



INTRODUCTION TO CELL

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Biology

First Semester

Week 3

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Outline

- Define the cell
- Cell structure
- Differences between prokaryotic and eukaryotic cells
- **Cell shape**

Objectives

- Introducing the basic characteristics of cell
- Understanding the components of cell and their function
- Introducing variation in cell shape size and functions

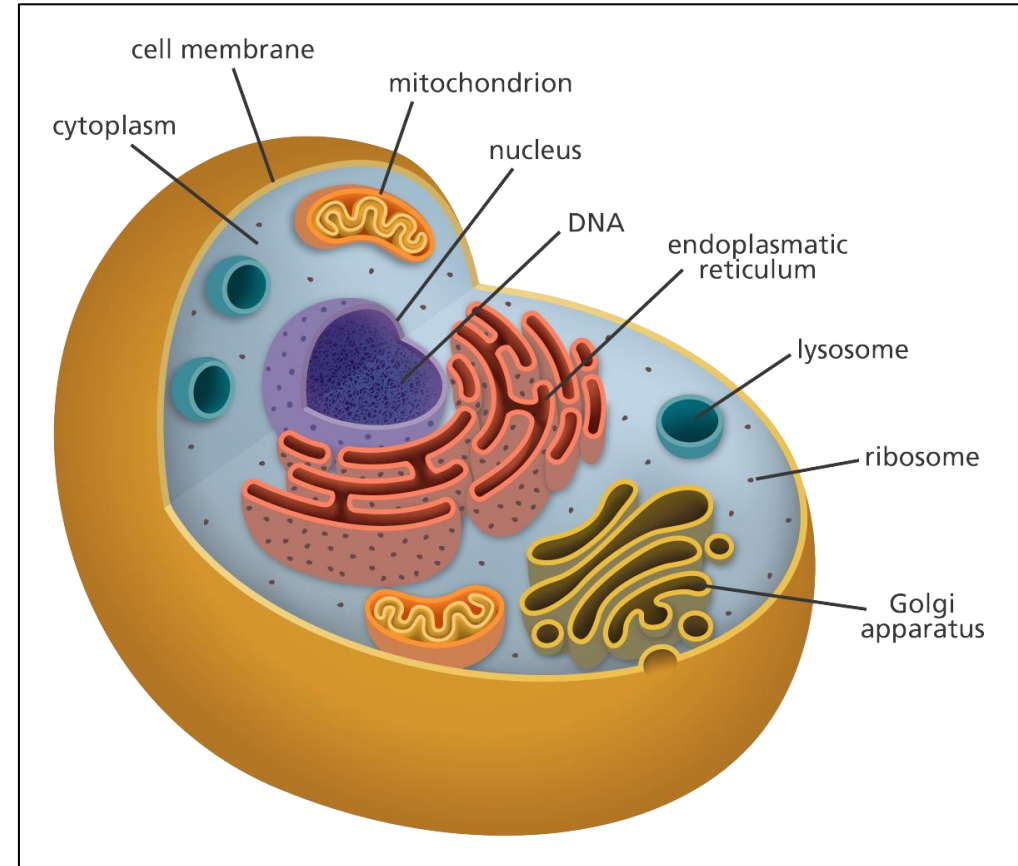
Introduction to cell

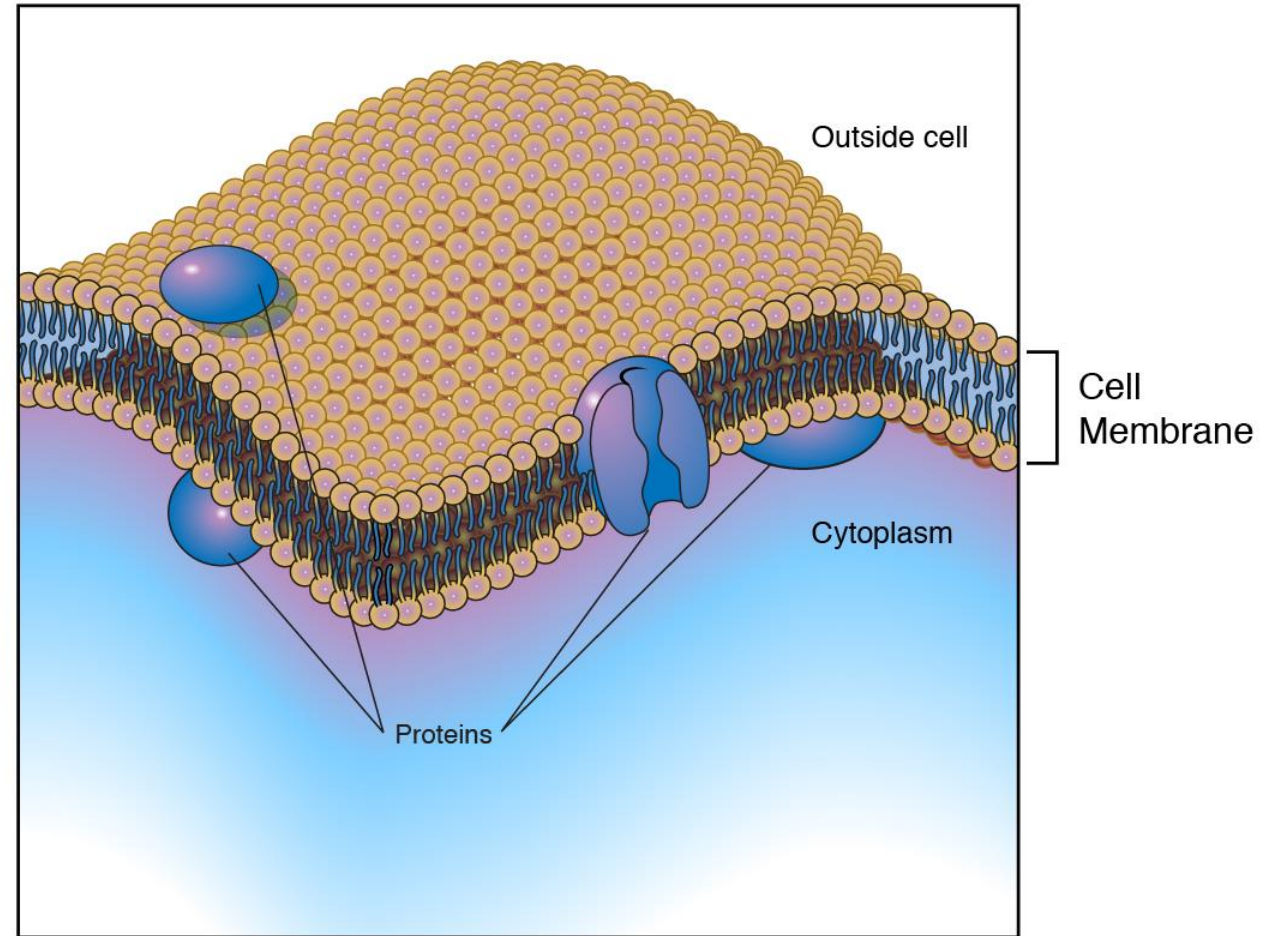
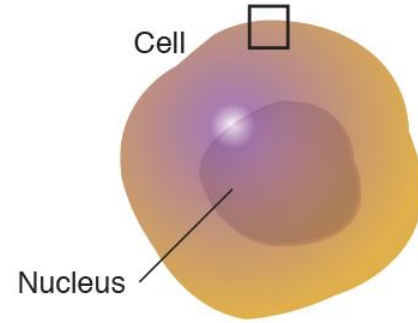
- Cells are the basic unit of life, every living thing, from the tiniest bacterium to the largest whale is made of one or more cells. There are mainly two types of organisms, divided on the basis of the cell.
