MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
HILLA UNIVERSITY COLLEGE
DEPARTMENT OF DENTISTRY

BIOLOGY

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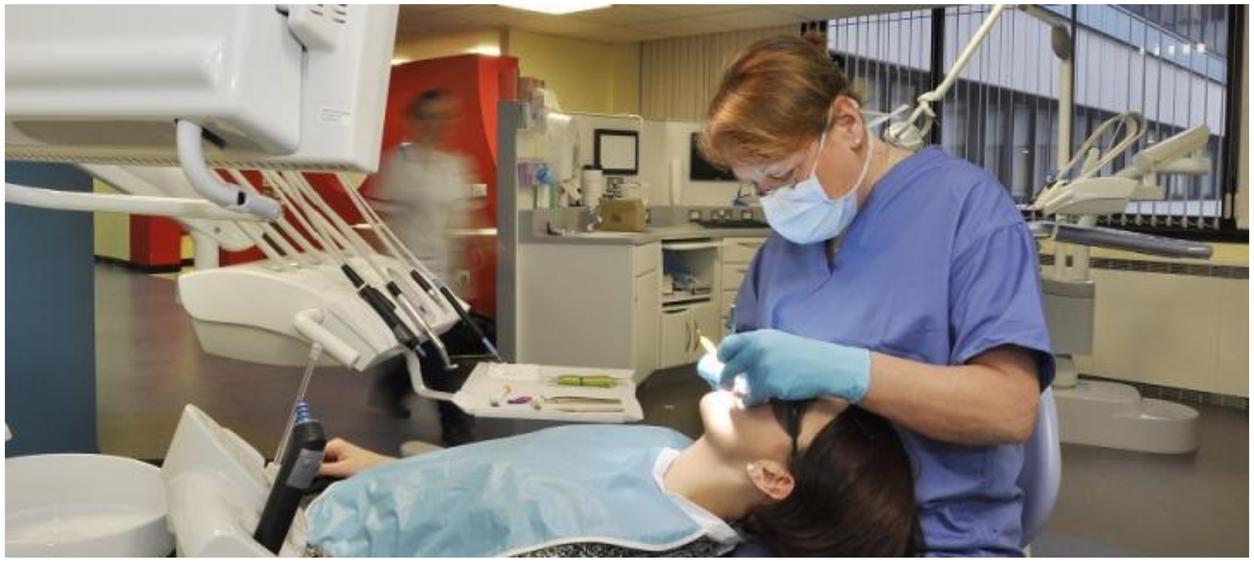
LEC. 1: INTRODUCTION OF MEDICAL &ORAL BIOLOGY

(first stage)

OUTLINE

- What is a oral biology ?
- Medical biology
- What is the cell ?
- Theory of the cell
- An overview of the cell
- Types of the cell





What is a oral biology ?

Oral Biology is the branch of dentistry that includes the study of embryology (pre and post natal growth), oral physiology, gross anatomy, histology and development with special emphasis on study of dental hard and soft tissue (enamel, dentin, pulp and periodontium) and extraoral structures (salivary glands and TMJ).

MEDICAL BIOLOGY

- Medical biology is a field of human biology that has practical applications in medicine, health care and laboratory diagnostics. Human Biology is the study of human beings and populations from a biological point of view. Biology is the science that studies all living things and their environments.



WHAT IS THE CELL?

When you look around, you see both living and non-living things. You must have wondered and asked yourself – ‘what is it that makes an organism living, or what is it that an inanimate thing does not have which a living thing has’ ? The answer to this is the presence of the basic unit of life – the cell in all living organisms.

All organisms are composed of cells. Some are composed of a single cell and are called unicellular organisms while others, like us, composed of many cells, are called multicellular organisms.

what is the cell ?

Unicellular organisms are capable of (i) independent existence and (ii) performing the essential functions of life. Anything less than a complete structure of a cell does not ensure independent living. Hence, cell is the fundamental structural and functional unit of all living organisms.

