SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-35
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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

UNIT I: INTRODUCTION TO LIFE

TOPIC: **Basic classification-cell theory-structure of prokaryotic and eukaryotic cell**

Cell

- Cell is the **basic structural and functional unit** of all living organisms.
- It is the **smallest unit of life** and can **replicate independently**.
- The study of cell is called **Cell Biology**.
- Cells vary from individual "single cell" organisms (**bacteria**) to "multi cellular" structures (tissues, organs) and organisms (**animals and plants**).
- Cell was discovered by **Robert Hooke in 1665**. The discovery of the cell was made possible through the invention of the microscope. He first observed cell in **thin slices of bottle cork.**
- Hooke discovered many tiny pores that he named "cells". This came from the Latin word "Cella". He described the cells as tiny boxes or a honeycomb. He thought that cells only existed in plants and fungi.

Development of cell theory

- 1838- German Botanist, Matthias Schleiden, concluded that all plant parts are made of cells.
- 1839- German physiologist, Theodor Schwann, who was a close friend of Schleiden, stated that all animal tissues are composed of cells.
- 1858- Rudolf Virchow, German physician, after extensive study of cellular pathology, concluded that cells must arise from preexisting cells.

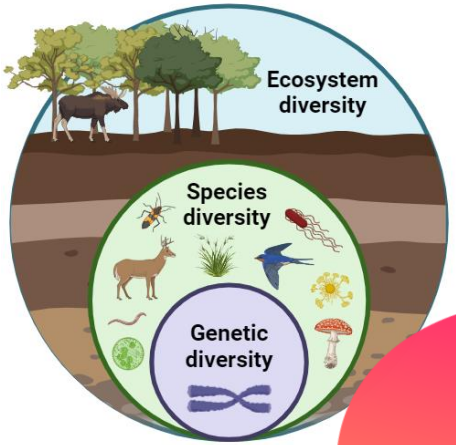
Cell theory

- **All organisms are composed of one or more cells .**
- **Cell is the basic unit of life in all living things.**
- **All cells are produced by the division of preexisting cells.**

Modern cell theory

Modern Cell Theory contains four statements, **in addition to the original Cell Theory**:

- **The cell contains hereditary information (DNA) which is passed on from cell to cell during cell division.**
- **All cells are basically the same in chemical composition and metabolic activities.**
- **All basic chemical and physiological functions are carried out inside the cells (movement, digestion etc) .**
- **Cell activity depends on the activities of sub-cellular structures within the cell (organelles, nucleus, plasma membrane etc)**



Uses of Cell Theory

- Disease/Health/Medical Research and Cures (AIDS, Cancer, Vaccines, Cloning, Stem Cell Research etc.)

It is amazing to think that the cells that make up our bodies are just as alive as we are. Humans are just a designed community of cells, which must work together to survive.

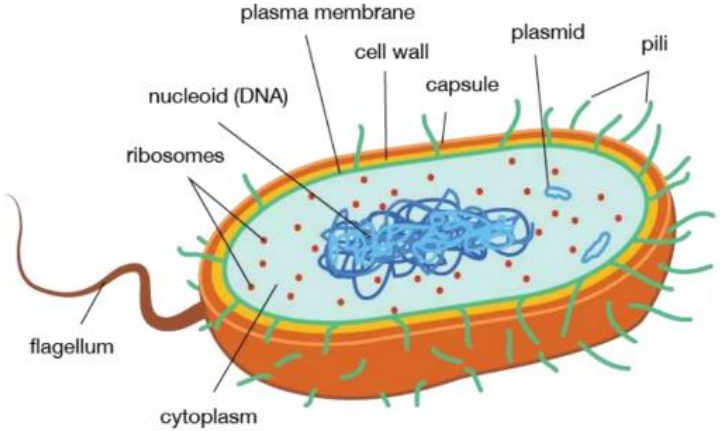
The average human being is composed of around 100 Trillion individual cells.

Types of cell

- Cells are of two types. i.e. **Prokaryotic and Eukaryotic cell**.
- Eukaryotic cell **contains a nucleus** and Prokaryotic **do not**.
- Prokaryotes are **single-celled organisms**, while Eukaryotes can be either **single-celled or multi-celled**.

Prokaryotic cell: (Pro- first formed, Karyo- nucleus)

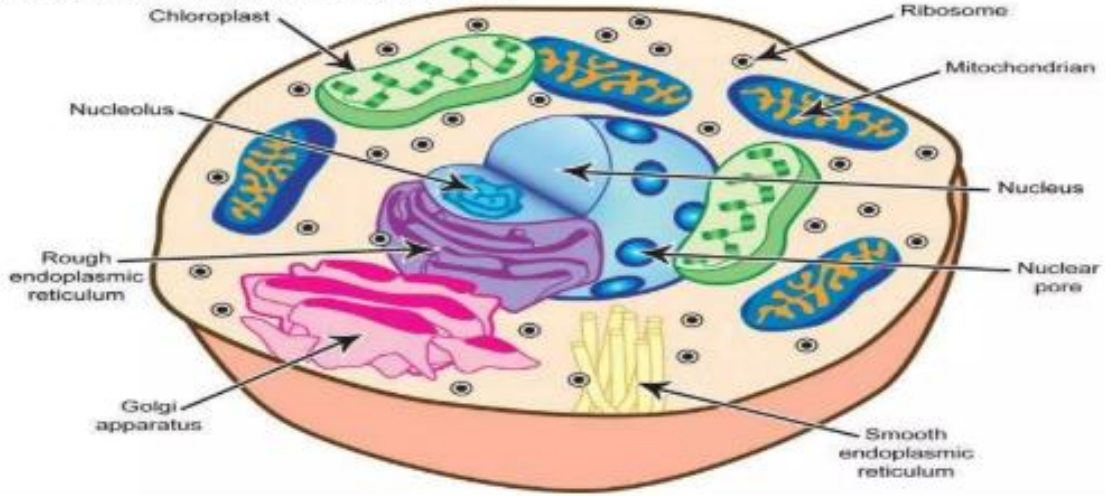
- Prokaryote is a single celled that lacks a membrane bound nucleus (**karyon**), mitochondria or any other organelles in the cytoplasm except ribosomes. Cell division occurs mainly by binary fission. E.g. Bacteria.
- Prokaryotic cells were the first form of life on Earth. They are simpler and smaller than Eukaryotic cells.



