

Salahaddin University- Erbil  
College of Agricultural Engineering Sciences  
Unit of Basic Sciences  
Class: 1<sup>st</sup> year/1<sup>st</sup> sem. 2022-2023



**SUBJECT:**

**PRACTICAL OF GENERAL ZOOLOGY**

**Assist. Lecturer**

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**M. Sc. Biology**

# THE CELL

## **THE CELL:**

- Cell is basic unit of life. Cells are the smallest structures capable of basic life processes, such as
  - Taking in nutrients.
  - Expelling waste.
  - Reproducing.

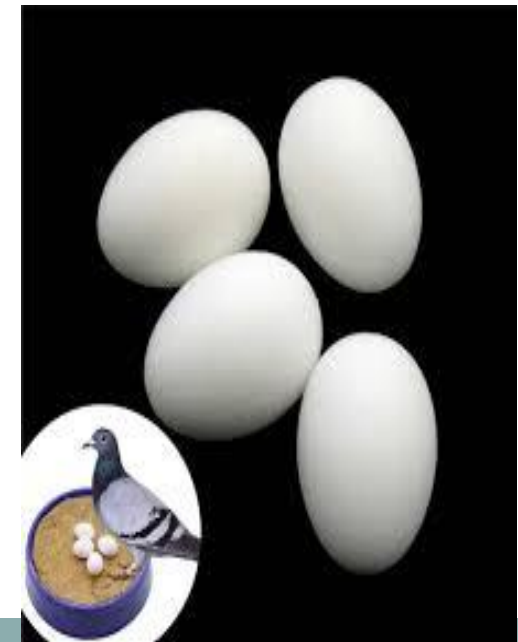
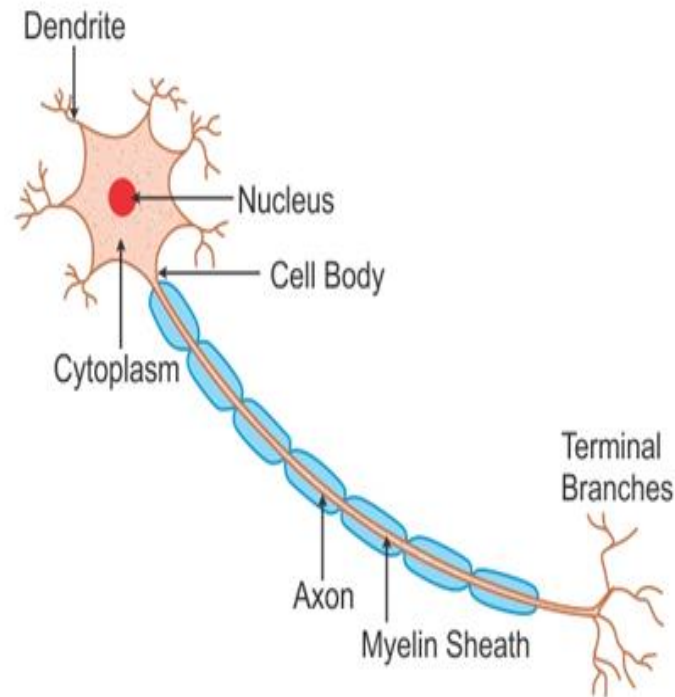
➤ All living things are composed of cells.

➤ Some microscopic organisms, such as **bacteria** and **protozoa**, are **unicellular**, meaning they consist of a **single cell**.

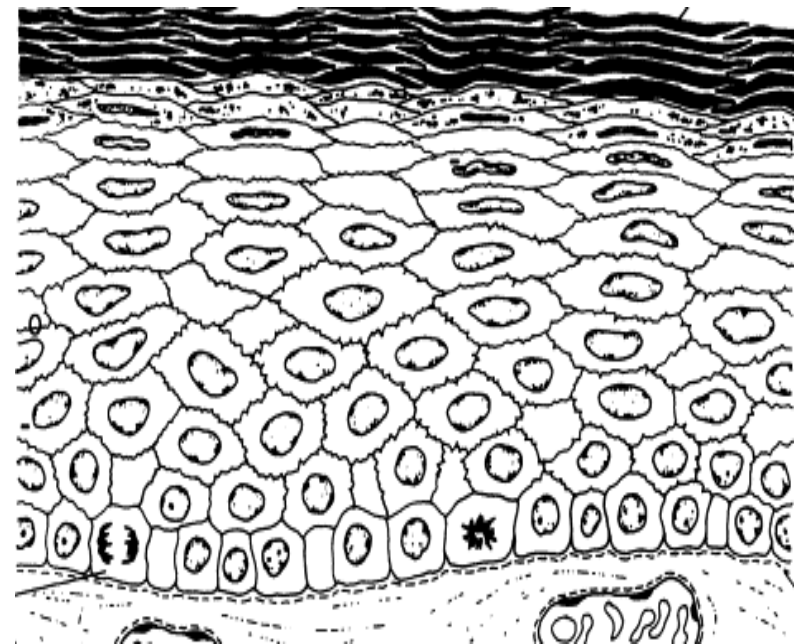
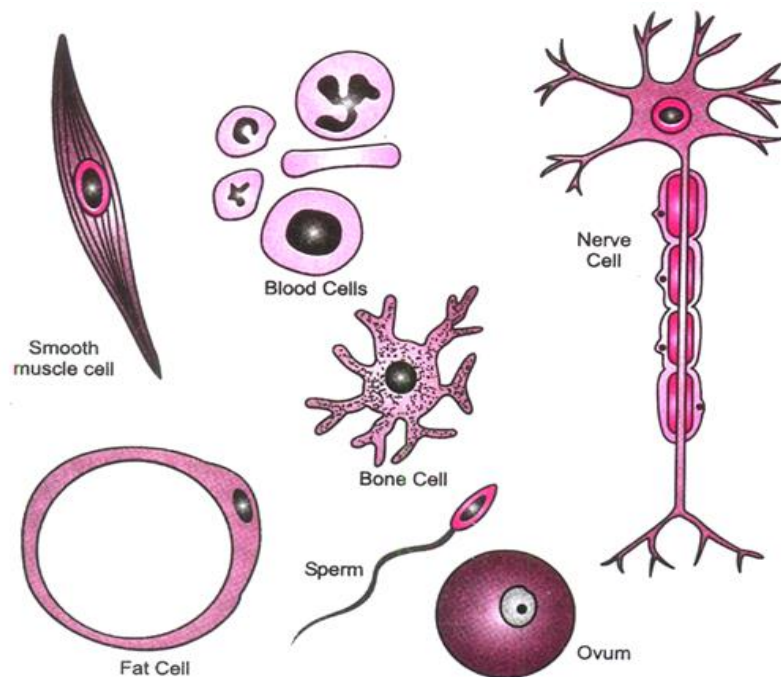
➤ **Plants, animals, and fungi** are **multicellular**; that is, they are composed of a **great many cells**.

- Cells vary considerably in **size, shape** and **internal composition**.
- The smallest cell, a type of bacterium known as a mycoplasma, **measures 0.0001 mm in diameter**,
- other cells have lengths with several meters e.g.: **nerve cells** and
- some cells can be seen with naked eye e.g.: **egg of birds**.

# MYCOPLASMA



- Along with their differences in size, cells present in **different shape**, (spherical shape, rod shape, elongated, flattened.....etc)
- In multicellular organisms, shape is typically **tailored to the cell's job**.
- For example, flat skin cells pack tightly into a layer that protects the underlying tissues from invasion by bacteria.



**Figure : VARIOUS CELLS FROM THE HUMAN BODY**

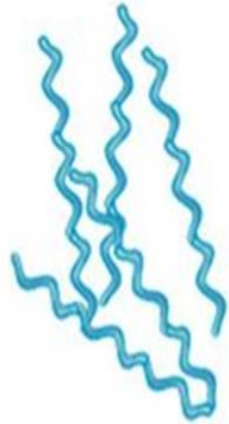
## Bacterial Shapes



**bacillus**  
(rod)



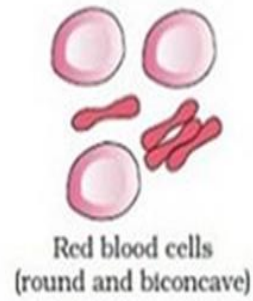
**coccus**  
(sphere)



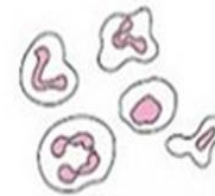
**spirillus**  
(spiral)



**Vibrio**  
(Comma)



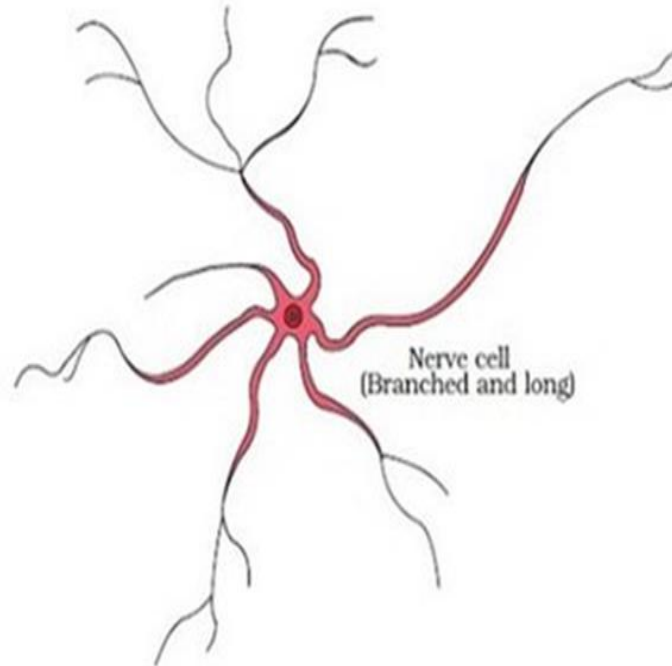
**Red blood cells**  
(round and biconcave)