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Anton Von Leeuwenhoek first saw and described a live cell. Robert Brown later discovered the nucleus. The invention of the microscope and its improvement leading to the electron microscope revealed all the structural details of the cell.

Theory of the cell

- In 1838, Matthias Schleiden, a German botanist, examined a large number of plants and observed that all plants are composed of different kinds of cells which form the tissues of the plant. At about the same time, Theodore Schwann (1839), a British Zoologist, studied different types of animal cells and reported that cells had a thin outer layer which is today known as the 'plasma membrane'. He also concluded, based on his studies on plant tissues, that the presence of cell wall is a unique character of the plant cells. On the basis of this, Schwann proposed the hypothesis that the bodies of animals and plants are composed of cells and products of cells.
- Schleiden and Schwann together formulated the cell theory. This theory however, did not explain as to how new cells were formed. Rudolf Virchow (1855) first explained that cells divided and new cells are formed from pre-existing cells (Omnis cellula-e cellula). He modified the hypothesis of Schleiden and Schwann to give the cell theory a final shape. Cell theory as understood today is:

(i) all living organisms are composed of cells and products of cells.

(ii) All cells arise from pre-existing cells.

AN OVERVIEW OF CELL

You have earlier observed cells in an onion peel and/or human cheek cells under the microscope. Let us recollect their structure. The onion cell which is a typical plant cell, has a distinct cell wall as its outer boundary and just within it is the cell membrane. The cells of the human cheek have an outer membrane as the delimiting structure of the cell. Inside each cell is a dense membrane bound structure called nucleus.

This nucleus contains the chromosomes which in turn contain the genetic material, DNA. Cells that have membrane bound nuclei are called eukaryotic whereas cells that lack a membrane bound nucleus are prokaryotic. In both prokaryotic and eukaryotic cells, a semi-fluid matrix called cytoplasm occupies the volume of the cell. The cytoplasm is the main arena of cellular activities in both the plant and animal cells. Various chemical reactions occur in it to keep the cell in the ‘living state’.