- The organisms which have only one cell are **unicellular** (Organisms that exist as single cells), whereas the organisms, which have the numerous cells are known as the **multicellular** (organisms that are made up of groups of cells working together)



Cell structure and internal organization

- **Plasma membrane** present around all types of the cells.
- Generally, the plasma membrane consists of lipids and proteins.
- Inside the cells, there is a specific membrane bounded structure which is called **Nucleus**
- Inside the nucleus the chromosomes (DNA+Proteins) are located



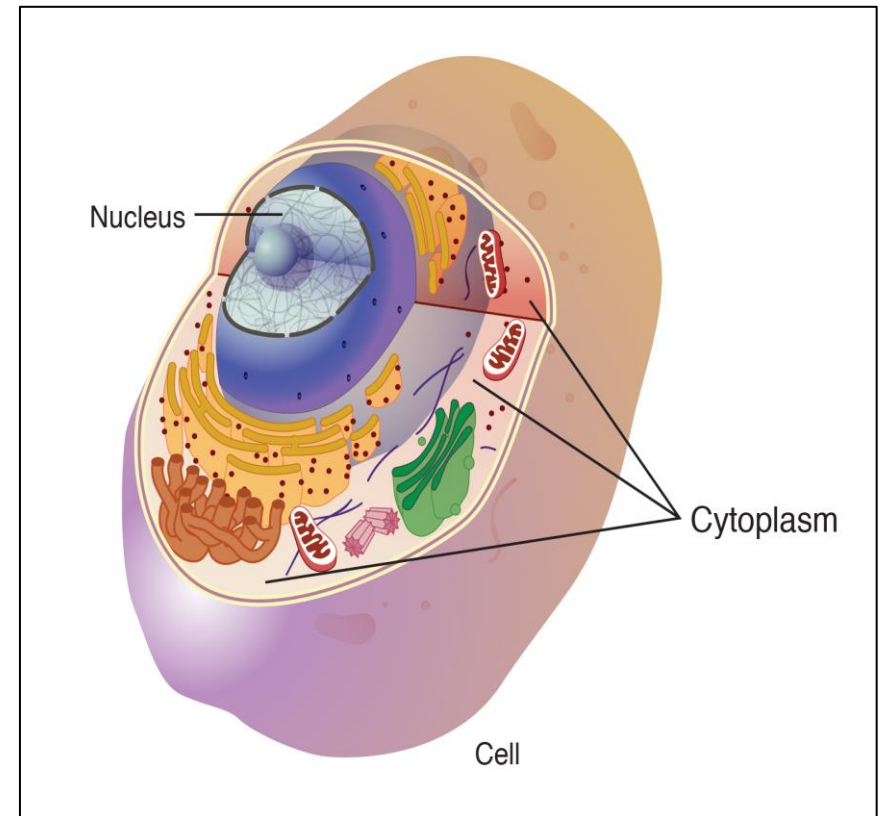


Plasma membrane consist of two layer of **phospholipids** with proteins molecules embedded in the lipid layers