**White blood cells**  
(amoeboid)



**Columnar epithelial cells**  
(long and narrow)

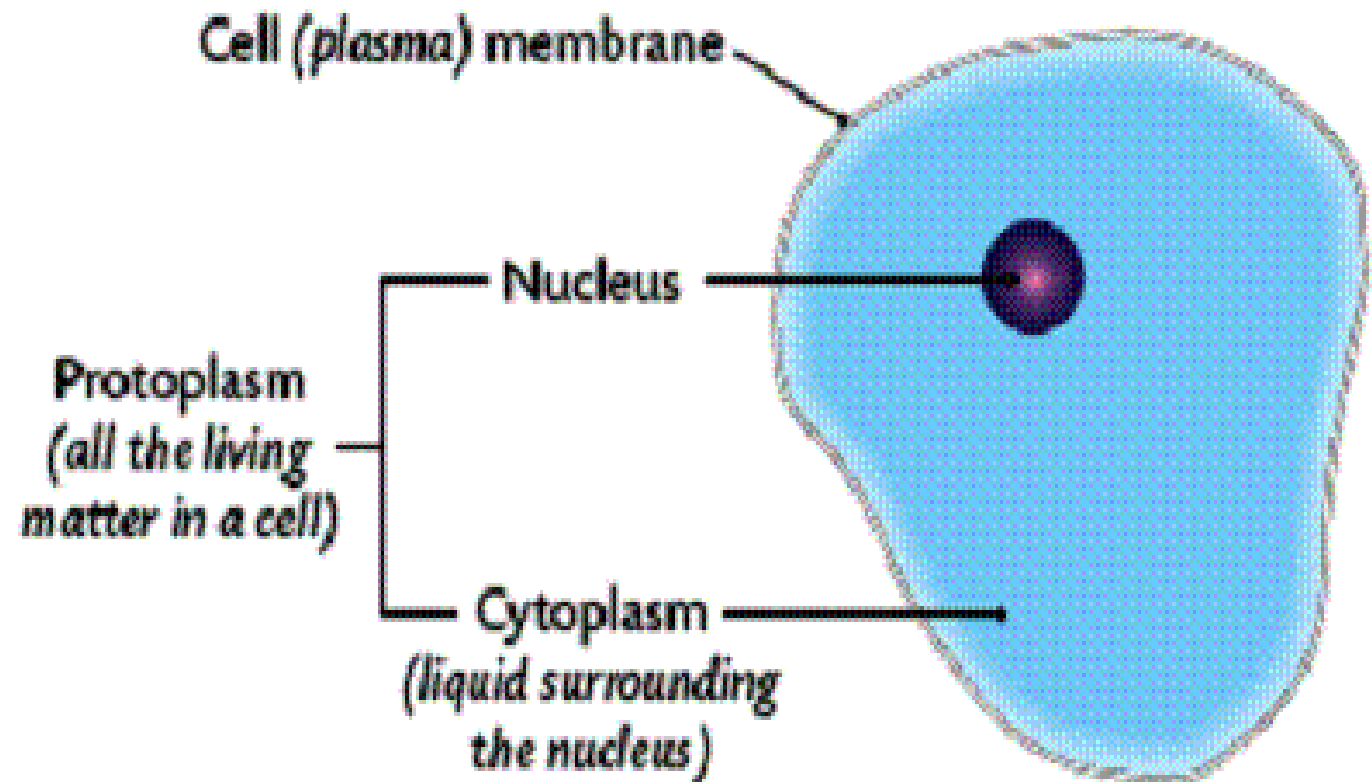


**Nerve cell**  
(Branched and long)



**Guard cells**  
(Kidney shaped)

- The cell consists of a mass of **protoplasm** surrounded by a **plasma membrane**.
- The **protoplasm** is differentiated into **two main parts**, the inner mostly central part called **nucleus** and the outer part that surrounds the nucleus called **cytoplasm**.





# The Structure of Cytoplasm:



**Cytoplasm** is a complex fluid containing a various cellular **organelles** and **inclusions**, and surrounded by the plasma membrane.

***Organelles:*** these are the specialized parts of the cell such as (endoplasmic reticulum, Golgi complex... etc)

***Inclusions:*** these are **non living** constitutes of cells such as (secretary granules, glycogen ...etc).

## Organelle

it is a structure within the **cytoplasm** that has a specific **function** .

