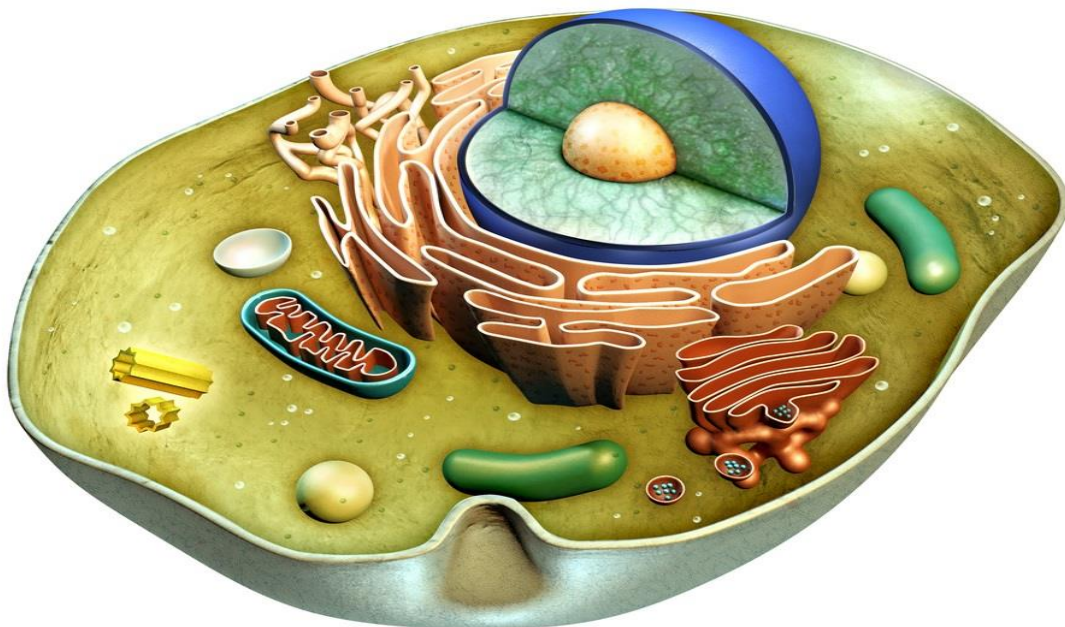




**AL-Zahraa University for Women**  
**College of Health and Medical Techniques**  
**Anesthesia Department**

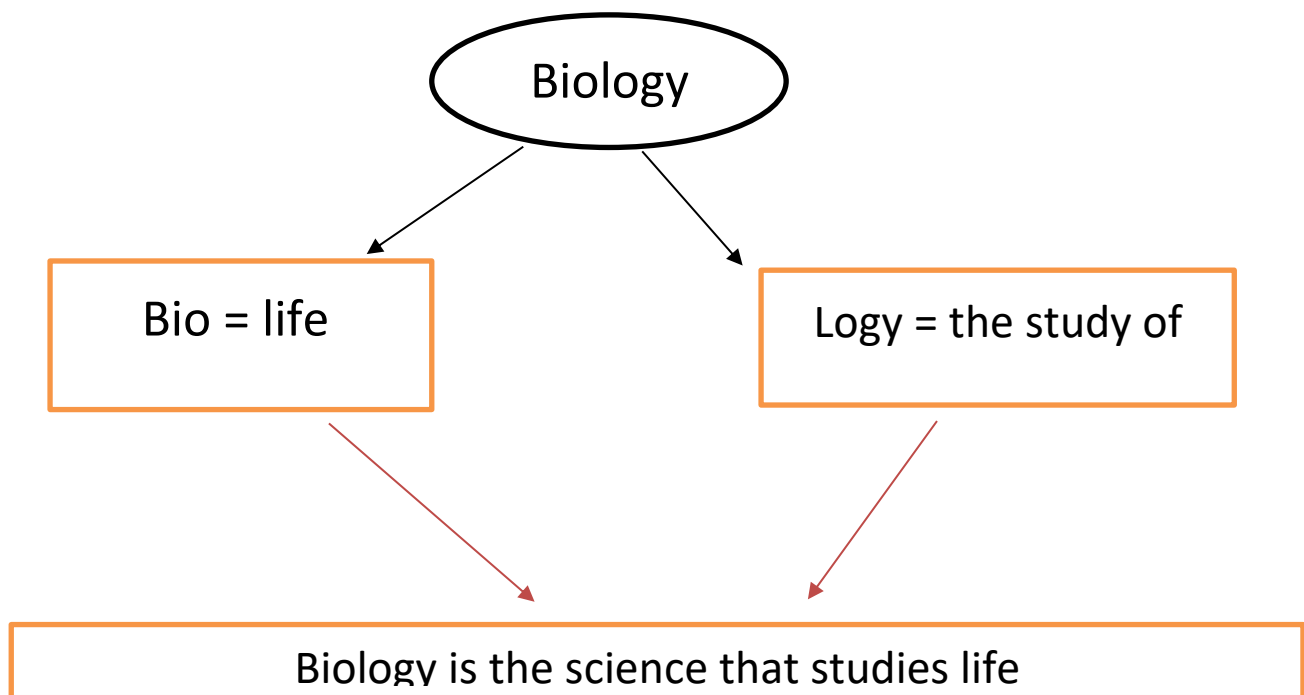
## **Introduction to Biology**



**Dr. farah Amir**

**Assit.Lec. Fatima salim**

**Biology:** is the science that studies living organisms and