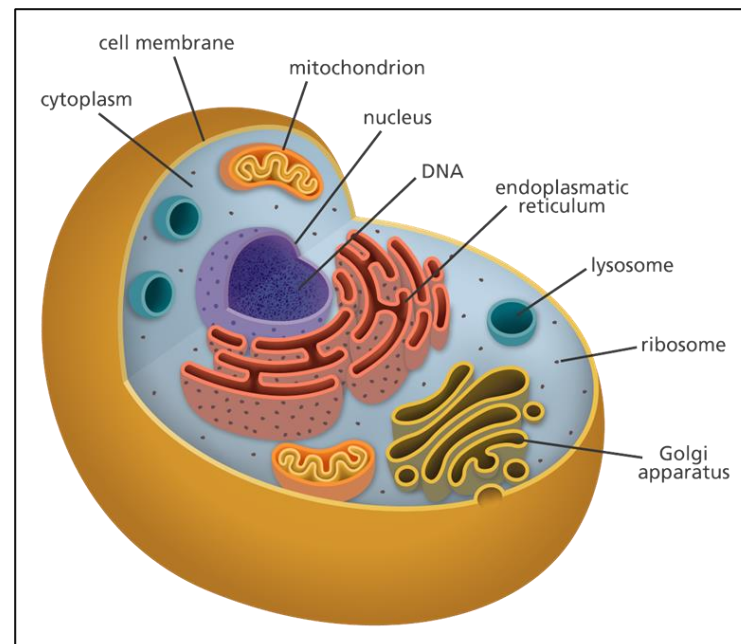
- **Cytoplasm** consists of all of the contents outside of the nucleus and enclosed within the cell membrane of a cell. It is clear in color and has a gel-like appearance.

The main components of the cytoplasm are

1. **cytosol_(a gel-like substance),**
 2. **organelles (the cell's internal sub-structures),**
 3. **various cytoplasm inclusions(macromolecules and granules)**
- The cytoplasm is about 80% water and is usually colorless

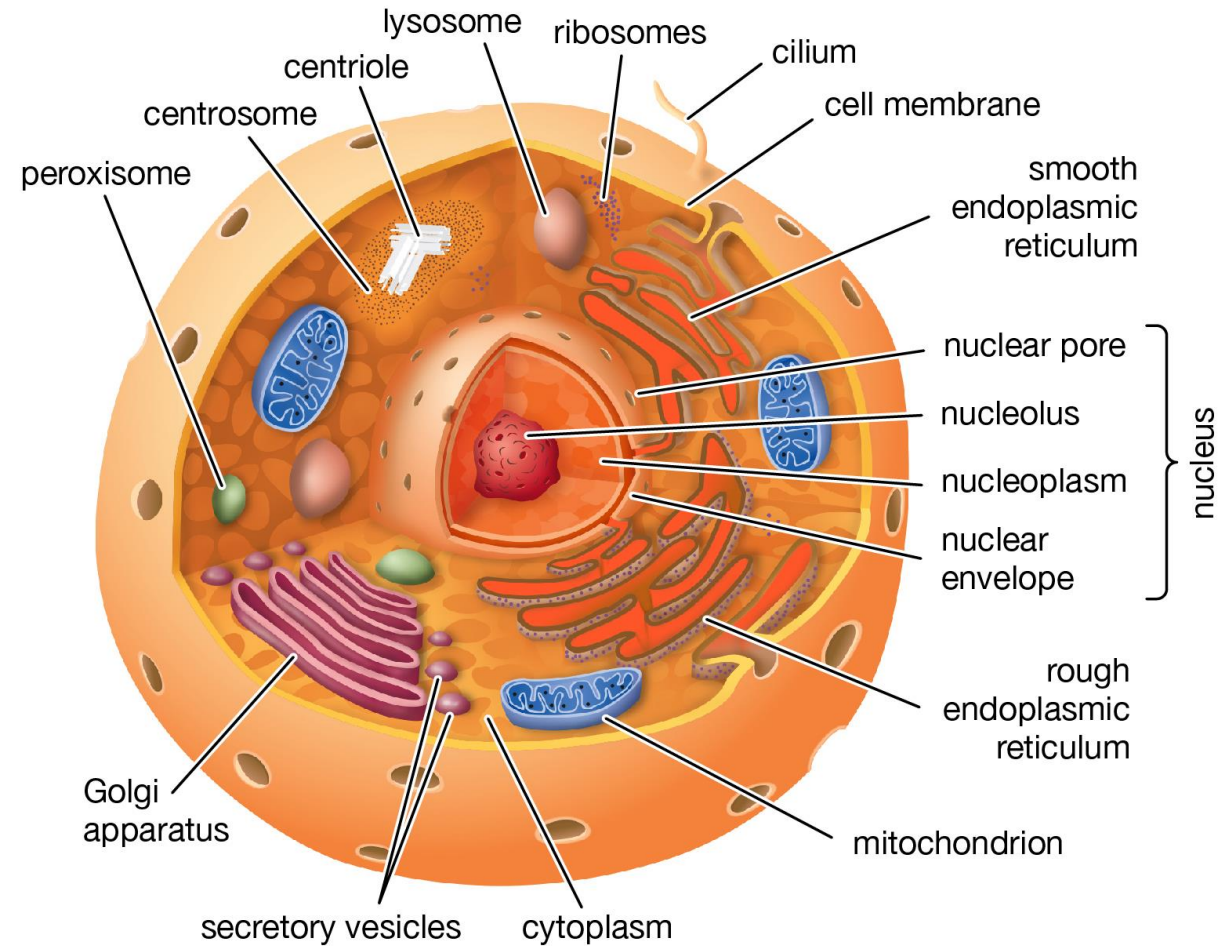


- Cells contain a variety of internal structures called **organelles** (except prokaryotic cells) they are located in cytoplasm, and each perform a specific function
- Organelles including **mitochondria**, **endoplasmic reticulum** (rough and smooth), **chloroplast**, **Golgi apparatus**.....etc
- The nucleus, mitochondria and chloroplasts of the, all are cell surrounded by double membrane.