Prokaryotic cell

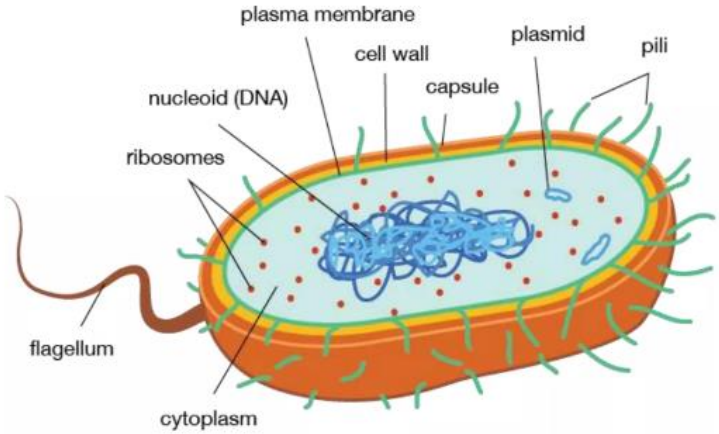
Eukaryotic cell: (Eu- true, Karyo- nucleus)

- Eukaryotes have specialized organelles in the cytoplasm, a membrane bound nucleus enclosing genetic material organized into chromosomes. Their cell division occurs by mitosis and meiosis. eg. Plants, animals, fungi, protozoa and algae.
- These cells are larger than a typical prokaryote and can be as much as a thousand times greater in volume.

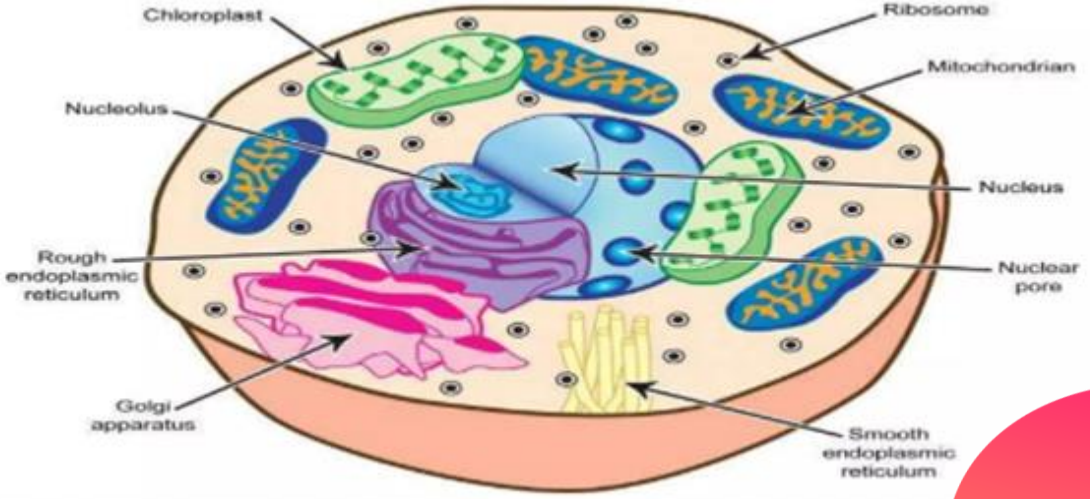


Features	Prokaryotic cells	Eukaryotic cells
Example	Bacteria	Algae, fungi, protozoa and animals
size	1-2 by 1-4 µm or less	Greater than 5 µm in width or diameter
Genetic system location	Nucleoid, chromatin body or nuclear materials	Nucleus, mitochondria , chloroplasts
Structure of the nucleus	Not bound by nuclear membrane; one circular chromosome	Bounded by the nuclear membrane; more than one chromosome
	Chromosome does not contains histones, no mitotic division	Chromosomes have histone; mitotic nuclear division
	Nucleolous absent	Nucleolous present

atures	Prokaryotic cells	Eukaryotic cells
Cytoplasmic structures	Mitochondria absent	Mitochondria present
	Chloroplasts absent	Chloroplasts may be present
	Golgi bodies absent	Golgi bodies present
	Endoplasmic reticulum absent	Endoplasmic reticulum present
	Membrane bound vacuoles absent	Membrane bound vacuoles present
	70 S ribosome is found. (subunit : 50S and 30S)	**80S ribosome is found. (subunit : 60 S and 40S)**
Cell wall	Peptidoglycan (murein or mucopeptide)	Absence of peptidoglycan
Pseudopodia	Absent	Present in some



Prokaryotic cell



Eukaryotic cells

RECAP….

…THANK YOU