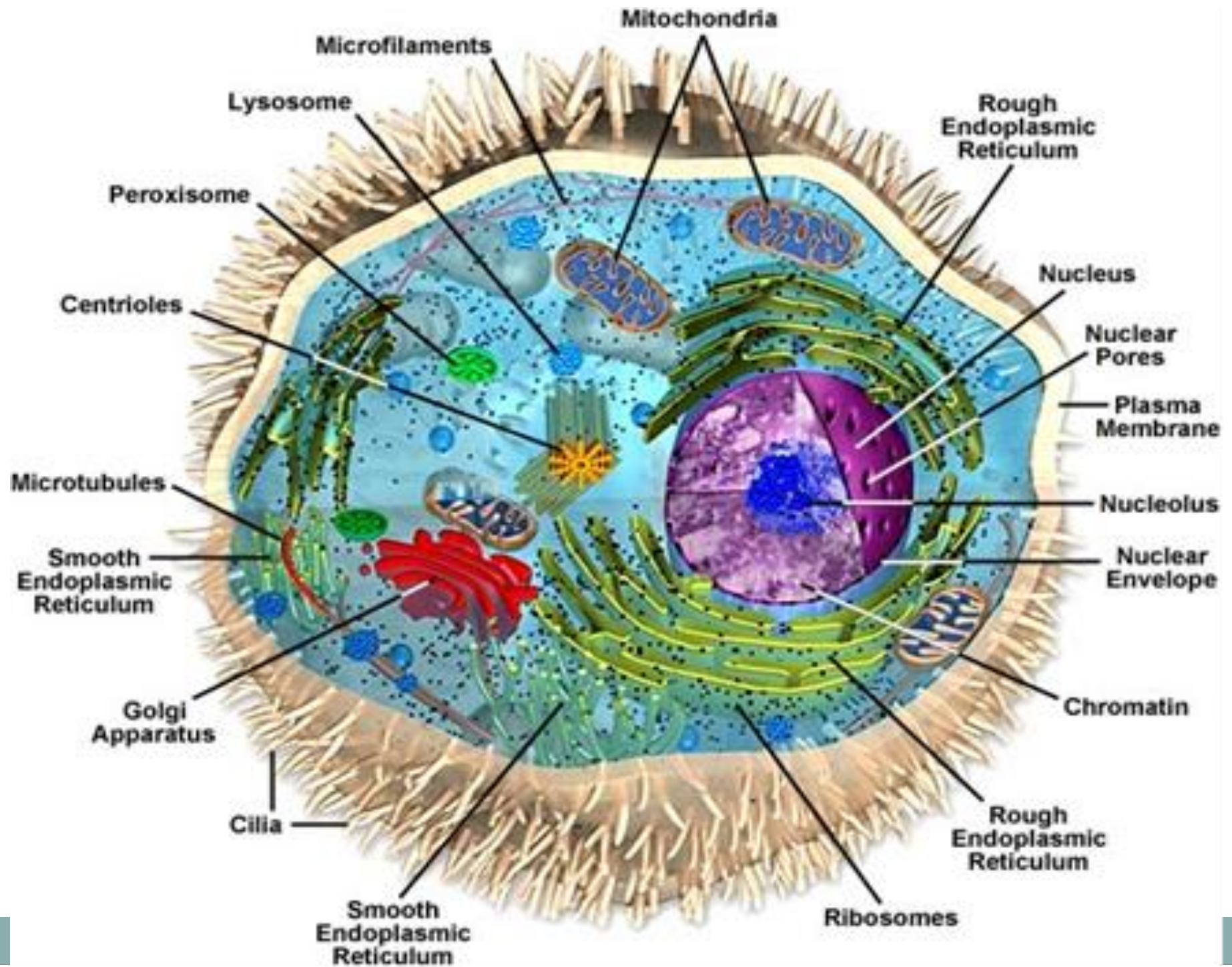
## Inclusion

They are **stored nutrients** secretory product & pigment granules

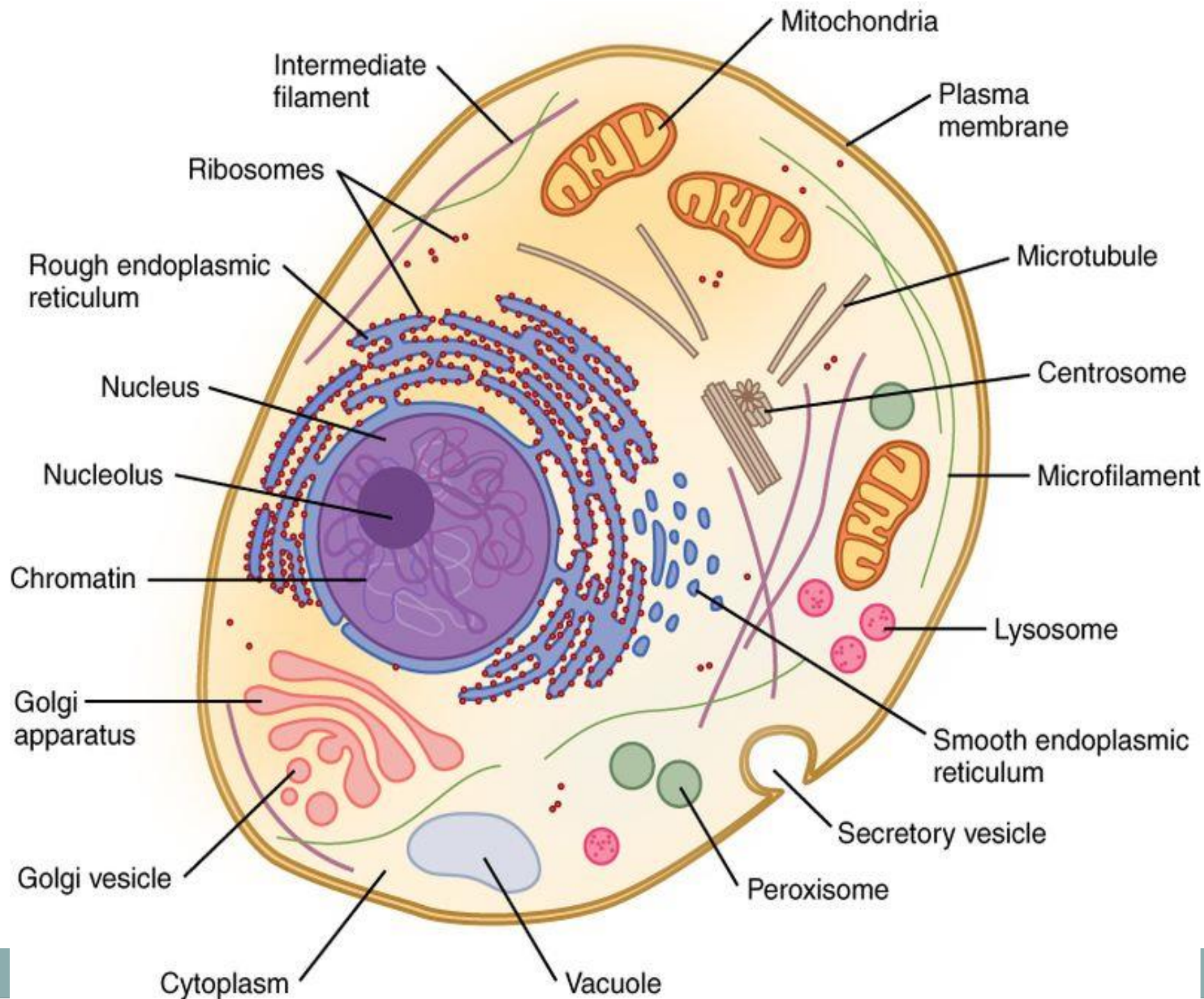
Ex: Lipid droplets in fat cells,

Pigment granules in certain cells of skin and hair,

Glycogen granules in the liver and muscle cells



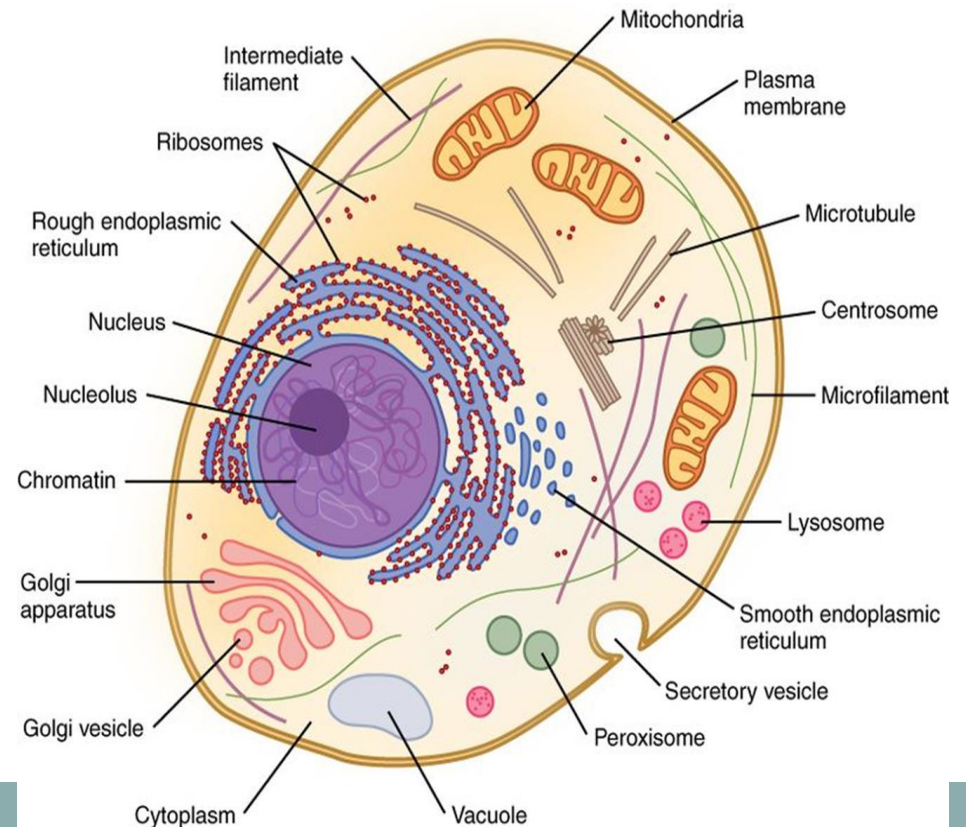
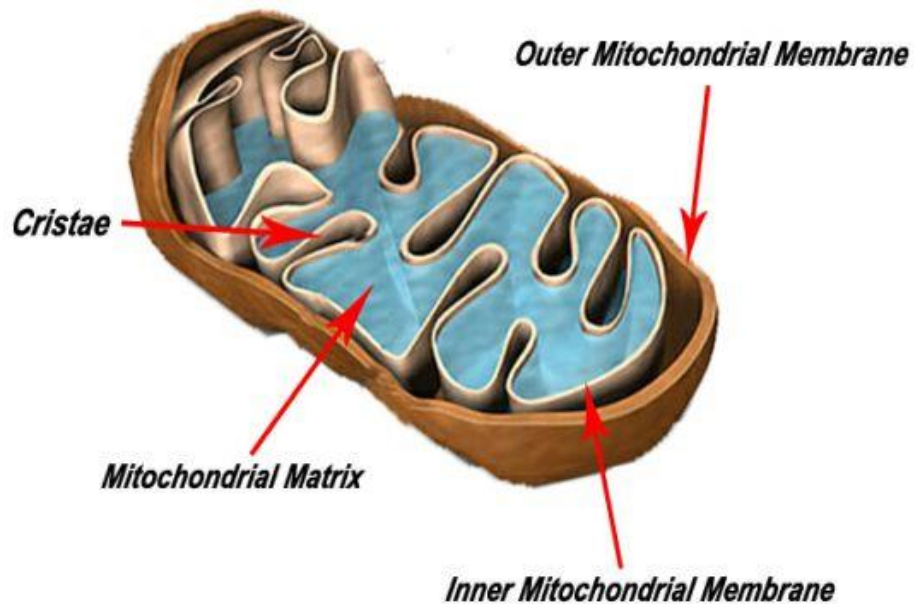