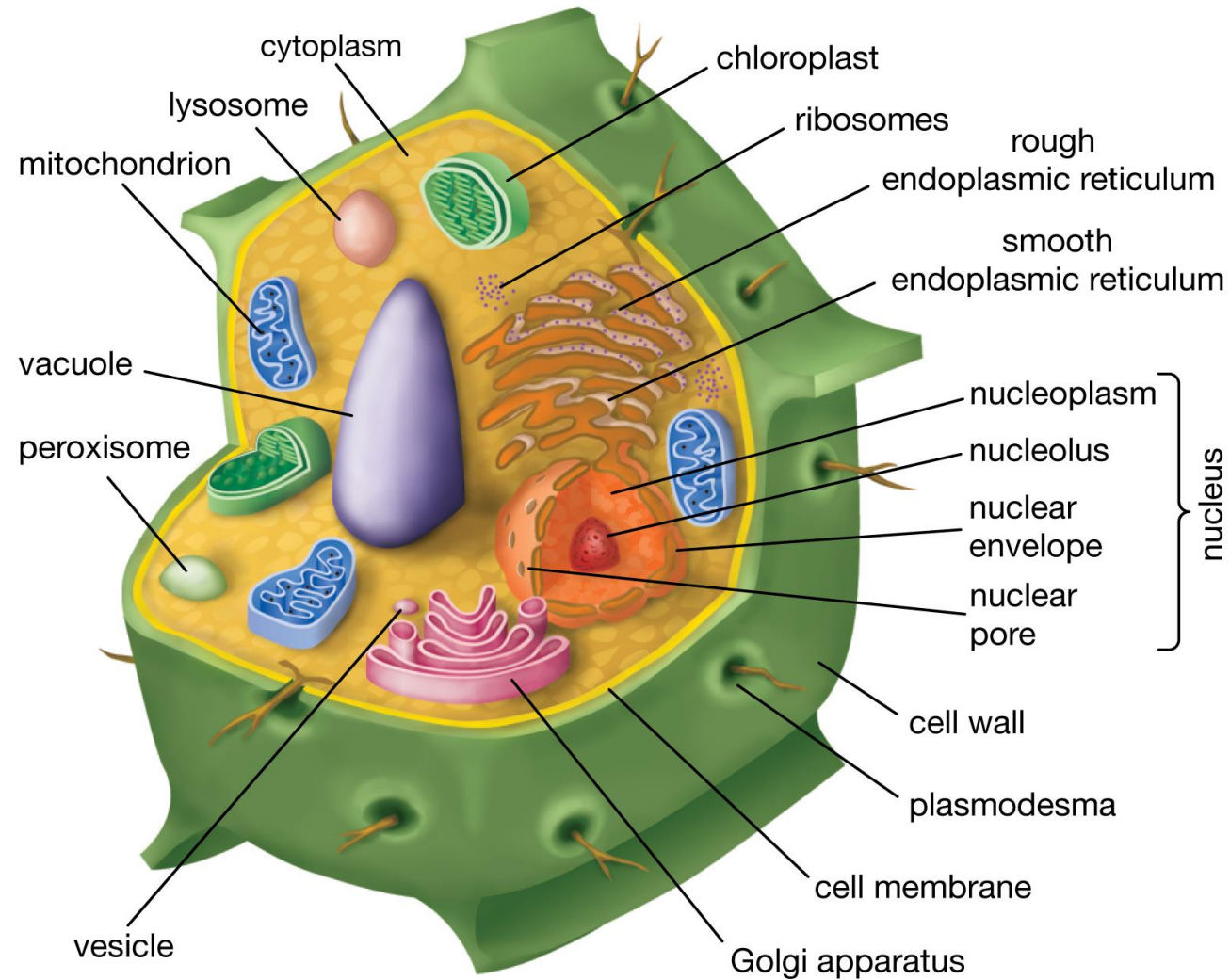
Cell structure and internal organization