how they interact with one another and their environment.

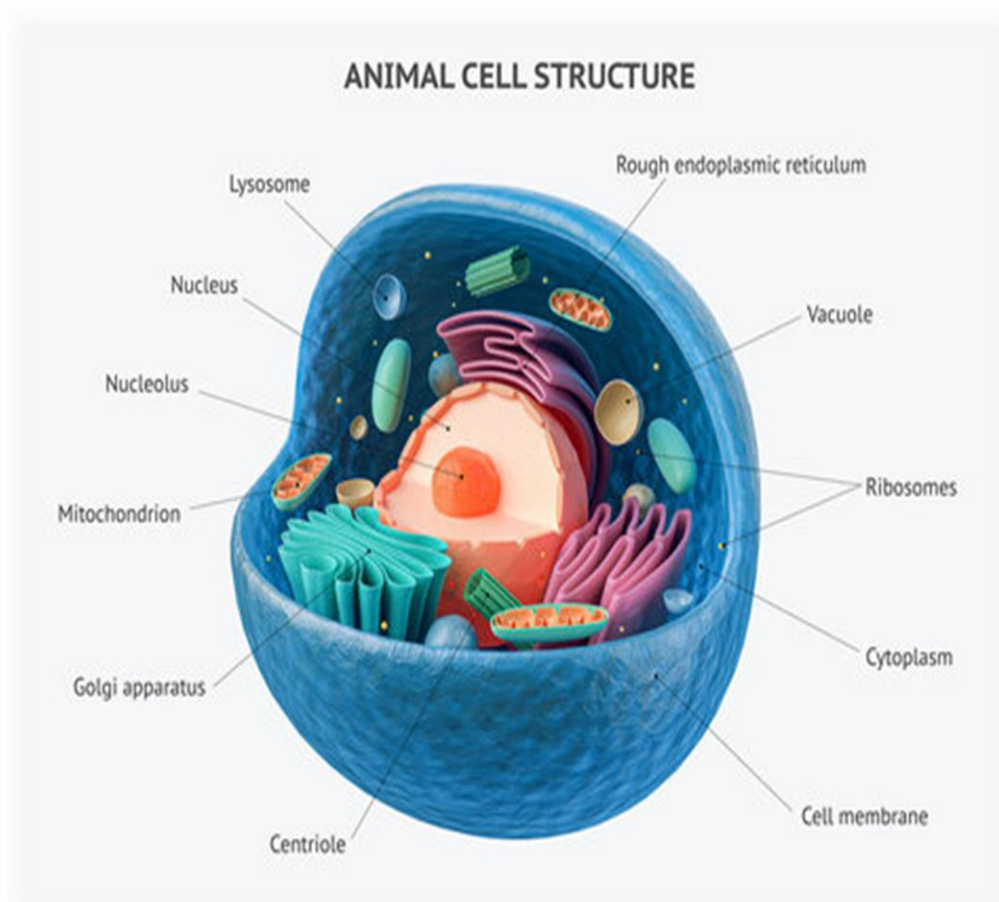


## All living organisms

- are built of cells
- reproduce them using the hereditary material DNA
- grow and develop
- capture energy from their environment
- sense their environment and respond to it
- show a high level of organization