# Organelles:

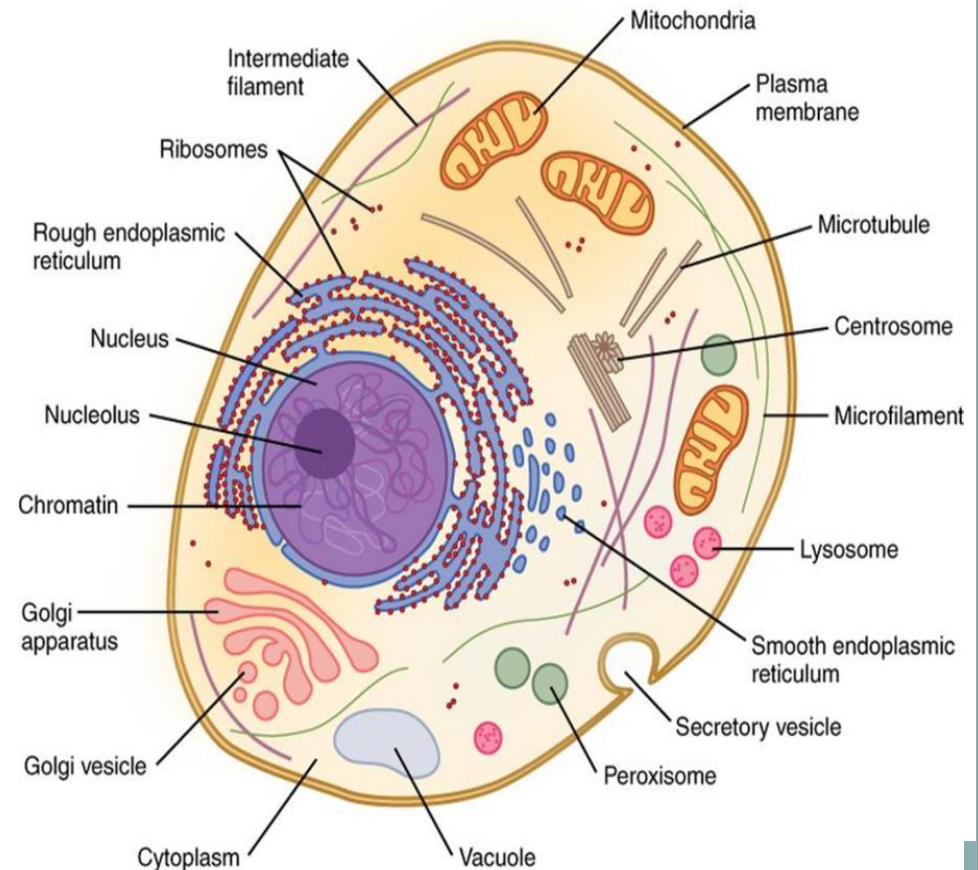
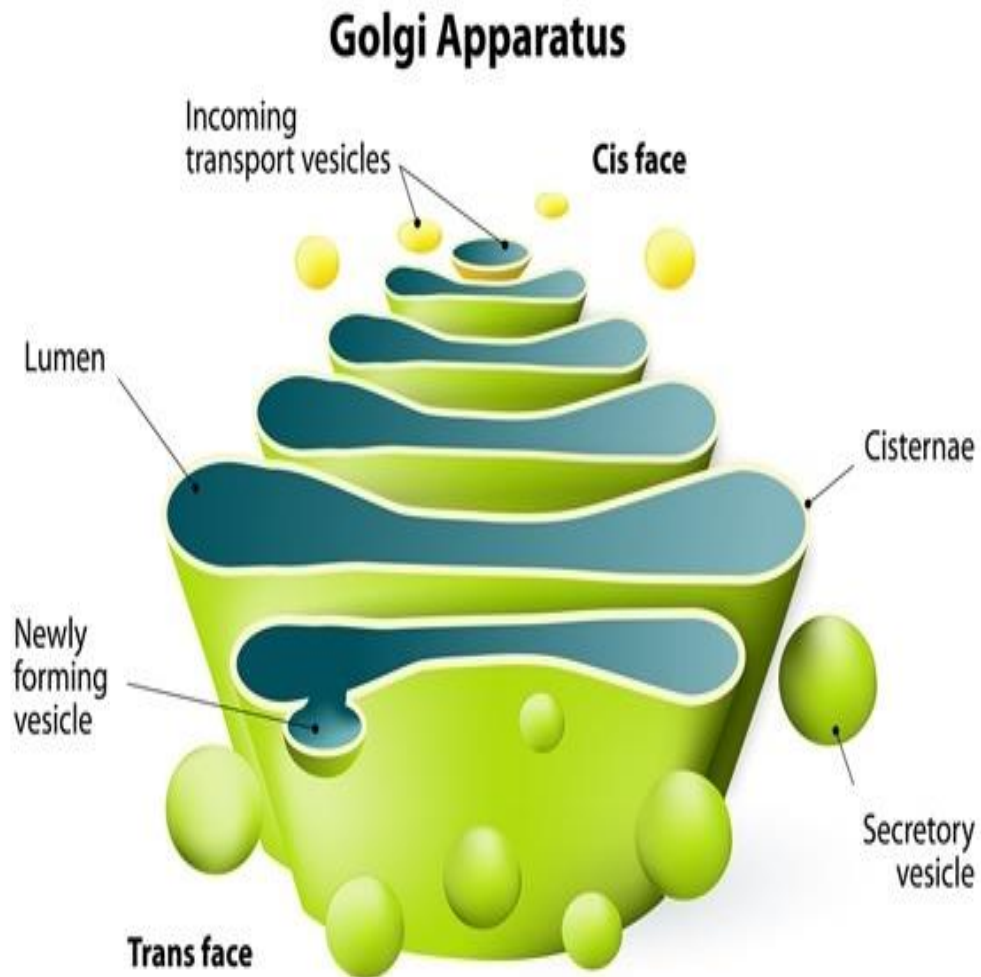
**Mitochondria:** most cells contain mitochondria which is a **double membrane** bound organelle, the main function of mitochondria is to provide the **energy** for the cell.

## *The Mitochondrion*





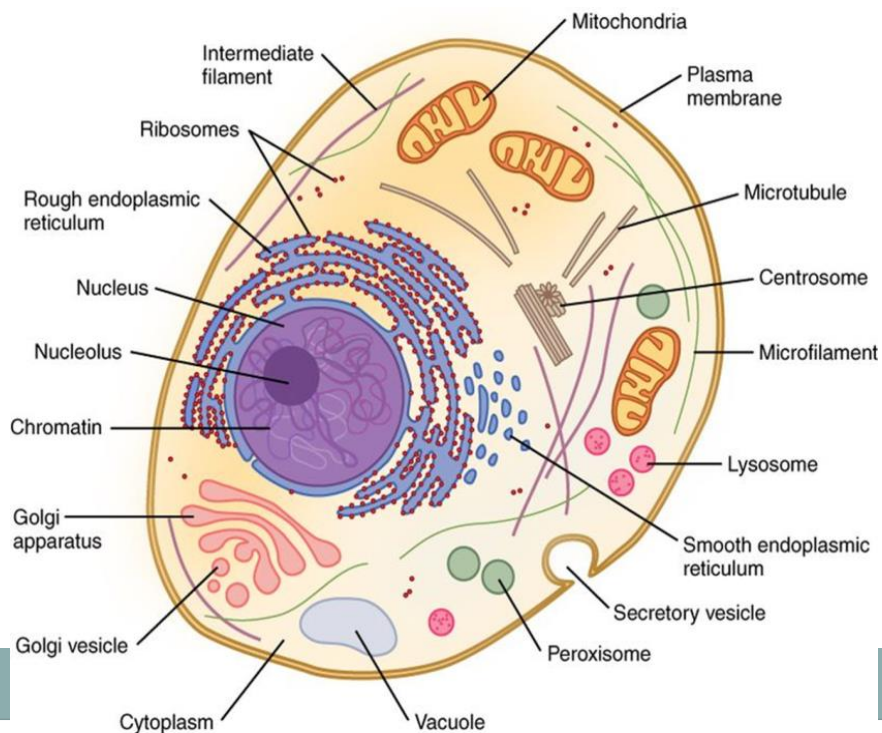
**Golgi complex:** they are flatted sacs, play an important role in **storage** and **synthesis** of secretary granules.



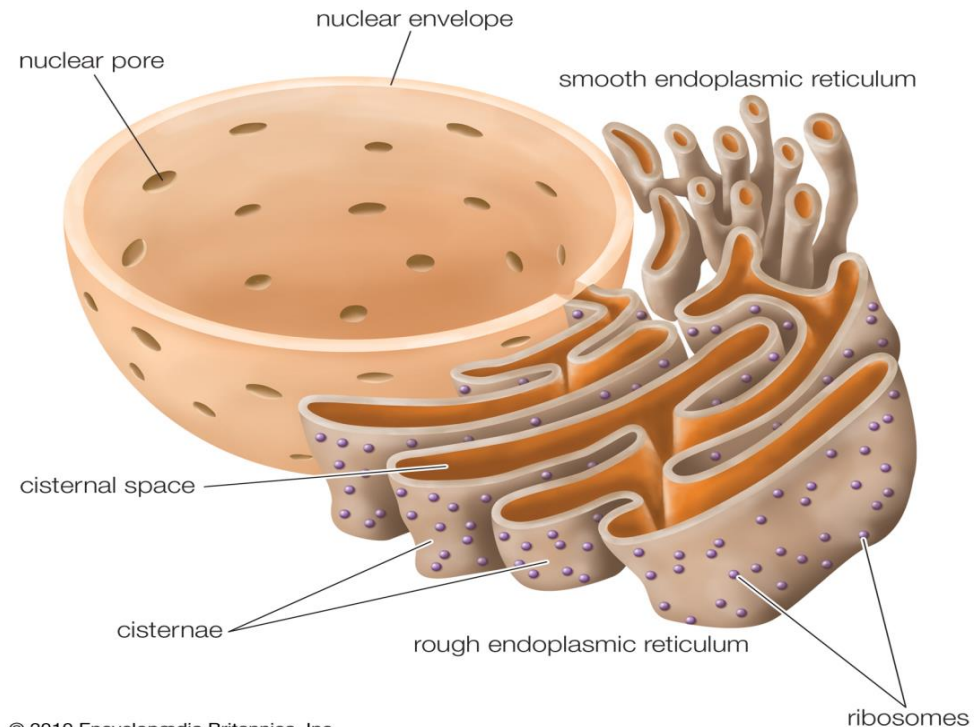
***Endoplasmic reticulum*** (ER): are sites of **lipid** and **carbohydrate** synthesis and they are of two types :