Animal cell



Plant cell

Plant cell



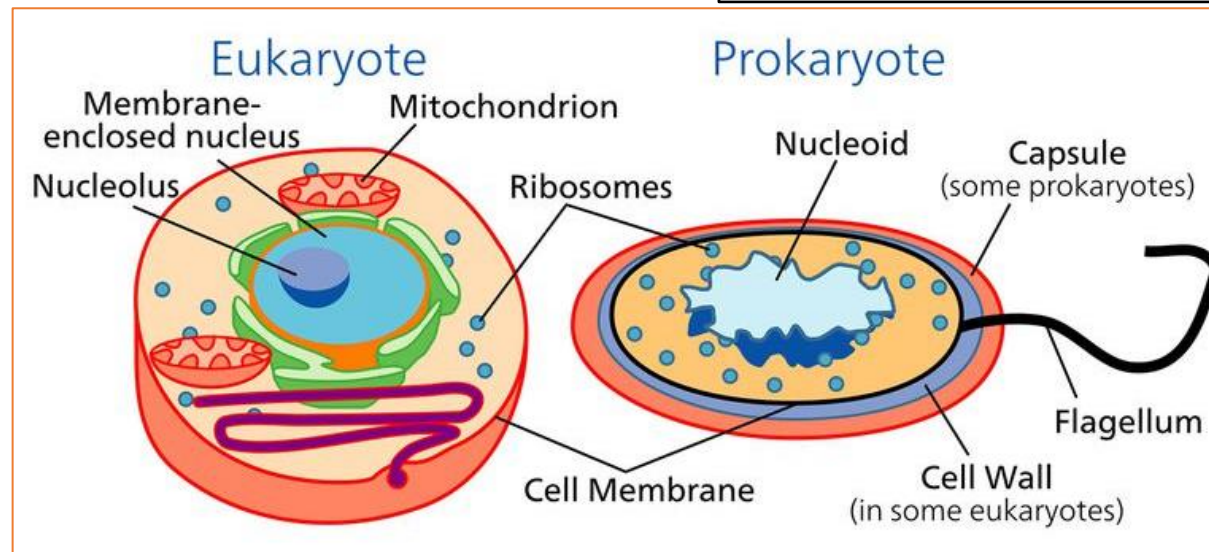
All living things are divided into two major groups these two groups are the **Eukaryotes**, and the **Prokaryotes**

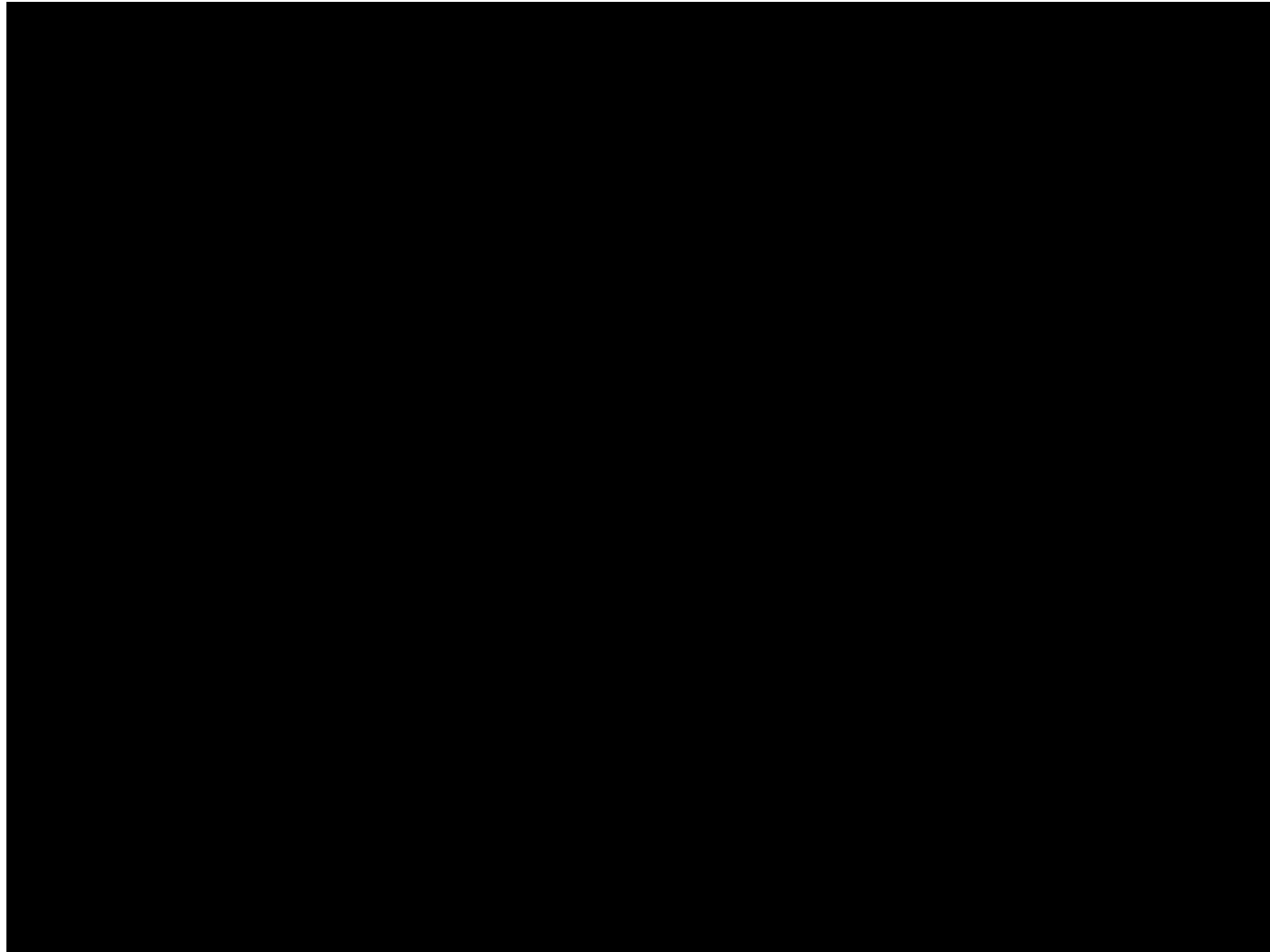
Eukaryotic cell

- Has true nucleus that is mean DNA surrounded by membrane (nuclear envelope).
- Compartmentalization (membrane bounded organelles present).
- Example animal cell.

