

Al- Mustaqbal University
College of Science
Medical Physics Department
First Stage



جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

General biology

Lecture one: Cells and organic molecules OF Cells

Lecturer: M.SC Jaafar Hamid Jaafar
2024 – 2025

cell: is the smallest unit of a living thing.

All living thing, whether made of one cell (like bacteria) or many cells (like a human), is called an organism.

organic molecules OF Cells

organic molecules include nucleic acids, proteins, carbohydrates, and lipids, all of which are essential to the cell's functions.

1. Nucleic acids

There are two major classes of nucleic acids

- **deoxyribonucleic acid (DNA)**
- **ribonucleic acid (RNA).**

DNA is the molecule that contains all of the information required to build and maintain the cell; RNA has several roles associated with expression of the information stored in DNA.

genetic material: Cells also use proteins to help replicate the genome and accomplish the profound structural changes that underlie cell division.

2. Proteins

Proteins are a second type of intracellular organic molecule. These substances are made from chains of smaller molecules called amino acids, and they serve a variety of functions in the cell, both catalytic and structural.

For example

proteins called **enzymes** convert cellular molecules (whether proteins, carbohydrates, lipids, or nucleic acids) into other forms that might help a cell meet its energy needs, build support structures, or pump out wastes.

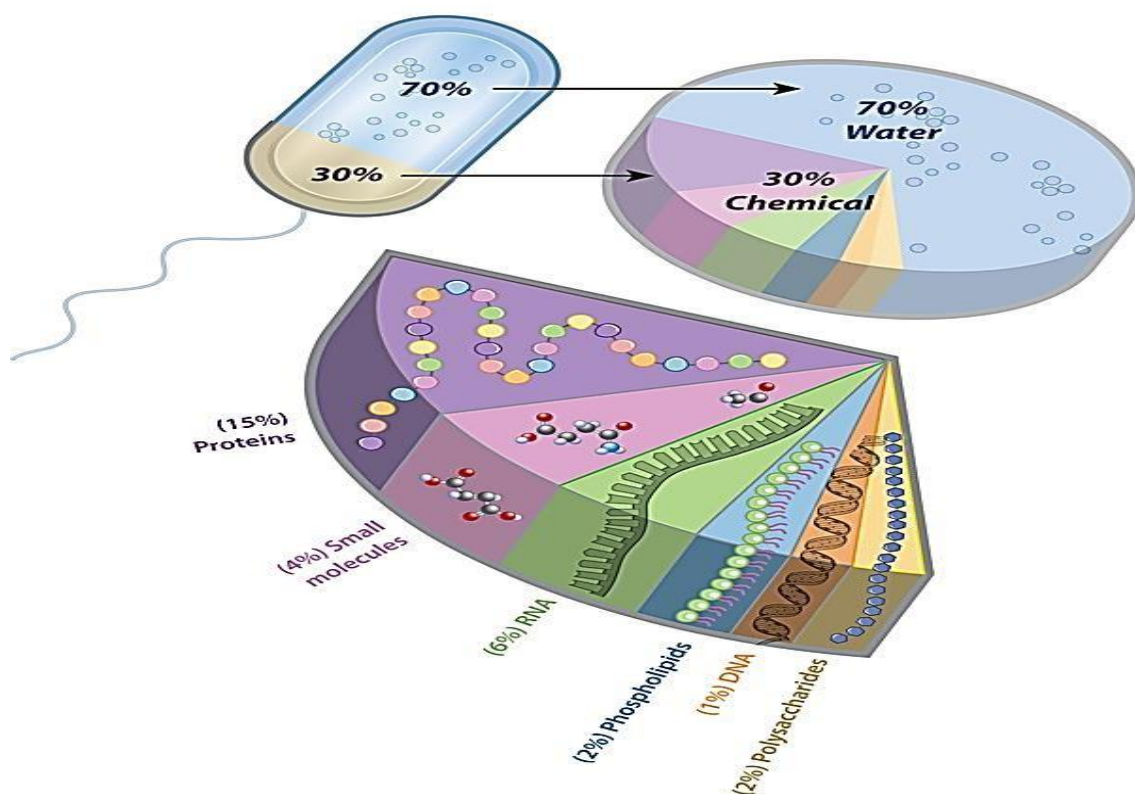
3. **Carbohydrates:** the starches and sugars in cells, are another important type of organic molecule.

Simple carbohydrates are used for the cell's immediate energy

complex carbohydrates serve as intracellular energy stores. Complex carbohydrates are also found on a cell's surface, where they play a crucial role in cell recognition.

4. **lipids or fat molecules**

are components of cell membranes — both the plasma membrane and various intracellular membranes. They are also involved in energy storage