## Levels of Organization of Living Things

- Molecules come together with other molecules to form **organelles**, small structures that exist within cells and perform specialized functions
- **Cells** are the smallest fundamental unit of a living organism
- **All** living things are made up of cells



## • Classifying Organisms

Organisms can be classified by the types of cells they are made up of:

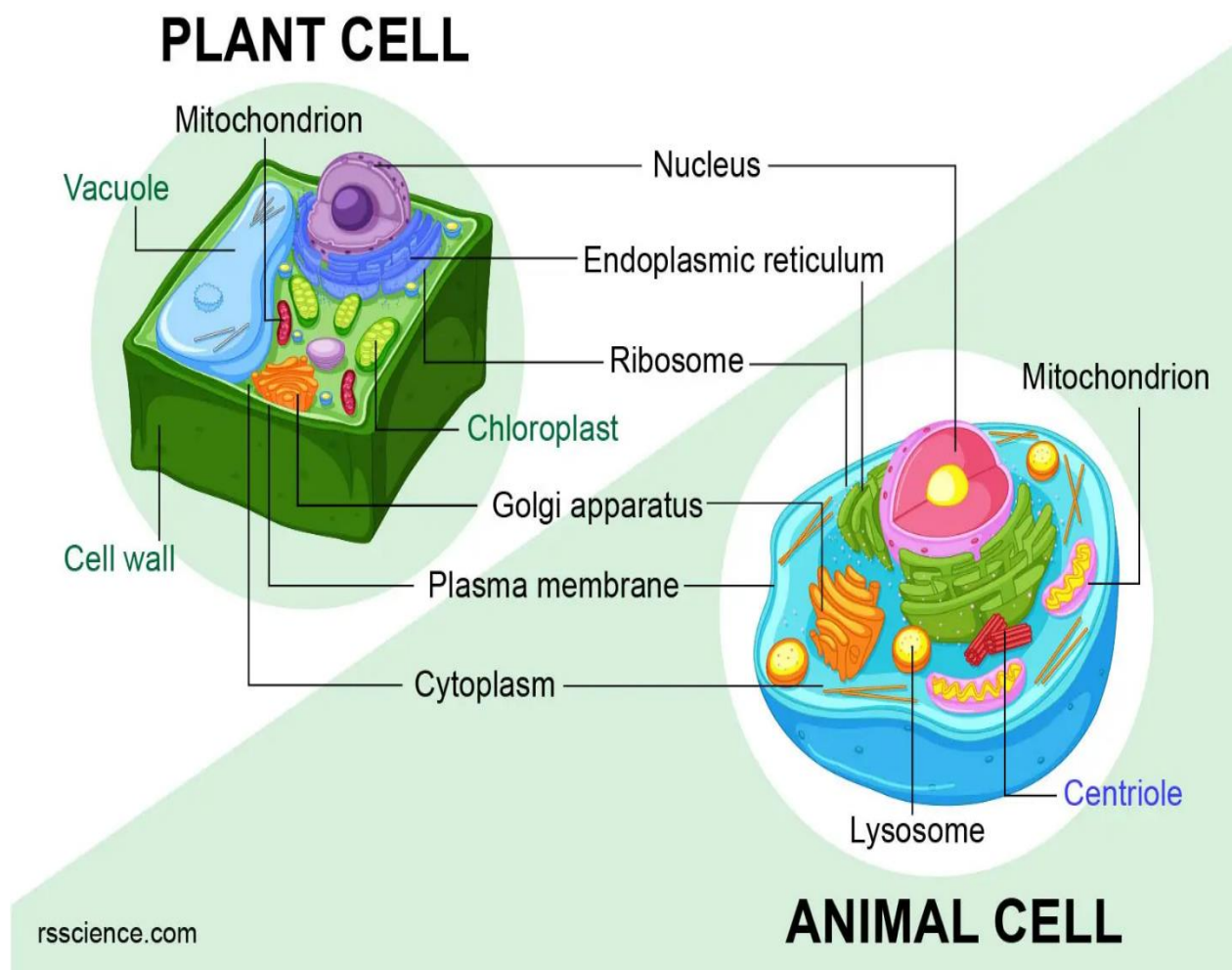
- **Prokaryotes** - single-celled organisms that do not have a membrane-bound nucleus nor organelles surrounded by a membrane .
- **Eukaryotes** - organisms with cells that do have a membrane-bound nucleus and other membrane-bound organelles.