Prokaryotic cells

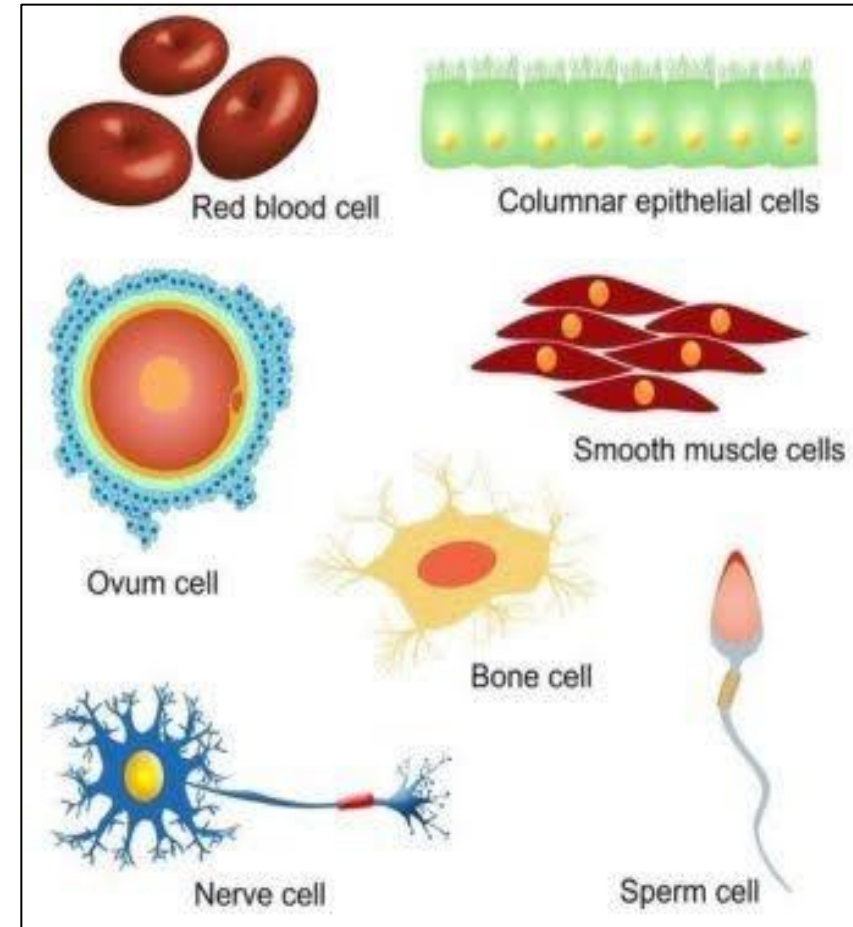
- Prokaryotic cell doesn't have true nucleus.
- DNA concentrates in a region which called nucleoid.
- Prokaryotic cell doesn't have membrane bounded organelles.
- Example bacteria.





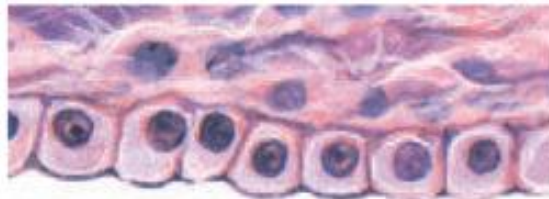
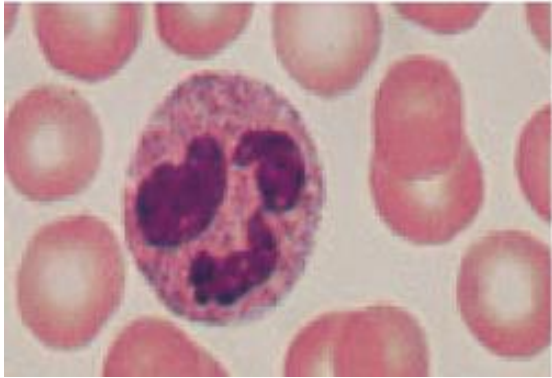
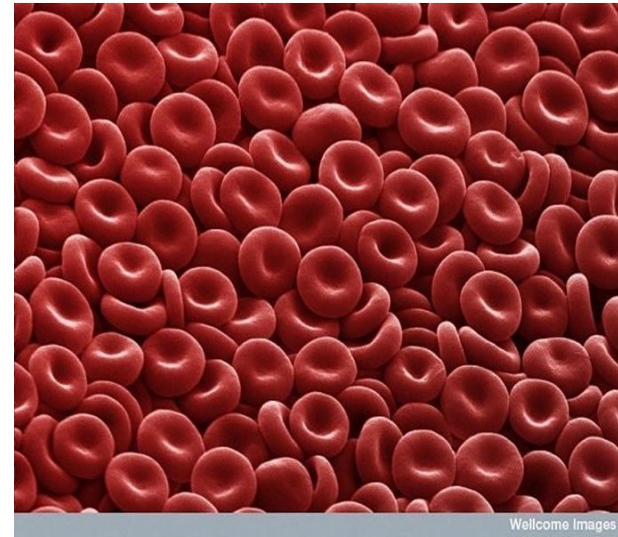
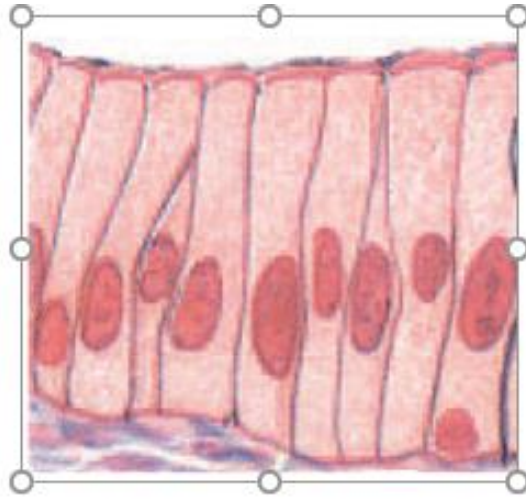
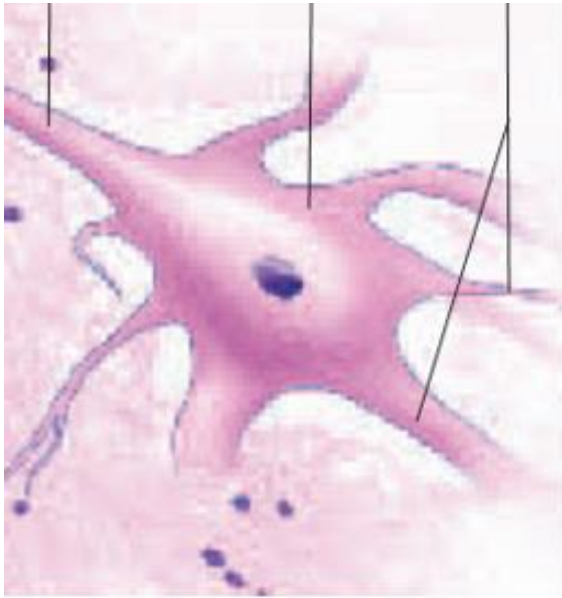
Cell shape

