Cell Biology

Chapter 1

- Definition of cell biology
- Definition of a cell
- Cell theory
- Common characteristics of cells
- Type of cells

Definitions

- **Biology is the natural science that studies life and living organisms, including their structure, chemical processes, physiological mechanisms, development and evolution.**

- **Cell biology (also known as cytology) is a branch of biology dealing with the study of cells structure, and function.**

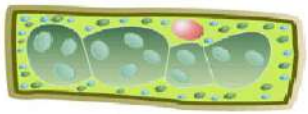
- **Cell biology is concerned with components, chemical composition, physiological properties, metabolic processes, and interactions of the cell with their environment.**

Definitions

- The cell is the basic structural, functional, and biological unit of all known living organisms.
- The cell is the smallest unit of life that can carry out life processes.
- The cells in tissues vary in size and shape related to their functions.

Muscle cell

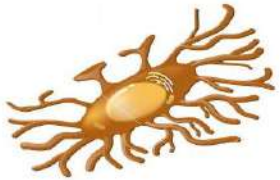
Intestinal cells



Leaf cell

Nerve cell, the longest cell: 2 meters

Red blood cell



Bone cell

White blood cell

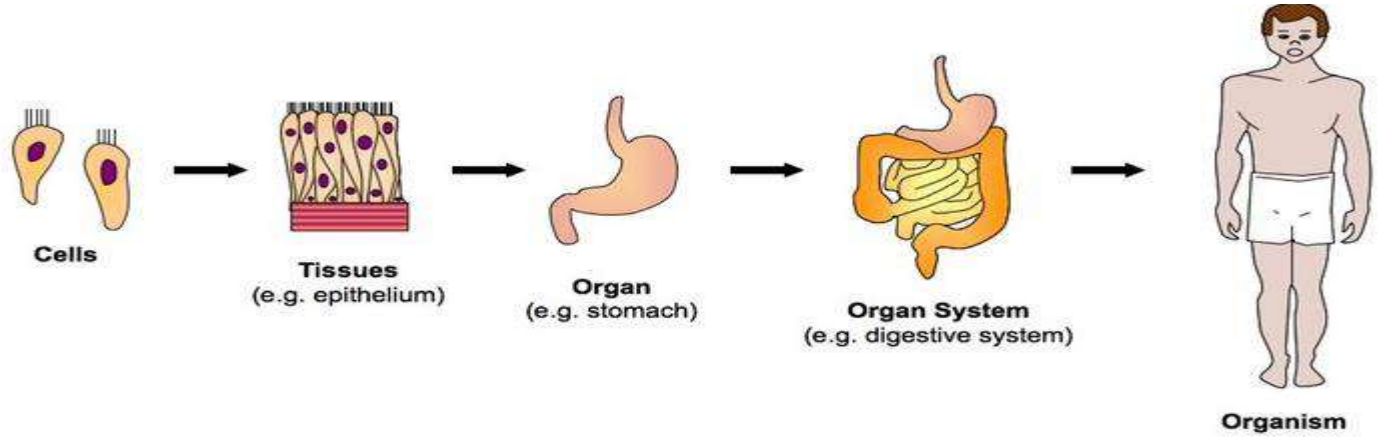
Sperm cell

Cell theory

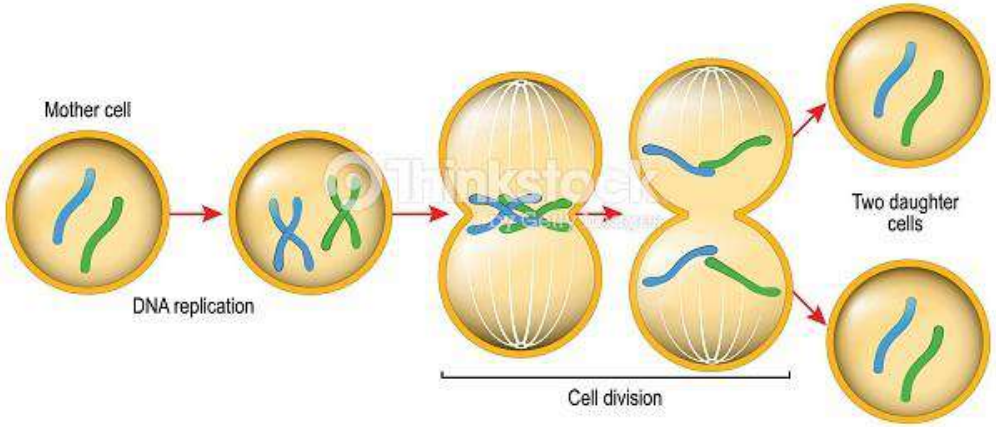
- **Cell theory consists of three basic points:**