AN OVERVIEW OF CELL

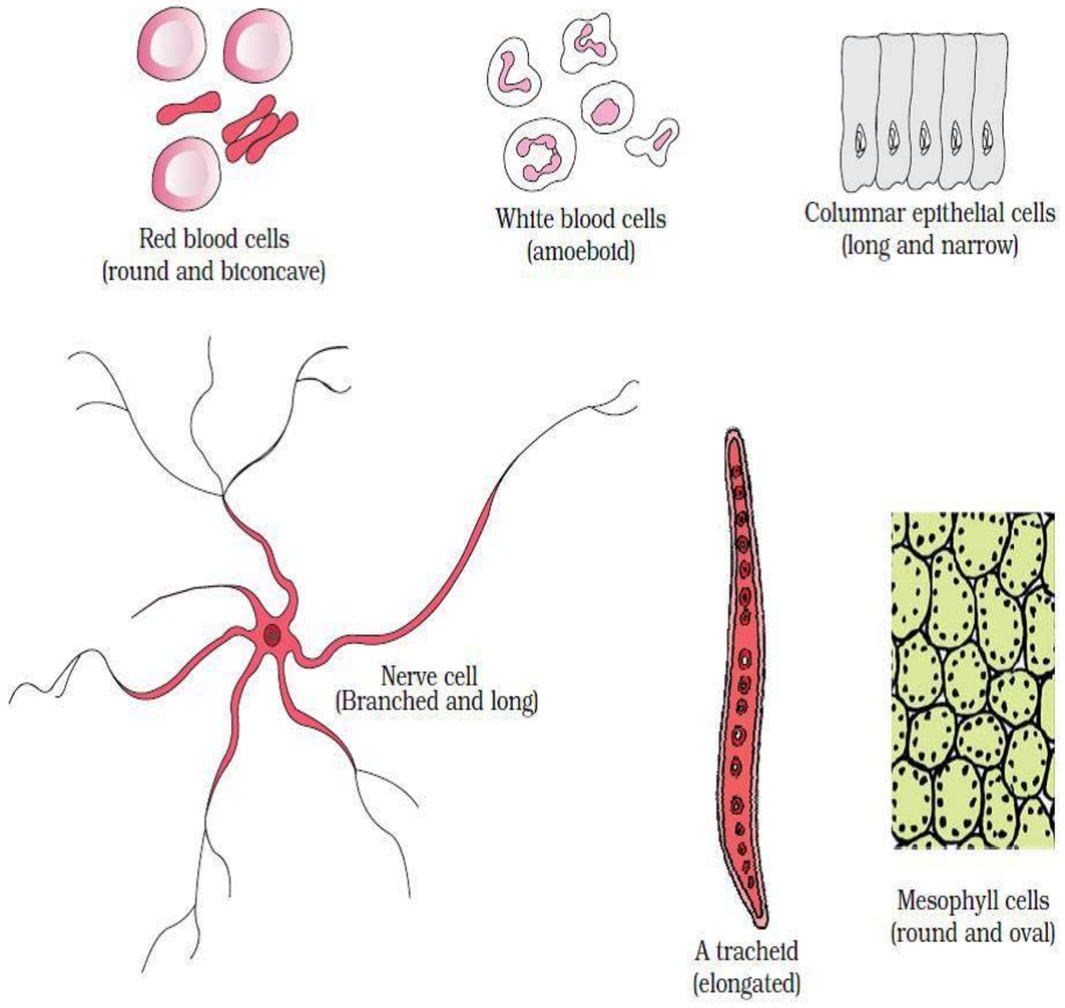
Besides the nucleus, the eukaryotic cells have other membrane bound distinct structures called organelles like the endoplasmic reticulum (ER), the golgi complex, lysosomes, mitochondria, microbodies and vacuoles. The prokaryotic cells lack such membrane bound organelles.

Ribosomes are non-membrane bound organelles found in all cells – both eukaryotic as well as prokaryotic. Within the cell, ribosomes are found not only in the cytoplasm but also within the two organelles – chloroplasts (in plants) and mitochondria and on rough ER.

Animal cells contain another non-membrane bound organelle called centrosome which helps in cell division.

AN OVERVIEW OF CELL

- Cells differ greatly in size, shape and activities (Figure 1). For example, Mycoplasmas, the smallest cells, are only 0.3 µm in length while bacteria
- could be 3 to 5 µm. The largest isolated single cell is the egg of an ostrich. Among multicellular organisms, human red blood cells are about 7.0 µm in diameter. Nerve cells are some of the longest cells. Cells also vary greatly in their shape. They may be disc-like, polygonal, columnar, cuboid, thread like, or even irregular. The shape of the cell may vary with the function they perform.