- Not all cells are alike. Even cells within the same organism show a number of diversity in size, shape, and internal organization.
- Your body contains around 10^{13} to 10^{14} cells of around **300 different** cell types and they differ in shape and size.
- The shape of cells sometimes varies according to their function or location (shapes of cells vary from one tissue to another), cells can have the shapes as **oval**, **spherical**, **rectangular**, and **polyhedral**, **spindle shaped**, and **star shaped**, **rod-shaped** or totally **irregular**. Cell membrane as well as cell wall maintains shape of cell.



Cell shapes

1. Rod shape (bacteria)
2. Spherical shape (bacteria)
3. Oval shape (yeast)
4. Rectangular (onion or plant)
5. Columnar shaped cell (epithelium)
6. Elongated in shape (skeletal muscle)
7. Fusiform in shape (smooth muscle)
8. Thread like in shape (neuron)
9. Star shape (osteocyte)
10. Polyhedral shape (hepatocyte)

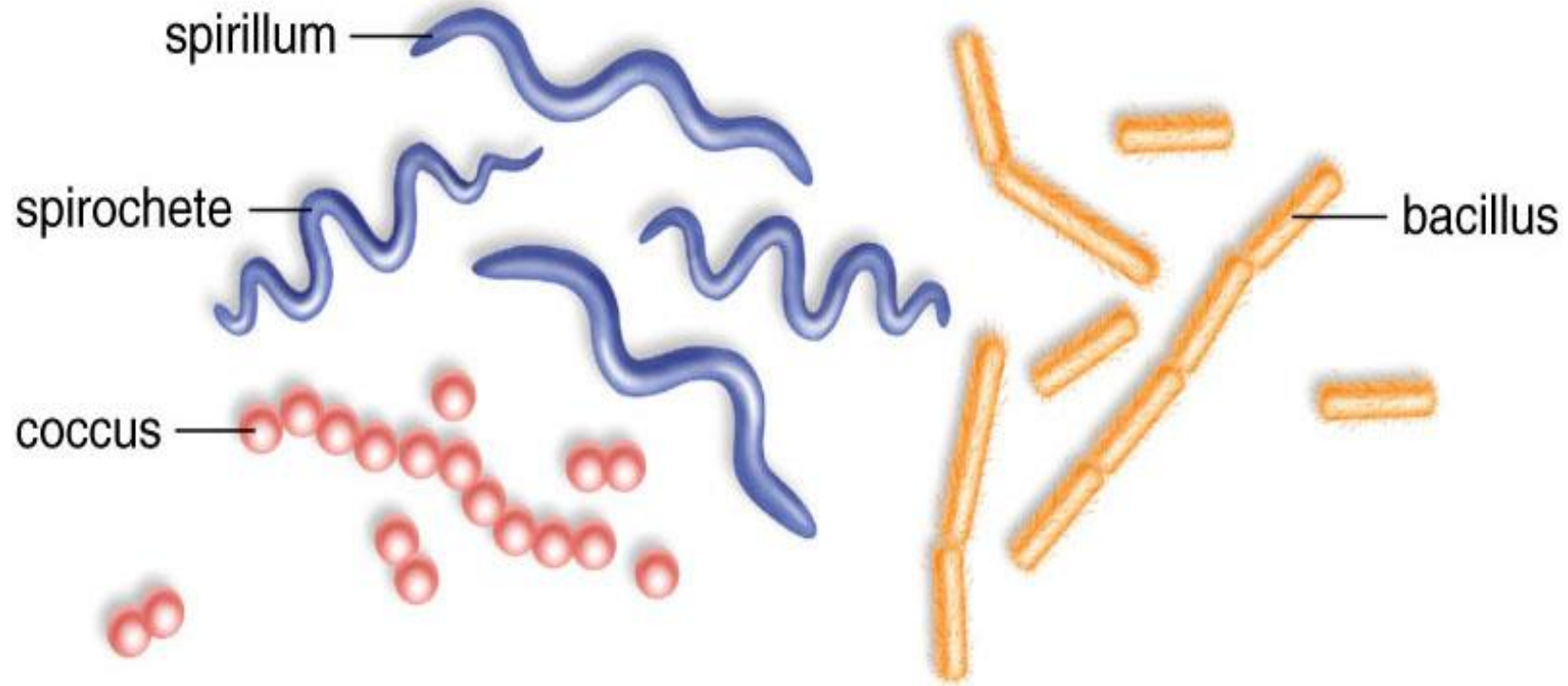


Fungal shape



Shapes of Bacterial Cells

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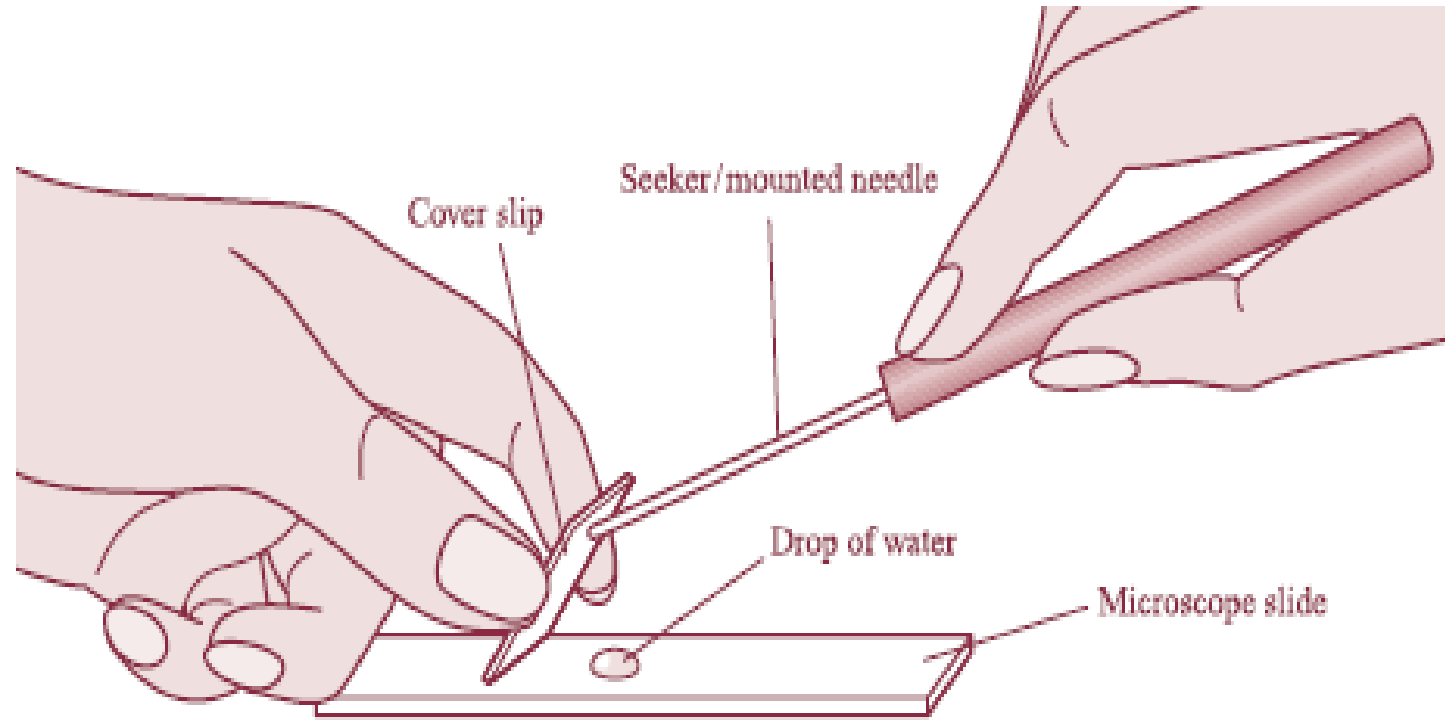


Pleomorphism

- Is the ability of some cells to alter their shape or size in response to environmental conditions? This property is seen in many bacteria and fungi.

Prepare and Examine animal cell, using light microscope

1. Swab inside cheek surface again using a disposable inoculating loop/swab and transfer the sample onto the second slide. Put the loop/swab into the disposal jar.
2. Cover the sample with one drop of methylene blue solution.
3. Allow to stand for one minute.
4. Apply a cover slip to this preparation as in Fig. 1.
5. Dry the slide carefully with filter paper/absorbent paper and label it.
6. Examine under the microscope following the usual procedure.
7. Draw and Label the cell



Application of cover slip



- Homework: Write the name of cellular organelles and their functions briefly ? These homework is included for the exam



References

- Urry, L. A., Cain, M. L. 1., Wasserman, S. A., Minorsky, P. V., Reece, J. B., & Campbell, N. A. (2017). *Campbell biology*. Eleventh edition. New York, NY, Pearson Education, Inc.
- Mader, Sylvia S. and Michael Windelspecht. 2022. *Biology*. New York, NY: McGraw-Hill Education.