



BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT: - BIOLOGY

CLASS IX: CHAPTER: THE FUNDAMENTAL UNIT OF LIFE

Guidelines:-

Dear Students

- Refer to the following content of the chapter.
- These notes will help you to understand the concept of the lesson.
- Do the assignment questions in the Biology notebook.

Link for Textbook:- http://ncertbooks.prashanthellina.com/class_9.Science.Science/CHAP%205.pdf

TOPIC:- STRUCTURAL ORGANISATION OF A CELL (part 3):-

NUCLEUS:-

The nucleus is an important element of the cells. It is a membrane-bound organelle that is typically found in the eukaryotic cells. Eukaryotes usually have a single nucleus, whereas some cell types do not possess a nucleus (RBC-Red Blood Cells).

Kindly refer to the link shared below for better understanding of the procedure to prepare a slide of human cheek cells:-

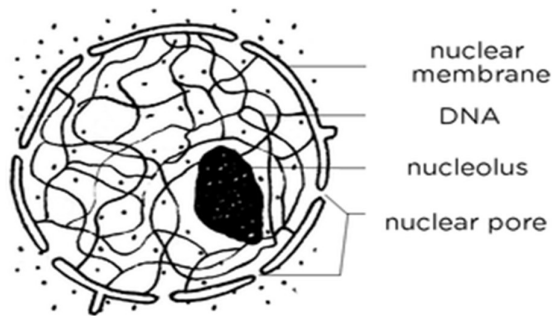
<https://www.youtube.com/watch?v=S-Q0trle000>

Plant and animal cells have a **nucleus** inside the cytoplasm. It controls all the processes and chemical reactions that take place inside the cell. The nucleus also contains the cell's genetic material which is organised into long **DNA** molecules.

The structure of the nucleus can be described as :

- A double membrane called the **nuclear membrane** encloses the **Chromatin material**. This nuclear membrane contains pores (holes) for substances to pass through.
- There is a **nucleolus** inside the nucleus. This is often seen as a darker area within the nucleus.
- The **Chromatin** appears as a mass of thread like structures that gets organised into **chromosomes** when the cell has to divide. Each chromosome has a molecule of DNA and small segments of DNA are called **Genes**.

Have a look at the diagram of the nucleus:-



Functions of Nucleus:-

1. Transmission of hereditary information through **Genes** (functional segments of DNA/ units of heredity).
2. Cellular reproduction.
3. It determines the way a cell develops by directing the chemical activities of the cell.

