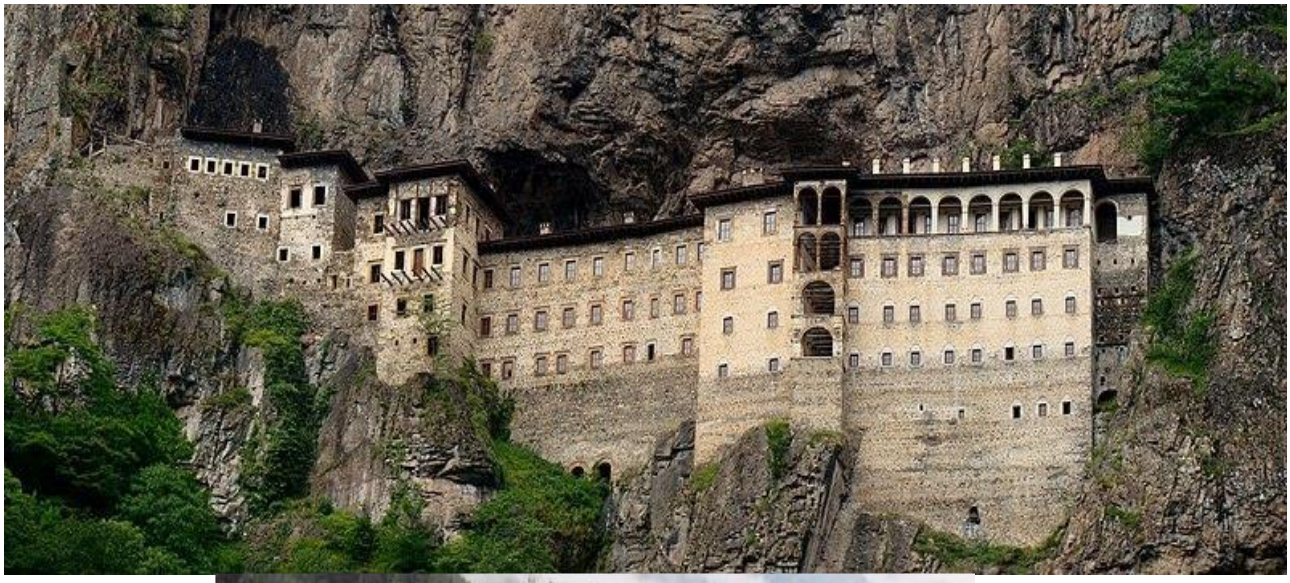
- Cell has a small size & can be observed only under the microscope.
- Zacharias Jansen (Dutch lens maker), in 1590-1591 made the first compound microscope with magnification power (9X) times.

Robert Hooke (1635-1703)

- An English scientist who was the first to describe a plant cell by his microscope.
- He observed a honeycomb-like shape of a slice of a cork in 1661.
- He called these chambers a cell because they reminded him of the cells inhabited by monks living in monastery.



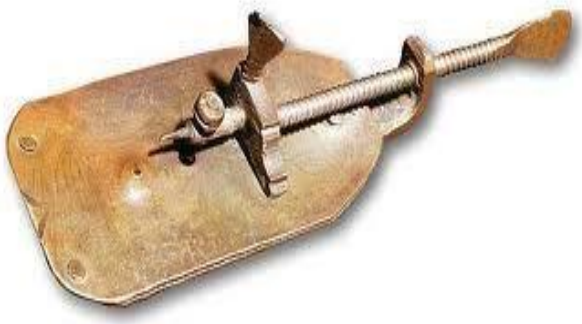




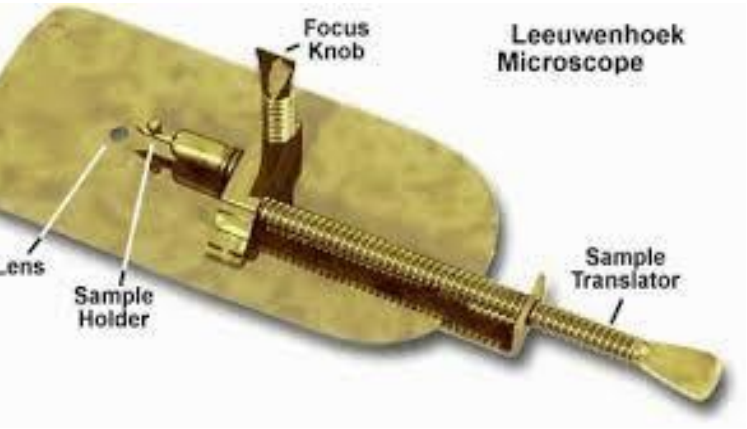
Monastery

Anton van Leeuwenhoek (1632-1723)

- A Dutch lens maker who made a simple microscope with remarkable quality.
- First to examine a drop of pond water under his microscope in 1673.
- First to observe bacteria and protozoa.
- Some of his lenses could magnify objects (250X).
- He described red blood cells in humans and other animals, as well as sperm cells.
- He studied the structure of plants, the compound eyes of insects and the life cycle of fleas and ants.



Anton van Leeuwenhoek's microscope



History of cell biology

- **Robert Brown in 1831, first described the nucleus in plant cell.**

- **Hugo Von Mohl in 1835, first described cell division in plant.**

- **Matthias Schleiden in1838, concluded that:**
  - **Plants were made of cells.**
  - **Plant embryo arose from a single cell.**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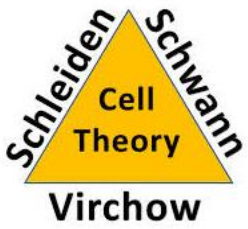
- **Theodor Schwann in 1839, studied animal cells and concluded that animals are also made up of cells.**
- **Schleiden & Schwann published a report that concluded (the cells of plants and animals have similar structures) and proposed these two tenets of the cell theory.**

Cell Theory

- **All organisms are composed of one or more cells.**
- **The cell is the structural unit of life.**



➢ **Rudolf Virchow in 1850 added the third tenet of the cell theory:**

- **All cells come from other pre-existing cells by cell division.**

Modern cell theory

1. **All living things are made up of cells.**
2. **Cells are the basic units of structure and function in living things.**
3. **Living cells come only from pre-existing cells by division.**
4. **The cell contains hereditary information, which is passed on from cell to cell during cell division.**
5. **All cells are basically the same in chemical composition and metabolic activities.**

Definitions

- **Cell** = from Latin *cella*, meaning "small room". The cell is the basic structural, functional and biological unit of all known living organisms.
- **Cell Biology** or **cytology**: the science that studies the cell, including the study of cell structure and function.
- **Zacharias Jansen**: a Dutch lens maker who made the first compound microscope with magnification power (9X) times.
- **Robert Hooke**: the first scientist to describe a plant cell with his microscope when he observed a honeycomb-like shape of a slice of a cork, and he was the first who called these chambers a **cell**.
- **Anton van Leeuwenhoek**: a Dutchman who made a simple microscope with a magnification reaching (250X). He was the first to examine a drop of pond water under a microscope and observe bacteria and protozoa.
- **Robert Brown**: was the first scientist who describe the plant cell's nucleus.
- **Hugo Von Mohl**: was the first scientist who described cell division in the plant.
- **Matthias Schleiden**: The scientist who concluded that every structural part of a plant was made of cells and that the plant embryo arose from a single cell.
- **Theodor Schwann**: The scientist who stated that animals are also made up of cells.
- **Rudolf Virchow**: The scientist who added the third tenet of the cell theory.