1. **The cell is the basic unit that can perform all the functions of life.**

2. **All living things are made up of one or more cells.**



3. **All cells come from preexisting cells (cell division).**

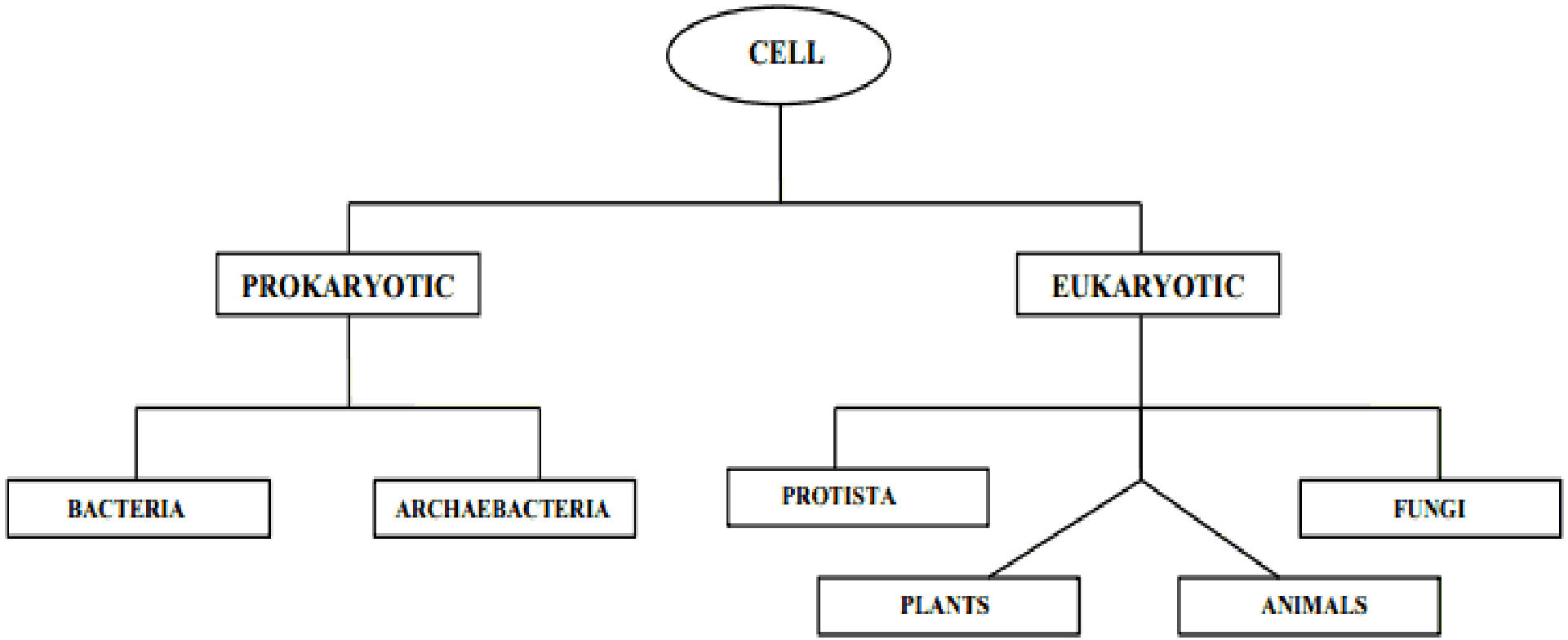


Common characteristics of cells

- All cells are surrounded by a structure called the cell membrane.
- All cells store their genetic information in the form of double-strand molecules of DNA.
- All cells transcribe portions of their genetic information into RNA.
- All cells translate mRNA into proteins in the same way.
- All cells require energy input to maintain their functional processes.
- All cells sense changes in their surroundings and make controlled response to those changes.