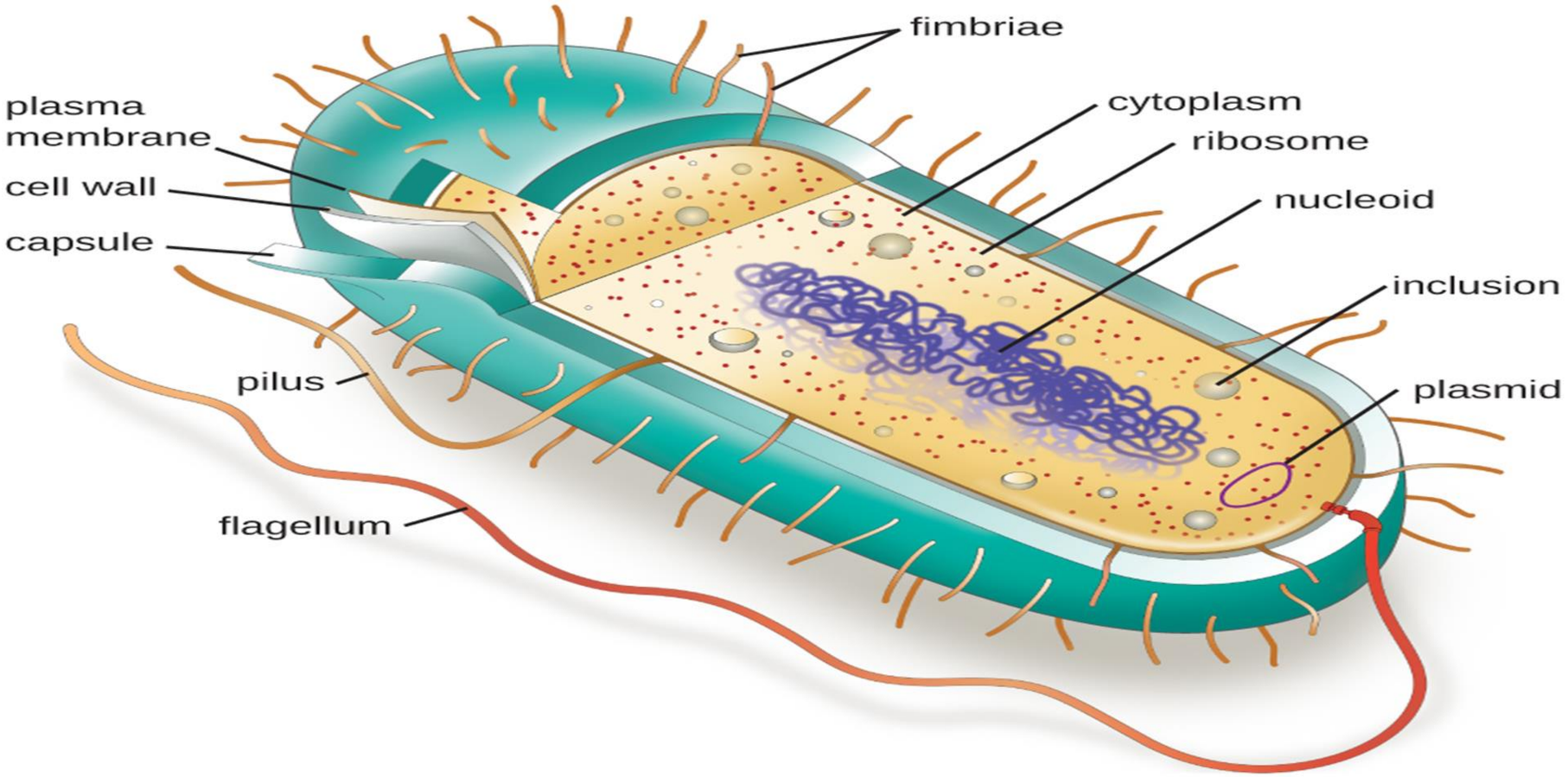


Types of the cell

Prokaryotic cells

The prokaryotic cells are represented by bacteria, blue-green algae, mycoplasma and PPLO (Pleuro Pneumonia Like Organisms). They are generally smaller and multiply more rapidly than the eukaryotic cells (Figure 8.2). They may vary greatly in shape and size. The four basic shapes of bacteria are bacillus (rod like), coccus (spherical), vibrio (comma shaped) and spirillum (spiral).