Based on the structure of nucleus there are two types of organisms:-

Prokaryotes- Pro= primitive/ primary; karyo= nucleus

Eukaryotes- Eu= true ; karyo= nucleus

Differences between Prokaryotic and Eukaryotic Cells

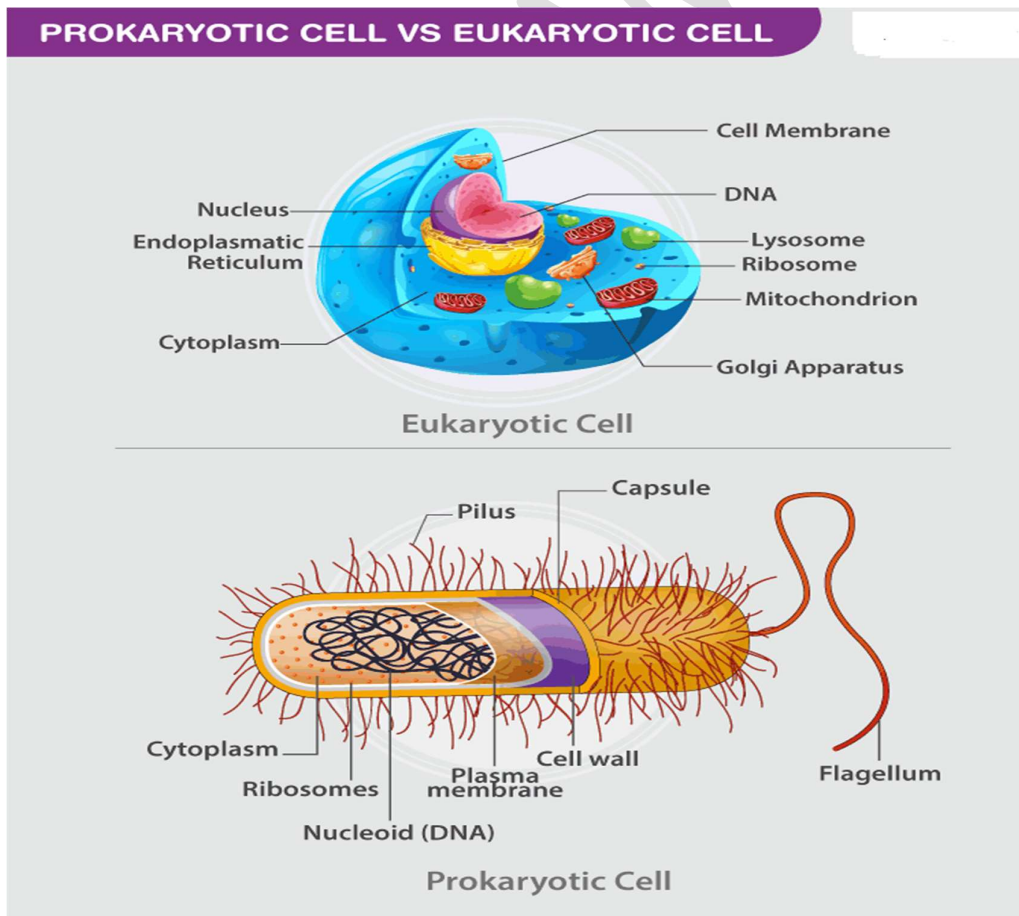
Kindly refer to the link shared for better understanding of the comparison between Prokaryotic and Eukaryotic cells: -

<https://youtu.be/RfeisQu977o>

Though these two classes of cells are quite different, they possess some common characteristics too. For instance, both possess cell membrane and ribosomes, but the similarities end there. The list of differences between Prokaryotic and Eukaryotic cells is given below:-

	Prokaryotes	Eukaryotes
Type of Cell	Always unicellular	Unicellular and multi-cellular
Cell size	Ranges in size from 1µm – 10 µm in diameter	Size ranges from 5µm – 100 µm in diameter
Cell wall	Usually present; chemically complex in nature	When present, chemically simple in nature

Nucleus	Poorly defined as nuclear membrane is absent & an undefined nuclear region called NUCLEOID present.	Well defined & surrounded by nuclear membrane.
Ribosomes	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape
Chromosome	Single	More than one
Mitochondria	Absent	Present
Cytoplasm	Present, but cell organelles absent	Present, cell organelles present
Endoplasmic reticulum	Absent	Present
Ribosome	Small ribosomes	Large ribosomes
Examples	Bacteria and Cyanobacteria (blue green algae)	Plant and Animal cells, Protists, Fungi



Cell Organelles:-

What are Cell Organelles?

The cellular components are called the Cell Organelles. These cell organelles are membrane-bound, present within the cells and are distinct in their structures and functions. They coordinate with their functions efficiently for the normal functioning of the cell. Few of their functions include providing shape and support, whereas some are involved in the locomotion and reproduction of a cell. There are various organelles present within the cell and are classified into two categories based on the presence of a single or double membrane.

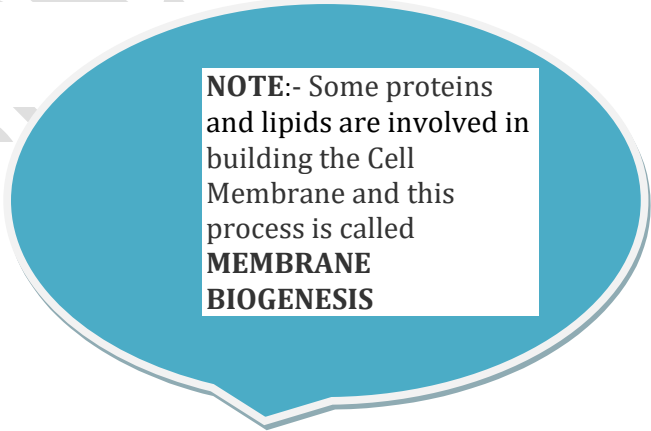
Single membrane-bound organelles: Vacuole, Lysosome, Ribosomes, Golgi Apparatus, Endoplasmic Reticulum are single membrane-bound organelles present only in a Eukaryotic cell. (NOTE: - Ribosomes are found in Prokaryotic cells too).

