



SNS COLLEGE OF TECHNOLOGY



AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19GET277 – BIOLOGY OF ENGINEERS

IV YEAR / VII SEMESTER

UNIT 1- INTRODUCTION TO LIFE



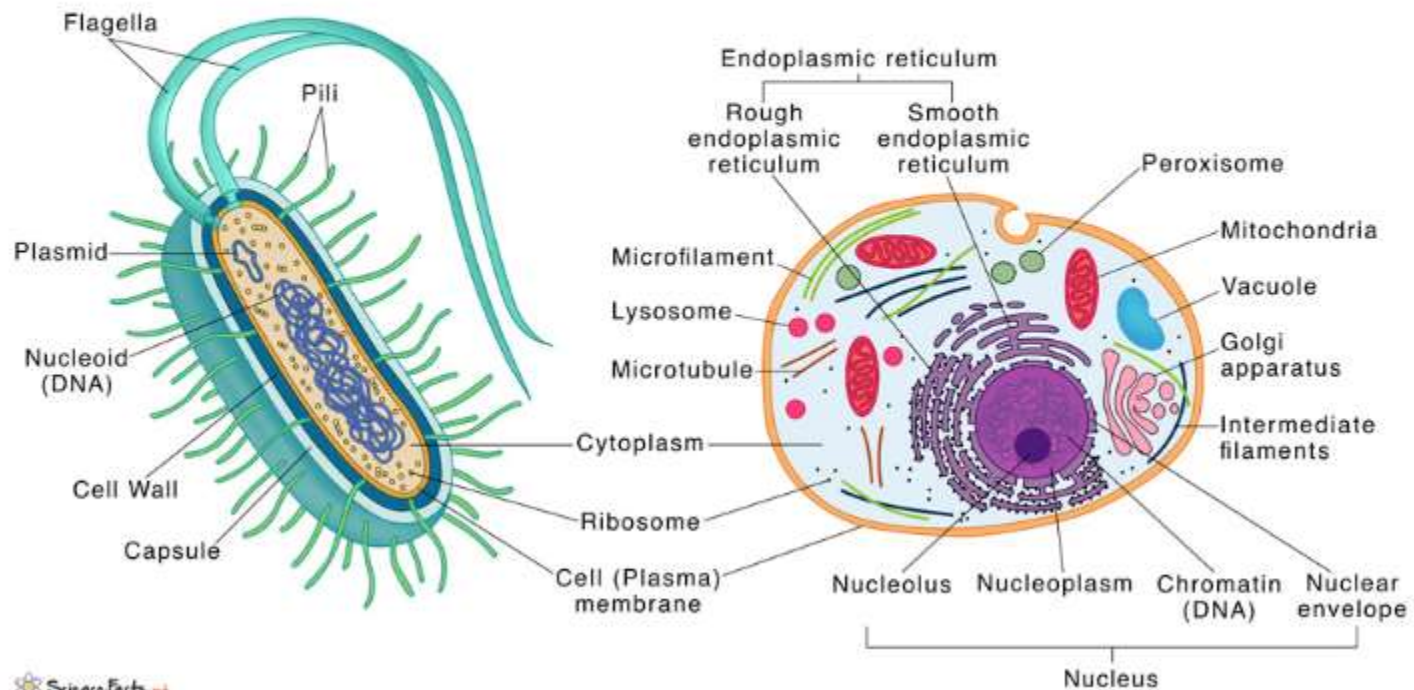
BASIC CLASSIFICATION – CELL THEORY

Definition :

- The cell theory is a fundamental principle in biology that describes the basic properties of cells and their role as the building blocks of life.
 - It was formulated over several decades by different scientists and is one of the most important concepts in the field of biology.
1. All living organisms are composed of cells:
 2. Cells are the basic units of structure and organization in living organisms
 3. Cells arise from pre-existing cells through cell division



Prokaryotic Cells vs Eukaryotic Cells



Science Facts



DIFFERENCE BETWEEN PROKARYOTIC AND EUKARYOTIC CELL



Eukaryotic Cells:

1. Eukaryotic cells are generally larger and more complex than prokaryotic cells.
2. They have a true nucleus, which contains the cell's genetic material (DNA) enclosed within a membrane.
3. Eukaryotic cells also contain various membrane-bound organelles such as mitochondria (energy production), endoplasmic reticulum (protein synthesis and lipid metabolism), Golgi apparatus (protein processing and secretion), and more.
4. Eukaryotic cells can be found in organisms such as animals, plants, fungi, and protists.