***A/the rough ER:*** it's granular (appears rough due to the presence of ribosomes on the membrane surface).

***B/the smooth ER:*** it's non-granular (the ribosomes are absent)



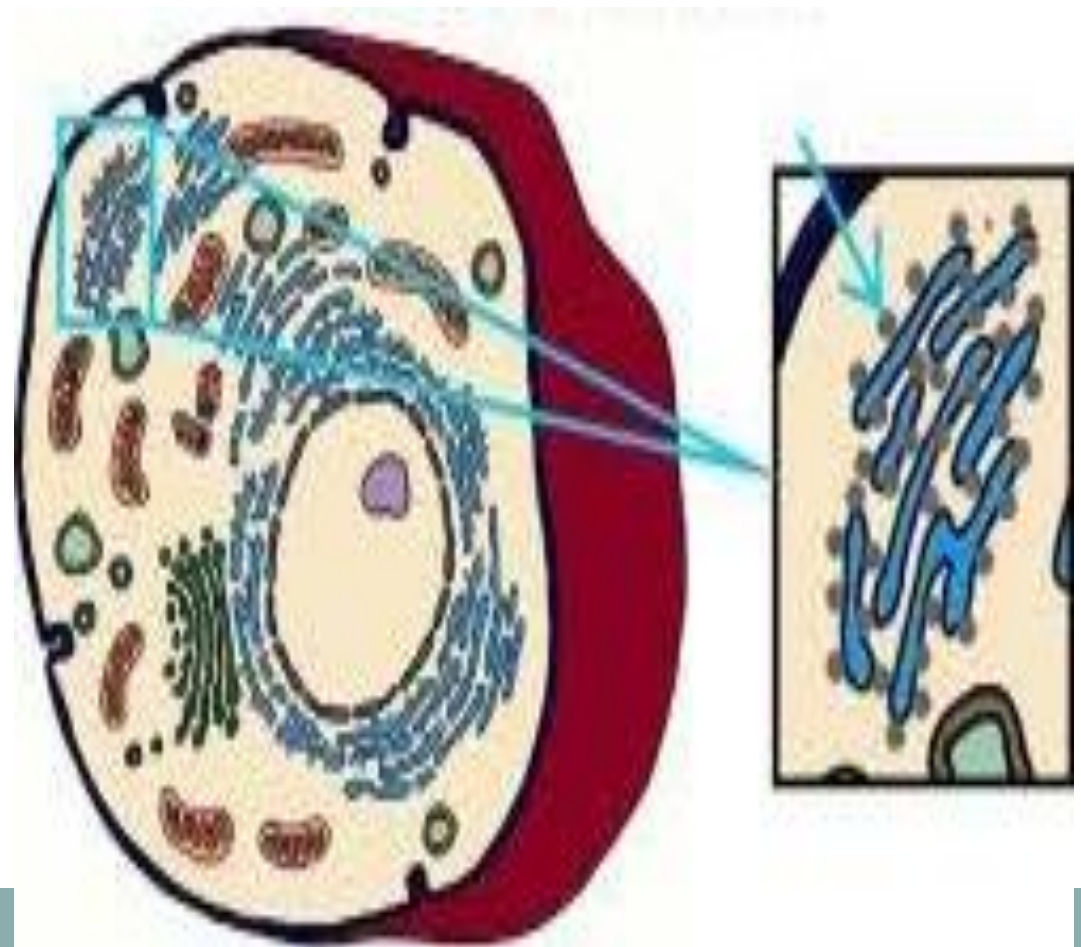
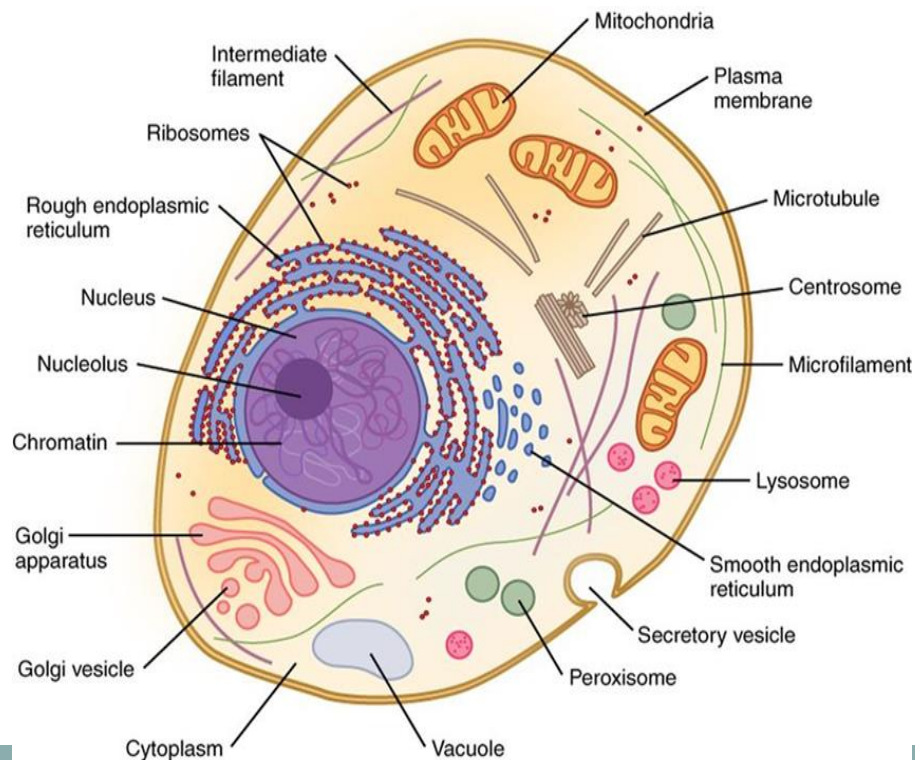
Endoplasmic reticulum





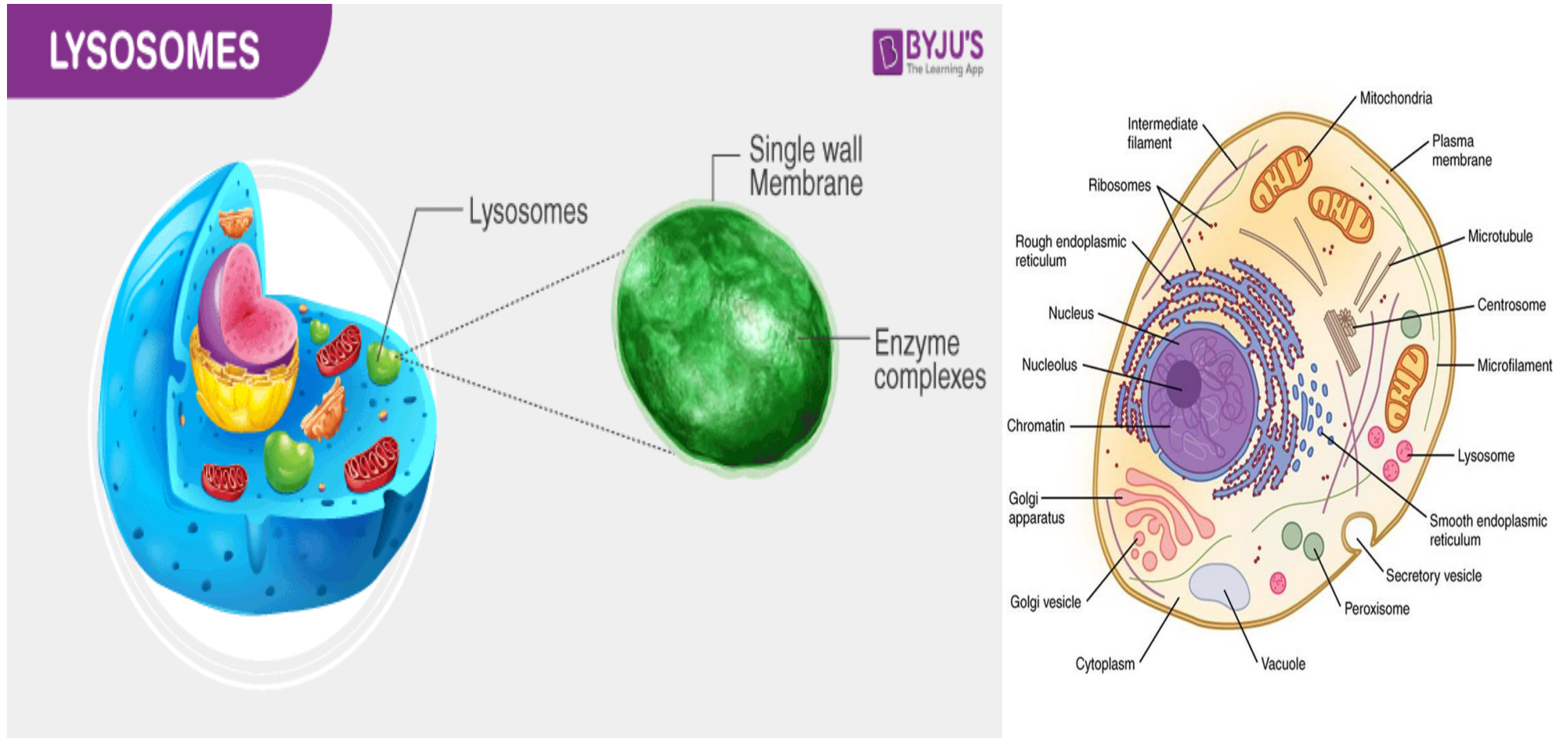
**The ribosomes:** ribosomes are the most essential organelles in cells,

- They play an important role in **protein** synthesis,
- It may be **located on endoplasmic reticulum**, or **are free in cytoplasm**.