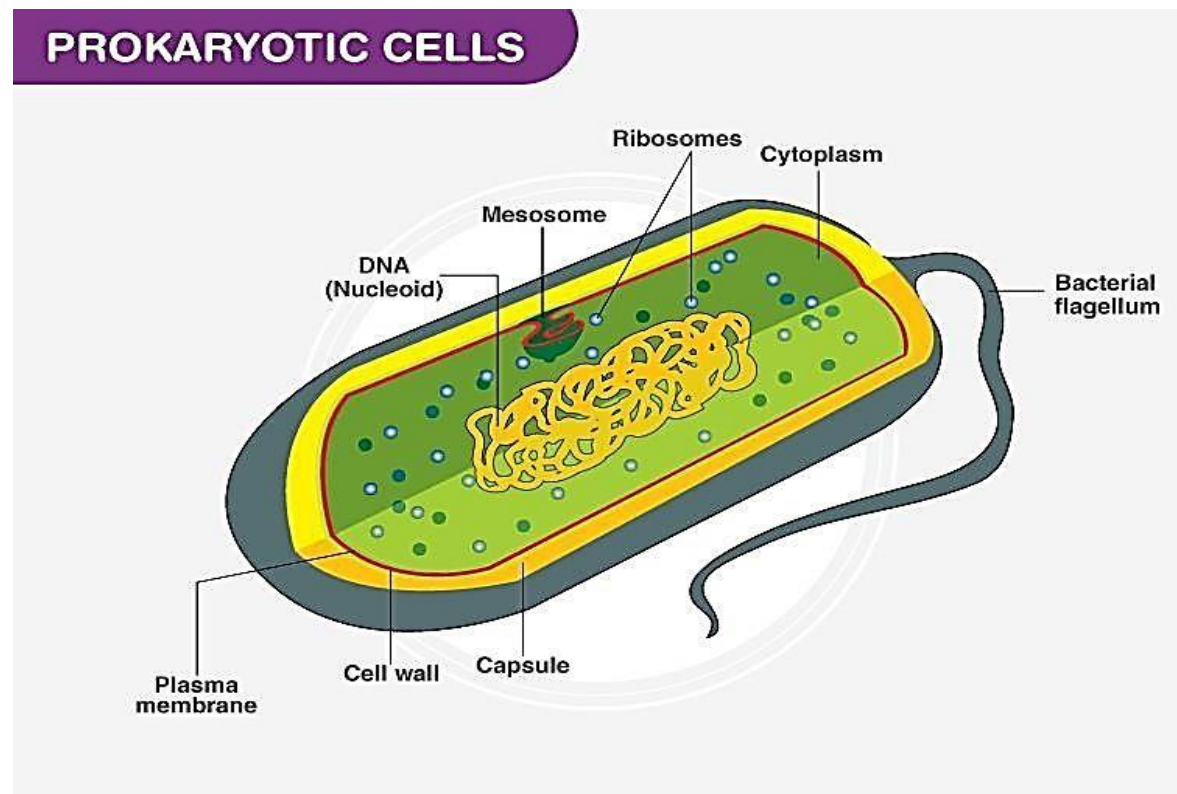
Structural Organization of Cells

Prokaryotic Cell

Prokaryotes refer to the smallest and simplest type of cells, without a true nucleus and no membrane-bound organelles. Such as Bacteria and Archaea .

Some characteristics of Prokaryotes are :

- Small (1-10 μm)
- DNA circular, unbounded
- Genome consists of single chromosome .
- Asexual reproduction common
- No general organelles
- Most forms are singular

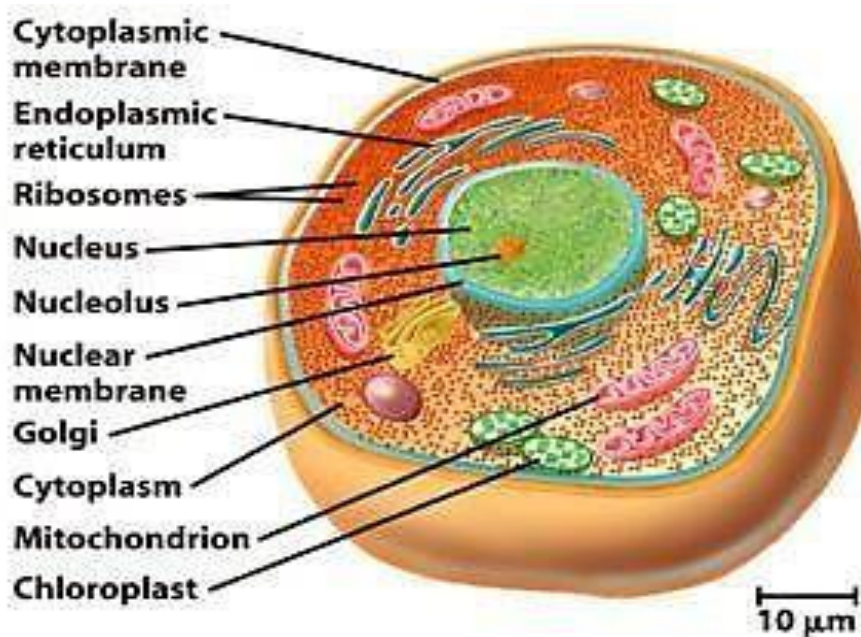


Eukaryotic Cell

The eukaryotic cell has a nuclear membrane surrounding the nucleus, where Eukaryotic cells also contain organelles, including mitochondria (cellular energy exchangers), Golgi apparatus (secretory apparatus), endoplasmic reticulum (a channel like system of membranes within the cell), and lysosomes .

Some characteristics of eukaryotes are

- Large (100 - 1000 μm)
- DNA in nucleus, bounded by membrane
- Genome consists of several chromosomes .
- Sexual reproduction common
- Mitochondria and other organelles present
- Most forms are multicellular



Difference between Prokaryotic and Eukaryotic Cells

Though these two classes of cells are quite different, they do possess some common characteristics. For instance, both possess cell membranes and ribosomes, but the similarities end there. The complete list of differences between prokaryotic and eukaryotic cells is summarized as follows:

CHARACTERISTICS	EUKARYOTIC CELLS	PROKARYOTIC CELLS
Nucleus	Present (membrane bound)	Absent (Nucleoid region)
Cell Size	Large	Small
Organism Type	Usually multicellular	Unicellular
Chromosomes	More than one	One long single loop of DNA and plasmids
Ribosomes	Large	small
Growth Rate/Generation Time	Slower	faster
Organelles	Present (membrane bound)	absent
Cell Wall	Simple: Present in plants and fungi	Complex: Present in all prokaryotes
Plasma Membrane	Present	Present
Cytoplasm	Present	Present