DIFFERENCE BETWEEN PROKARYOTIC AND EUKARYOTIC CELL



Prokaryotic Cells:

1. Prokaryotic cells are smaller and simpler in structure compared to eukaryotic cells.
2. They lack a true nucleus; instead, their genetic material is located in the nucleoid region, which is not membrane-bound.
3. Prokaryotic cells lack membrane-bound organelles, with the exception of some internal membrane structures in certain species.
4. The two main types of prokaryotic cells are bacteria and archaea.



STRUCTURE OF PROKARYOTIC CELL

Prokaryotic Cells:

- Prokaryotic cells are simpler and smaller than eukaryotic cells. They are found in organisms belonging to the domains Bacteria and Archaea. Here are the key features of prokaryotic cells:
- **Cell Wall:** Prokaryotic cells have a rigid cell wall outside the cell membrane. The cell wall provides structural support and protection to the cell.
- **Cell Membrane:** Just beneath the cell wall is the cell membrane, a thin, flexible barrier that surrounds the cell and separates its internal environment from the external environment. The cell membrane controls the entry and exit of substances into and out of the cell.
- **Cytoplasm:** The interior of the cell is called the cytoplasm. It contains various structures and molecules necessary for cellular functions.



STRUCTURE OF PROKARYOTIC CELL

- **Nucleoid:** Prokaryotic cells lack a true nucleus. Instead, they have a region called the nucleoid, which contains a single circular DNA molecule that carries the genetic information of the cell.
- **Plasmids:** Some prokaryotic cells contain small, circular pieces of DNA called plasmids, which carry additional genetic information. Plasmids can be exchanged between cells and may confer certain advantageous traits, such as antibiotic resistance.
- **Ribosomes:** Prokaryotic cells contain ribosomes, which are responsible for protein synthesis. These ribosomes are smaller than those found in eukaryotic cells.
- **Flagella:** Many prokaryotic cells have flagella, whip-like structures that allow the cell to move through liquid environments.
- **Pili/Fimbriae:** Some prokaryotic cells have hair-like appendages called pili or fimbriae, which help them attach to surfaces or other cells.



STRUCTURE OF EUKARYOTIC CELL

Eukaryotic Cells:

1. Eukaryotic cells are more complex and larger than prokaryotic cells. They are found in plants, animals, fungi, and protists. Here are the key features of eukaryotic cells:
2. Cell Membrane: Similar to prokaryotic cells, eukaryotic cells have a cell membrane that surrounds and protects the cell.
3. Nucleus: Eukaryotic cells contain a well-defined nucleus, which is enclosed by a nuclear envelope with pores. The nucleus houses the cell's genetic material, organized into multiple linear chromosomes.
4. Cytoplasm: Like prokaryotic cells, eukaryotic cells have a cytoplasm where various cellular structures and molecules are found.



STRUCTURE OF EUKARYOTIC CELL

5. Organelles: Eukaryotic cells have numerous membrane-bound organelles that perform specific functions. Some essential organelles include:

- **Endoplasmic Reticulum (ER):** A network of membranes involved in protein synthesis and lipid metabolism. There are two types of ER: rough ER (studded with ribosomes) and smooth ER (lacks ribosomes).
- **Golgi Apparatus:** A stack of membranes involved in the modification, sorting, and packaging of proteins for transport.
- **Mitochondria:** Organelles responsible for cellular respiration and energy production through the synthesis of ATP.
- **Chloroplasts (in plant cells):** Organelles where photosynthesis occurs, converting sunlight into energy-rich molecules.
- **Lysosomes:** Vesicles containing enzymes that break down waste materials and cellular debris.
- **Vacuoles (larger in plant cells):** Membrane-bound sacs that store substances like water, nutrients, or waste products.



STRUCTURE OF EUKARYOTIC CELL

6. Cytoskeleton: Eukaryotic cells have a cytoskeleton, which is a network of protein filaments that provides structural support, helps maintain cell shape, and aids in cell movement and cell division.
7. Ribosomes: Eukaryotic cells also contain ribosomes, which are involved in protein synthesis. These ribosomes are larger and more complex than those in prokaryotic cells.
8. Flagella and Cilia: Some eukaryotic cells have flagella or cilia for movement or to create currents in the surrounding fluid.



Thank You!!