	<b>Prokaryotes</b>	<b>Eukaryotes</b>
<b>Type of Cell</b>	Always unicellular	Unicellular and multi-cellular
<b>Cell size</b>	Ranges in size from 0.2 $\mu\text{m}$ – 2.0 $\mu\text{m}$ in diameter	Size ranges from 10 $\mu\text{m}$ – 100 $\mu\text{m}$ in diameter
<b>Cell wall</b>	Usually present; chemically complex in nature	When present, chemically simple in nature
<b>Nucleus</b>	Absent. Instead, they have a nucleoid region in the cell	Present
<b>Ribosomes</b>	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape
<b>DNA arrangement</b>	Circular	Linear
<b>Mitochondria</b>	Absent	Present

Examples of prokaryotes are blue-green algae, bacteria and mycoplasma. They are single-celled and range in size from 0.2 to 10 microns (about 10 times smaller than most plant and animal cells).

### Examples of eukaryotic cells:

- Muscle cells.
- Stem cell.
- Bone cells.
- Cancer cells.
- Ova.
- Fungal cells.







**Animal  
Cells**

**Plant  
Cells**



## What are the Differences Between Them?

- smaller
- no cell wall
- nucleus in center
- many vacuoles
- cannot synthesis nutrients
- no plasmodesmata

- larger
- cell wall
- nucleus on the side
- one vacuole
- synthesizes nutrients
- has plasmodesmata



## Difference between Unicellular and Multicellular Organisms

The difference between unicellular and multicellular organisms is quite apparent – the number of cells. In other words, each and every living organism is composed of the cell. Based on the number of cells these organisms possess, they can be classified into:

- **Unicellular Organisms**
- **Multicellular Organisms**



## Unicellular Organisms

unicellular organisms are made up of a **single cell**. They are the oldest form of life, with fossil records dating back to about 3.8 billion years ago. **Bacteria**, **amoeba**, **Paramecium**, **archaea**, **protozoa**, **unicellular algae**, and unicellular fungi are examples of unicellular organisms. These unicellular organisms are **mostly invisible to the naked eye**, hence, they are also referred to as **microscopic** organisms. Most of the unicellular organisms are also **prokaryotes**.

## Multicellular Organisms

Organisms that are composed of more than one cell are called **multicellular** organisms. **Multicellular organisms** are almost always eukaryotes. However, bacteria can form large interlinked structures such as **colonies** or **biofilms** but these can't be classified as multicellular organisms.

## Multicellular Organisms Examples

Some of the examples of multicellular organisms are listed below:

- **All vertebrates and invertebrates**
- **All angiosperms, gymnosperms and higher land plants**

Unicellular Organisms	Multicellular Organisms
<ul style="list-style-type: none"> <li>• They are made up of single cell.</li> <li>• The single cell of the organism can perform all the functions of life.</li> <li>• These organisms are generally very small (microscopic) in size.</li> <li>• They lack tissues, organs and organ systems.</li> <li>• Growth occurs by an increase in the size of the cell. eg. Amoeba, Paramecium and Euglena.</li> </ul>	<ul style="list-style-type: none"> <li>• They are organisms are made up of many cells.</li> <li>• Division of labour exists among cells. Different cells are specialized to perform different functions.</li> <li>• They are mostly large in size.</li> <li>• They are composed of tissues, organs and organ systems.</li> <li>• Growth occurs by an increase in the number of cells by cell division. eg. Earthworms, Fish, Frogs, Lizard and human beings.</li> </ul>

## What are Cell Organelles?

The cellular components are called cell organelles.

There are various organelles present within the cell and are classified into three categories based on the presence or absence of membrane.

**Organelles without membrane:** The Cell wall, Ribosomes, and Cytoskeleton are non-membrane-bound cell organelles. They are present both in the **prokaryotic cell** and the eukaryotic cell.

**Single membrane-bound organelles:** Vacuole, Lysosome, Golgi Apparatus, Endoplasmic Reticulum are single membrane-bound organelles present only in a **eukaryotic cell**.

**Double membrane-bound organelles:** Nucleus, mitochondria and chloroplast are double membrane-bound organelles present only in a eukaryotic cell.

## Levels of Organization of Living Things

Cells combine to make tissues, a group of similar cells that carry out the same function.

Organs are collections of tissues grouped together based on a common function.

Organ System consists of functionally related organs