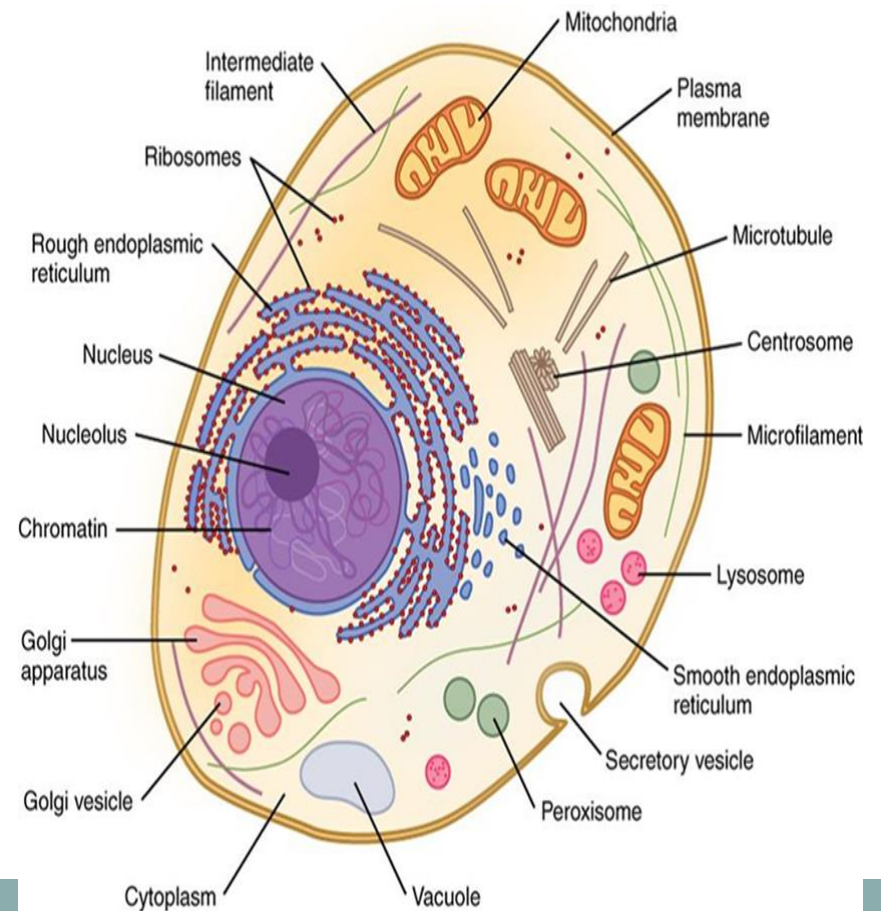
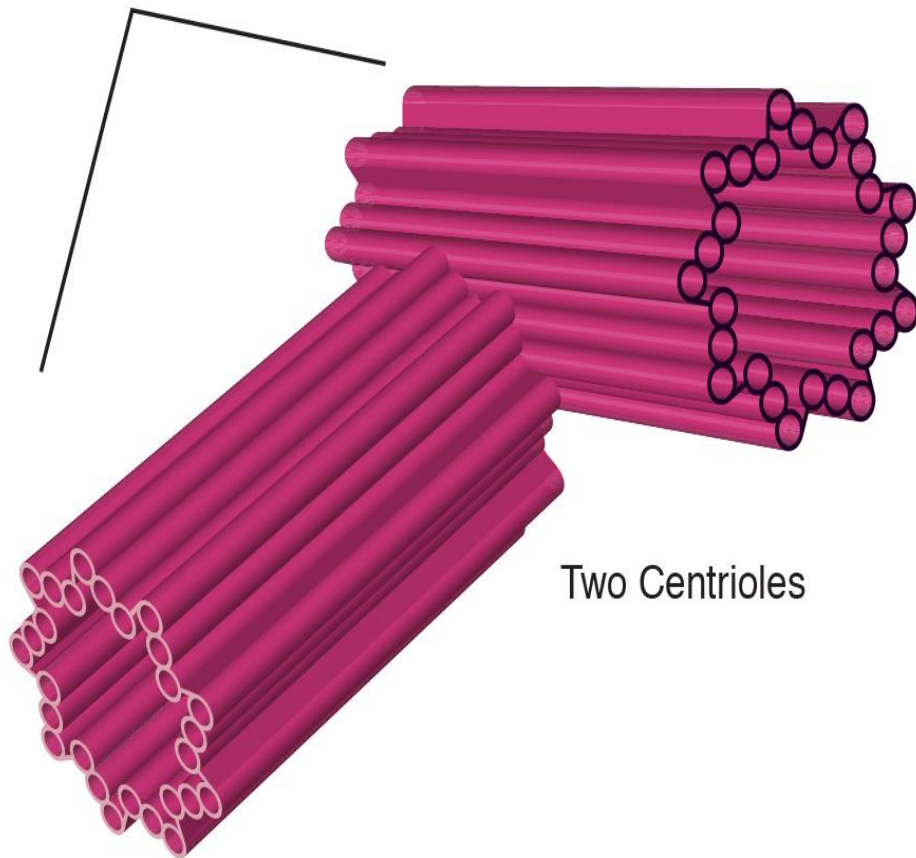


**The lysosomes:** these are membrane bounded organelles which contain a **hydrolytic enzyme**, it is important in the **digestion process** inside the cell.