Double membrane-bound organelles: Mitochondria and chloroplast are double membrane-bound organelles present only in a Eukaryotic cell.

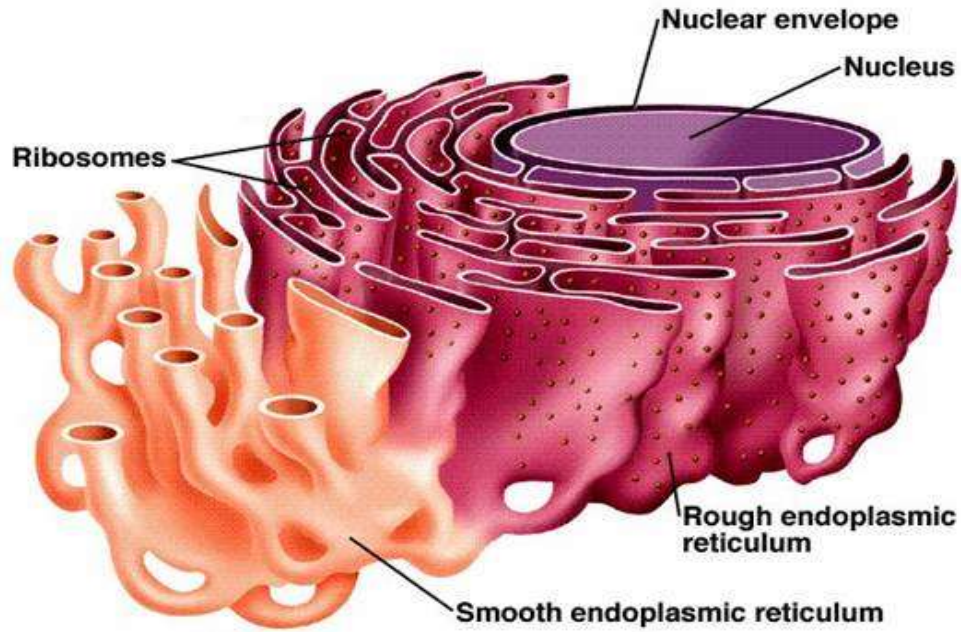
I. Endoplasmic Reticulum:-

The Endoplasmic Reticulum is a network of membranous canals filled with fluid. They are the transport system of the cell, involved in transporting materials throughout the cell. There are two different types of Endoplasmic Reticulum:-

1. **Rough Endoplasmic Reticulum** – They are composed of cisternae, tubules, and vesicles, which are found throughout the cell and are involved in protein manufacture.
2. **Smooth Endoplasmic Reticulum** – They are the storage organelles, associated with the production of fat molecules or Lipids. They also detoxify the poisons and drugs in the liver cells of vertebrate animals.



NOTE:- Some proteins and lipids are involved in building the Cell Membrane and this process is called **MEMBRANE BIOGENESIS**