Type of cells

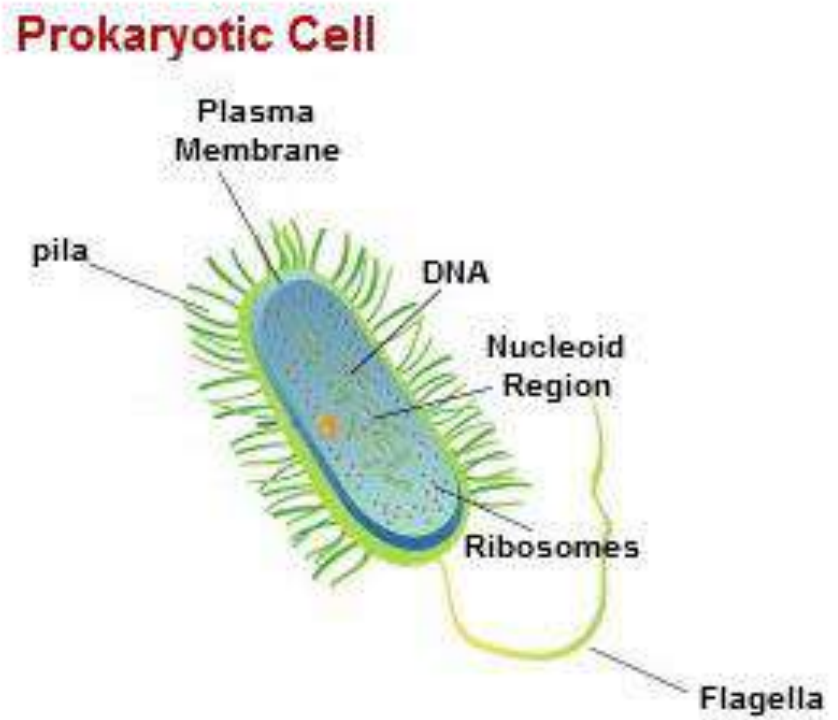
- The presence or absence of the nucleus is used as a basis for classification of cells.
- There are two primary types of cells: prokaryotic cells and eukaryotic cells.



Type of cells

1. Prokaryotic cell

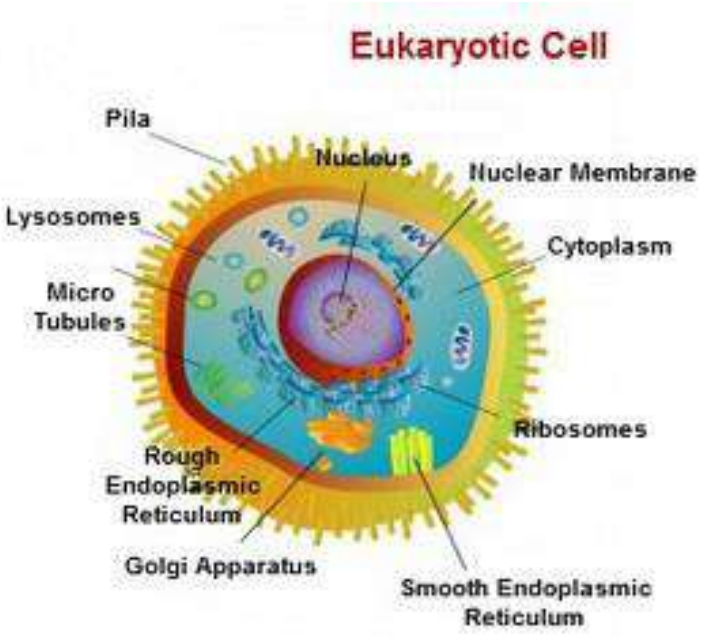
- Prokaryotic cell is simpler and smaller than the eukaryotic cells.
- Prokaryotic cell lacks nucleus.
- Prokaryotic cell lacks membrane bound organelles.
- Prokaryotic cells are unicellular organisms.
- Example: Bacteria



Type of cells

2. Eukaryotic cell

- Eukaryotic cell is complex and larger than the prokaryotic cell.
- Eukaryotic cell can be easily distinguished through a membrane-bound nucleus.
- Eukaryotic cells are membrane-bound organelles, which have a multiple membrane-bound organelles to carry out specific cell functions.
- Most of eukaryotic cells are multicellular organisms.
- Example: Animal cell, Plant cell, Fungi



Differences between Prokaryotic cell and Eukaryotic cell

Prokaryotic Cell

- They are very small in size.
- No membrane bound nucleus.
- Single chromosome present.
- Nucleolus is absent.
- Membrane bound organelles are absent.
- Multiplication of cell is by binary fission or budding.
- Cell wall present.
- Unicellular.
- Cell size is 1-10µm

Eukaryotic Cell

- They are comparatively larger in size.
- Nucleus is surrounded by a double membrane layer.
- More than one chromosome are present.
- Nucleolus is present.
- Membrane bound organelles are present.
- Cell division by mitosis or meiosis.
- Cell wall seen in only plant cells.
- Unicellular and multicellular cells.
- Cell size 10 - 100µm.