**The centrosome:** consists of two centrioles located near the nucleus, it plays a role in **cell division**.

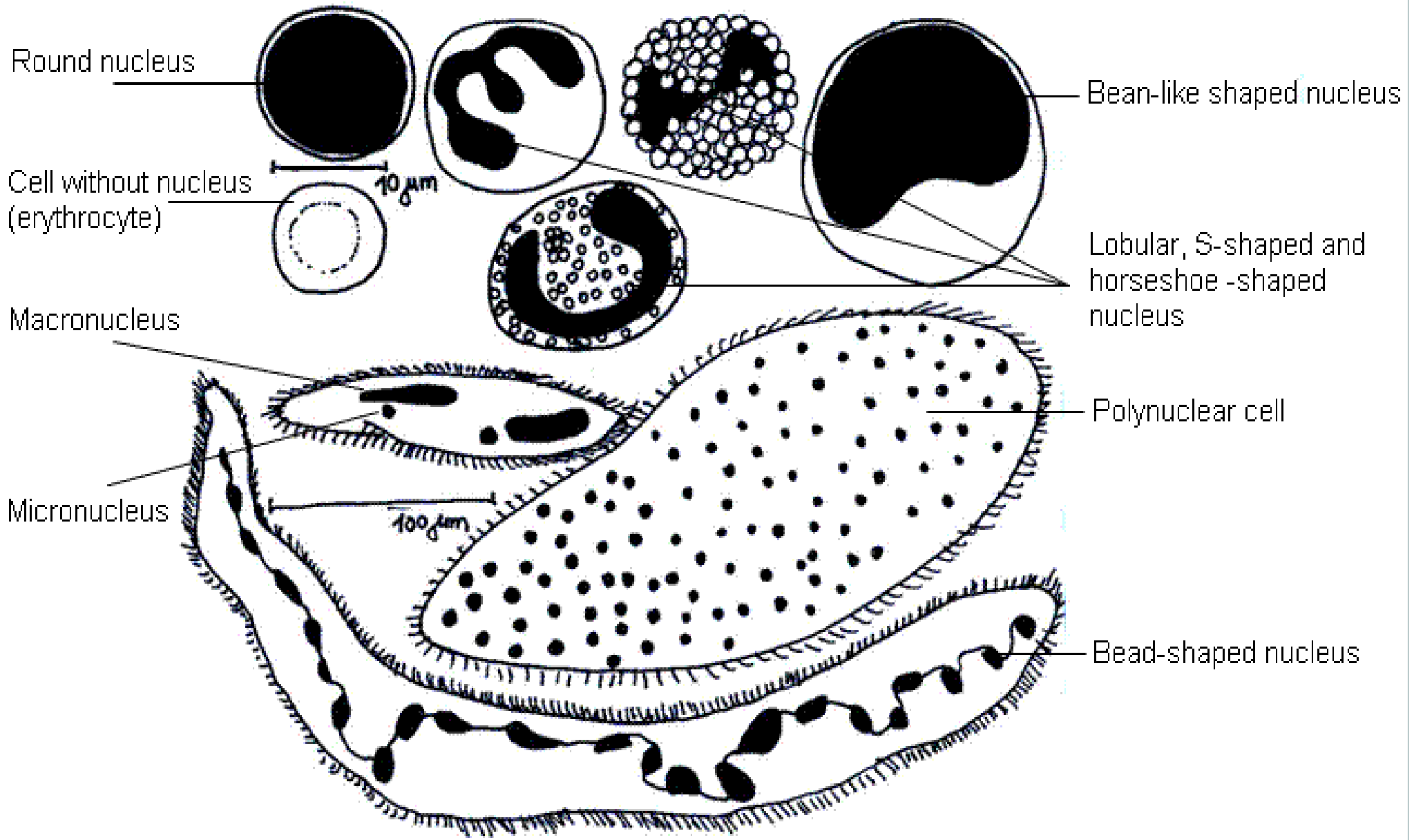
-Centrosome



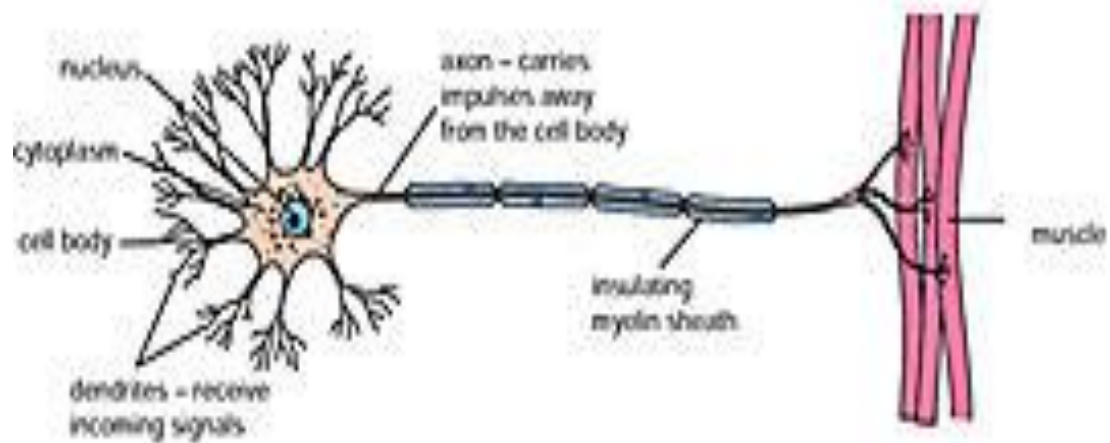
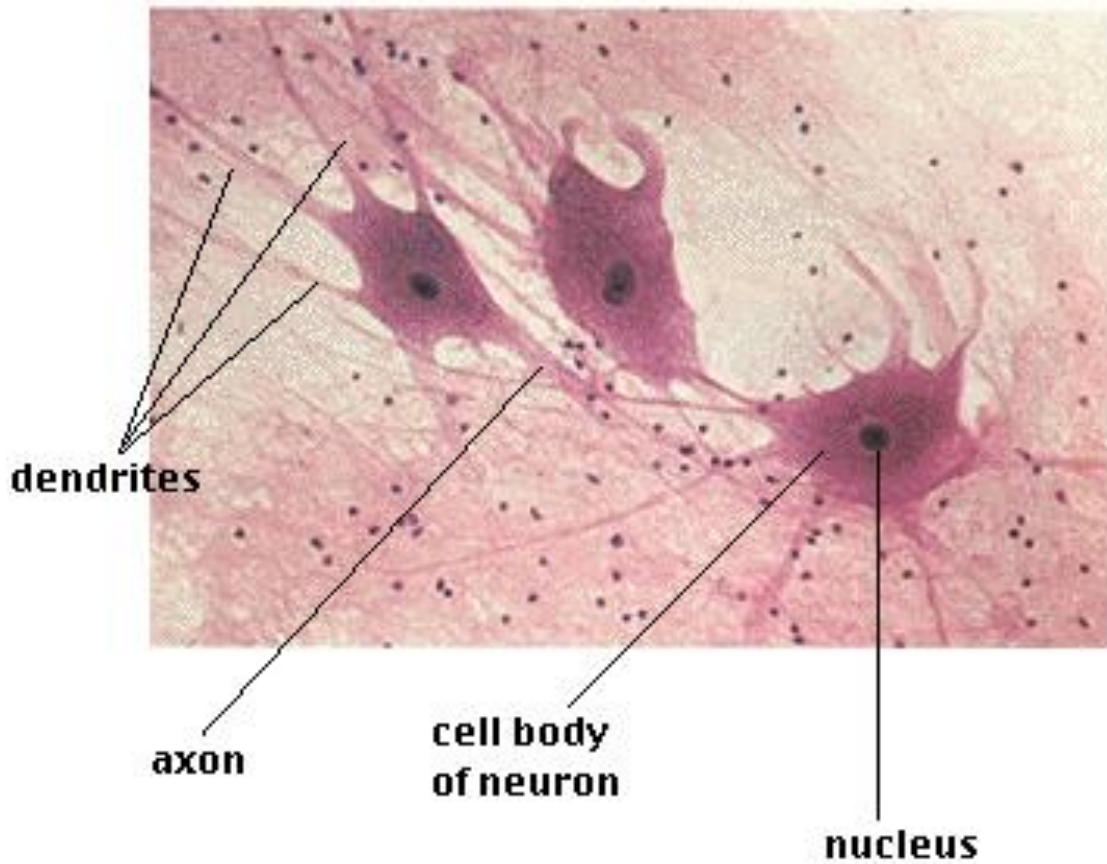


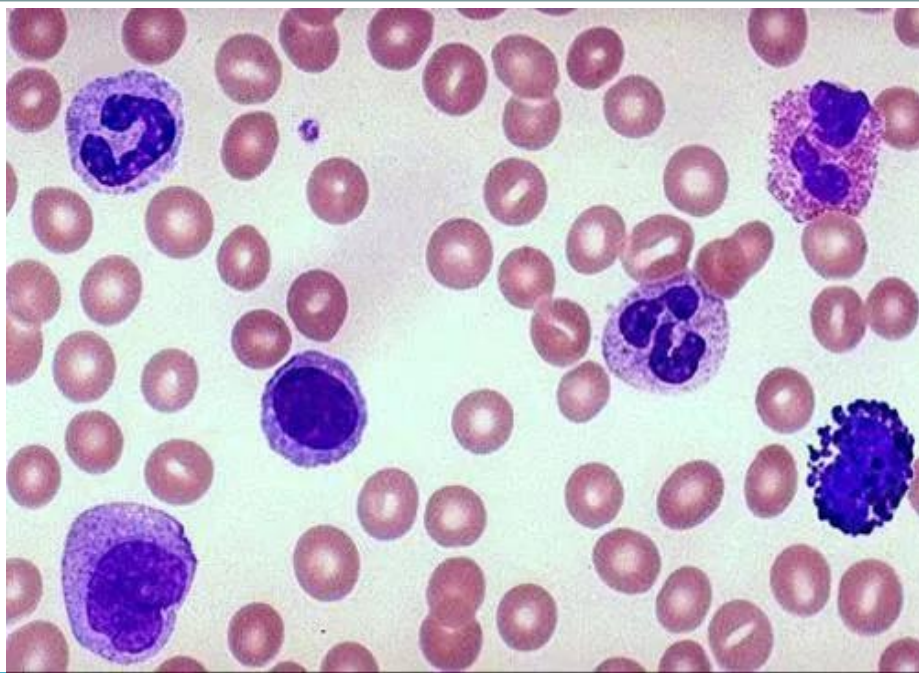
## The Nucleus:

It is the most important part of the cell as it performs the **metabolic activity** of the cell, it is usually **spherical** in shape or it occur in different shapes such as (kidney, ovoid, flatted and elongated shape).



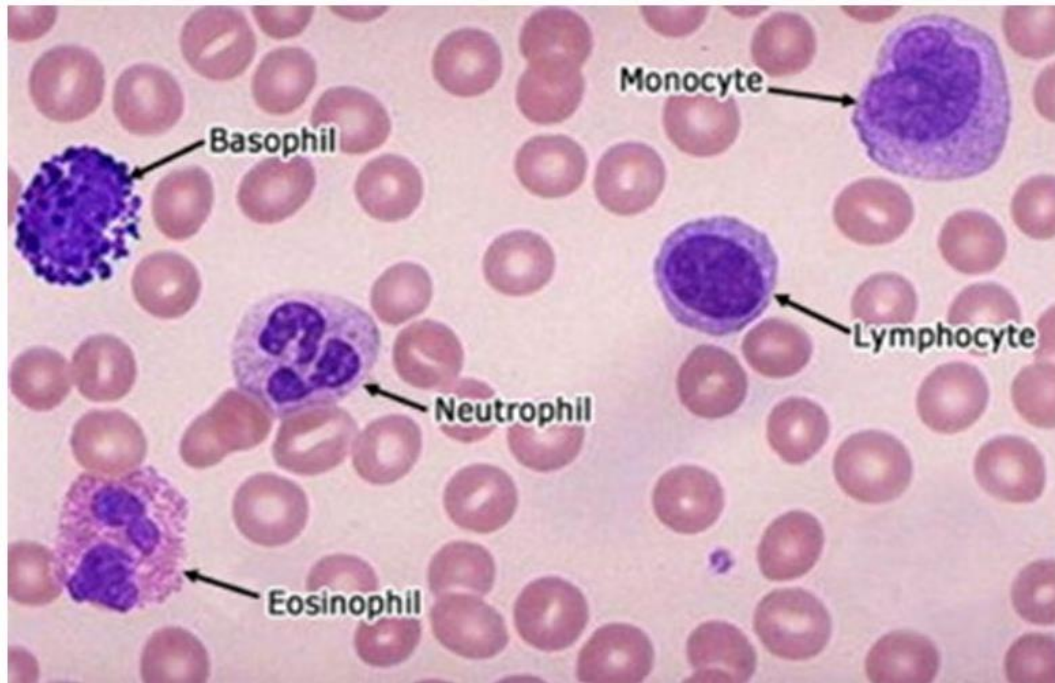
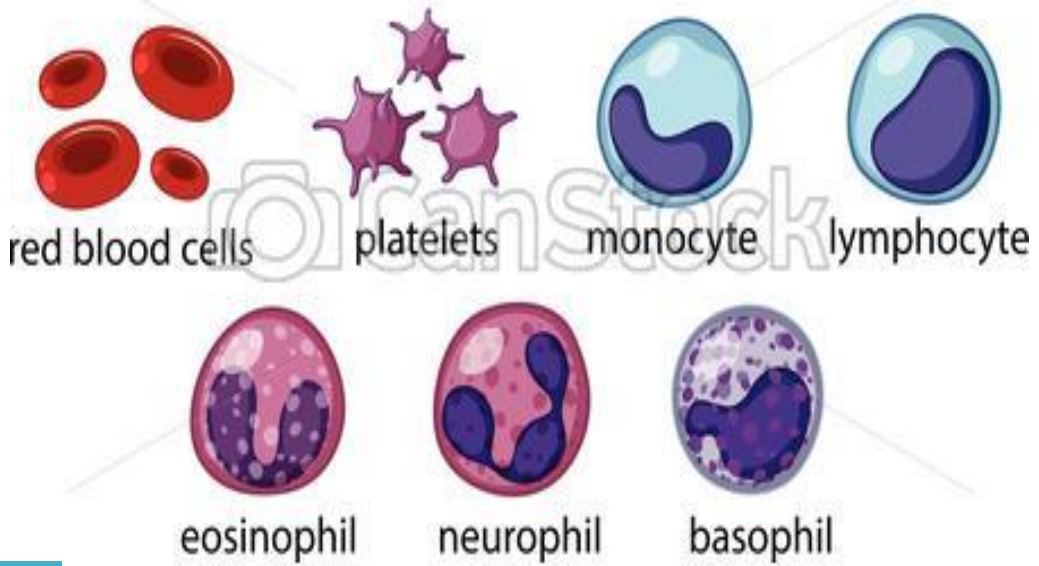