Prokaryotic cells



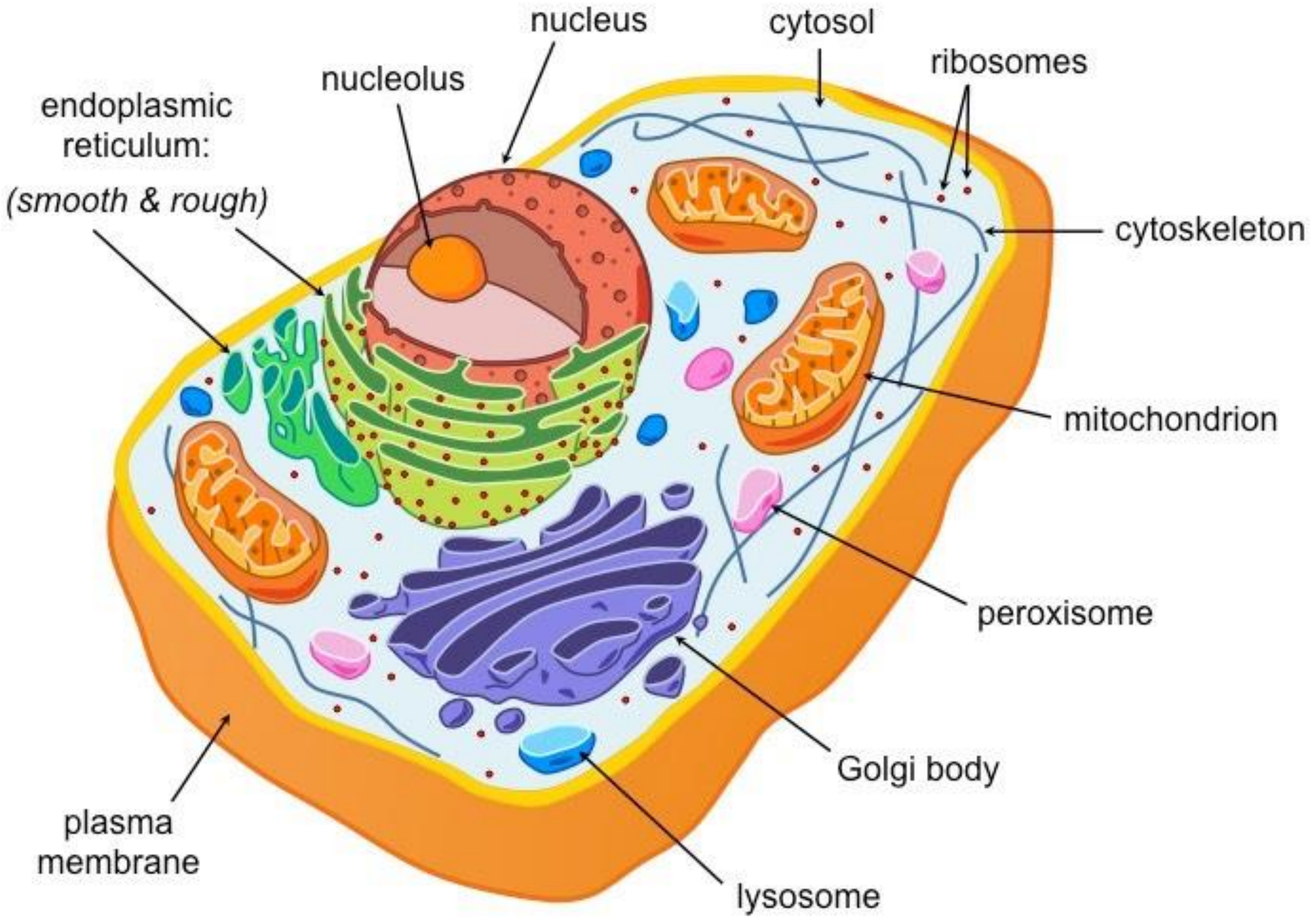
Types of the cell

Eukaryotic cells

The eukaryotes include all the protists, plants, animals and fungi. In eukaryotic cells there is an extensive compartmentalisation of cytoplasm through the presence of membrane bound organelles. Eukaryotic cells possess an organised nucleus with a nuclear envelope. In addition, eukaryotic cells have a variety of complex locomotory and cytoskeletal structures. Their genetic material is organised into chromosomes.

All eukaryotic cells are not identical. Plant and animal cells are different as the former possess cell walls, plastids and a large central vacuole which are absent in animal cells. On the other hand, animal cells have centrioles which are absent in almost all plant cells

TYPES OF THE CELL




thank you