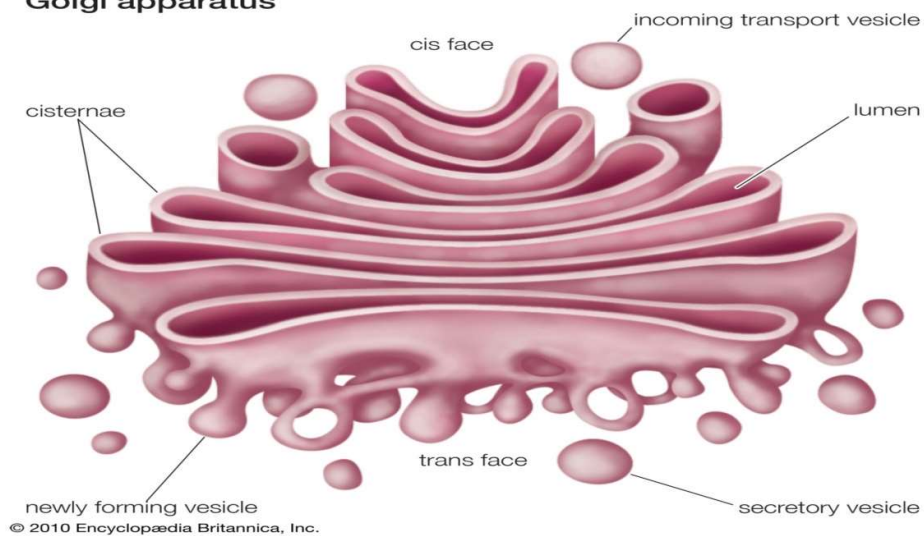


II. Golgi Apparatus:-

Golgi Apparatus is also termed as Golgi Complex. It is a membrane-bound organelle, which is mainly composed of a series of flattened, stacked pouches called cisternae. Golgi Apparatus is found within the cytoplasm of a cell and is present in both plant and animal cells. This cell organelle is primarily responsible for:-

1. Transporting, modifying, and packaging proteins and lipid to targeted destinations.
2. Preparing complex sugars from simple sugars.
3. Forming lysosomes.

Golgi apparatus



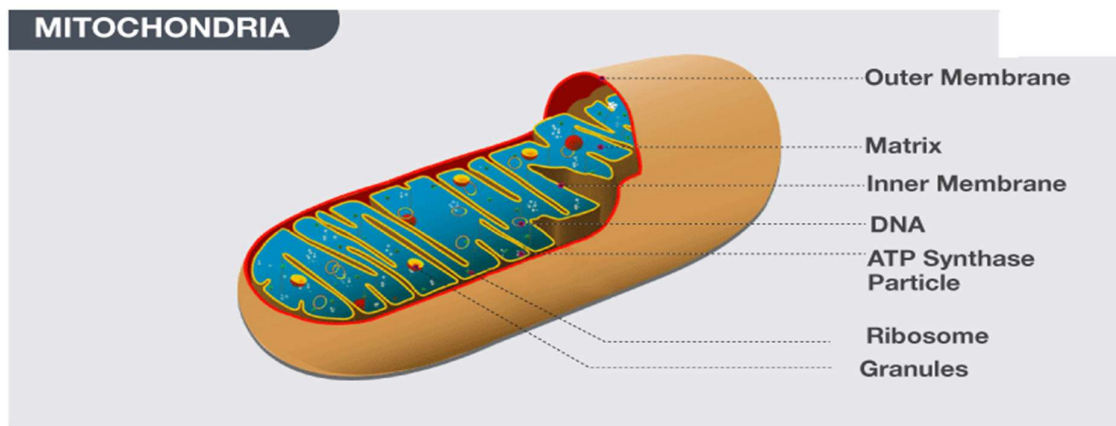
III. Lysosomes:-

Lysosomes help to keep the cell clean by digesting foreign matter that enters the cell and worn out cell organelles as they contain powerful digestive enzymes capable of breaking down all organic material. Thus, they are called “suicidal bags” of a cell. These enzymes are made by RER.

IV. Mitochondria:-

Mitochondria are called the **powerhouses of the cell** as they produce energy-rich molecules for it. It is a double membrane-bound organelle found in almost all eukaryotic cells and it has the inner compartment called 'matrix' which is folded into **crisetae** whereas the outer membrane forms a continuous boundary with the cytoplasm. They usually vary in their size and are either round or oval in shape. Mitochondria are the sites of **aerobic respiration** in the cell, produce energy in the form of ATP and help in the transformation of the molecules. For instance, glucose is converted into **adenosine triphosphate - ATP**.

Mitochondria have their own circular DNA and ribosomes and few other molecules that help in protein synthesis- SEMI AUTONOMOUS



ASSIGNMENT:-

1. What would happen if there was no nucleus in the cell? Discuss keeping in mind the importance of nucleus in a cell.
2. Elaborate upon the functions of chromosomes in a cell.
3. In human cheek cells, the nucleus is located at the _____.
 - a. Centre of the cell
 - b. The left side of the cell
 - c. The right side of the cell
 - d. None of these
4. Giving examples draw a contrast between Prokaryotic & Eukaryotic cells.
5. What would happen to a cell if it does not have Golgi apparatus?
6. Draw a contrast between Rough and smooth Endoplasmic Reticulum.