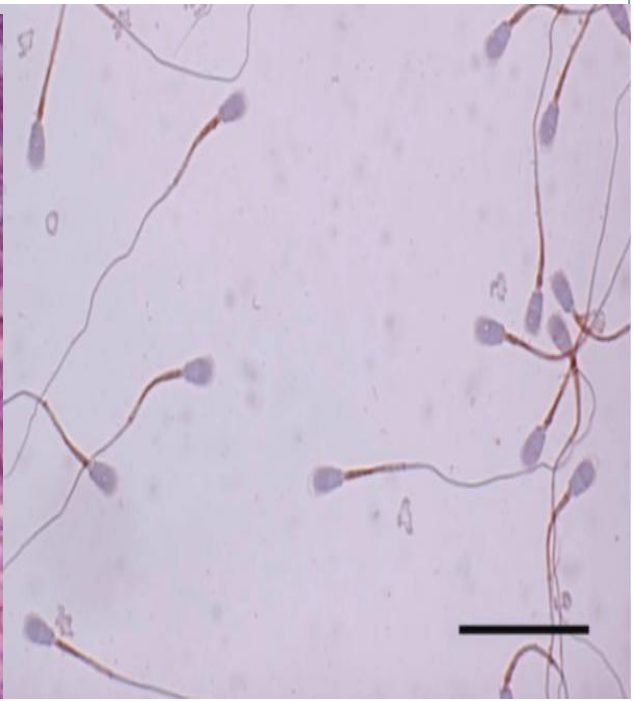
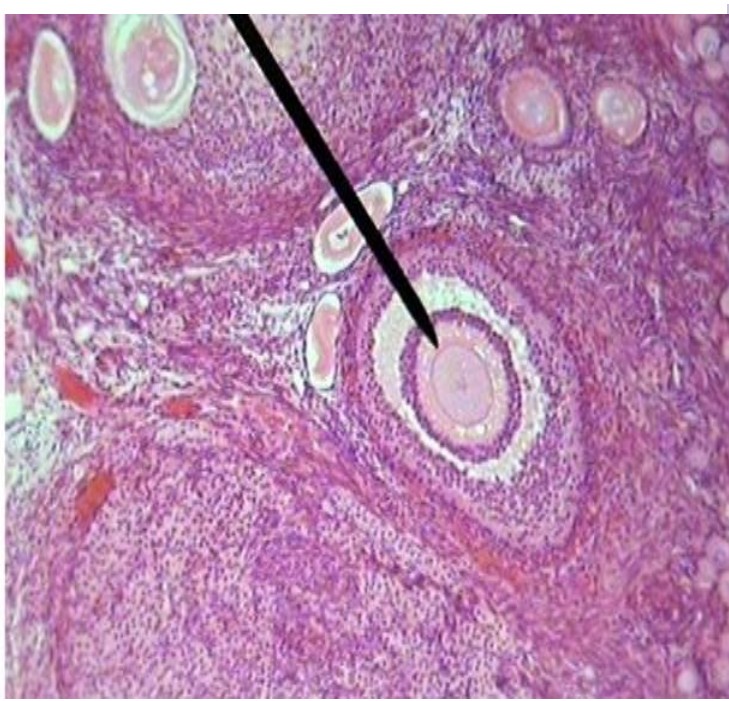
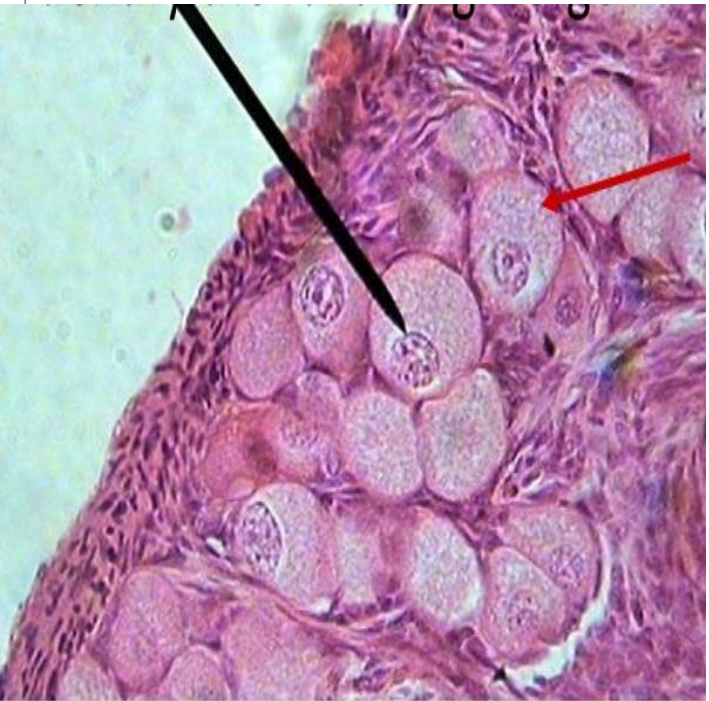
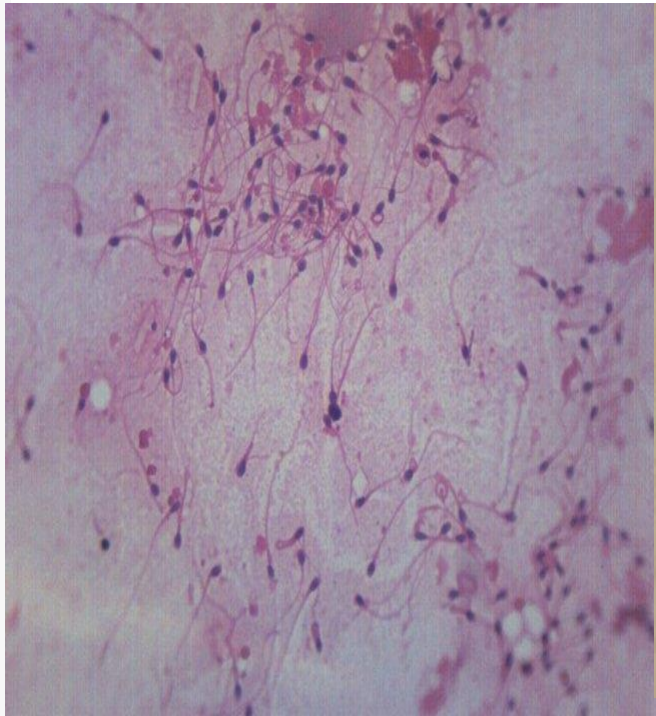
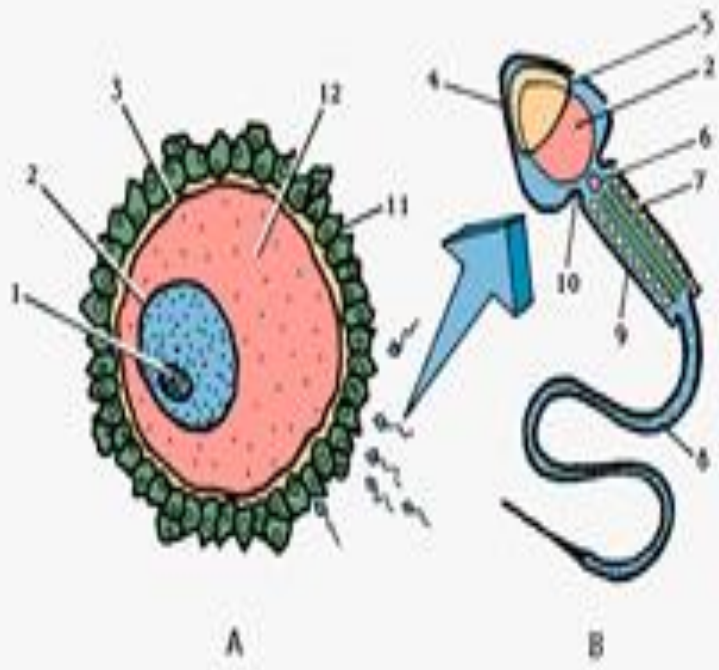


Blood smear under microscope

# Types of Blood Cells







# Quiz