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D II Hons/Sub - Zoology
Paper III
Cir - A

Page - 1

Lecture - 6

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Concept of Prokaryotic & Eukaryotic cell.

non living things. What is it that makes an organism living or what is it that makes inanimate that does not have things which living one has? This is the basic unit of life - the cell in all living organisms.

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

What is a cell?

Cell is the fundamental structural and functional unit of all living organisms. Anton von Leeuwenhoek first saw & described a live cell. There are different types of cells. Certain cells have membrane nuclei are called eukaryotic cells whereas cells that lack a membrane bound nucleus are prokaryotic cells. In both prokaryotic & eukaryotic cells a semifluid matrix called cytoplasm present the vol. of cells. The cytoplasm is the main area of cellular activities in both plant & animal cells.

Cells differ greatly in size, shape & activities. For ex - Mycoplasma are smallest cells are only $0.3 \mu m$ in length while bacteria could be $3-5 \mu m$. Largest single cell is an egg of an ostrich. Among multicellular organisms the human RBC are about $7.0 \mu m$ diameter. Nerve cells are the longest cell. Cells vary greatly in their shape. They may be dis like fibrous, cuboidal, columnar, thread like, or irregular.

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Prokaryotic cells.

These are represented by bacteria, blue green algae, mycoplasma, & PPLO (Pleuro pneumonia like organisms). They are smaller & multiply more rapidly than the eukaryotes. They may vary greatly shape & size. The 4 basic shape of bacteria are bacillus (rod like), coccus (spherical), vibrio (comma like) & spirillum (spiral).

All prokaryotes have a cell wall surrounding the cell membrane. The fluid matrix filling the cell is cytoplasm. There is no well defined nucleus. The genetic material is naked, not enveloped by a nuclear membrane. In addition to genomic DNA (the single chromosome/circular DNA) most bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids. The plasmid DNA confers certain unique phenotypic characters to such bacteria. One such character is resistance to antibiotics. No organelles such as Golgi bodies, Endoplasmic reticulum, Mitochondria, are found. Only ribosomes are present. Prokaryotes have some things unique in the form of inclusions. A specialized differentiated form of cell membrane called Mesosome is the characteristic of prokaryotes. They are infoldings of cell membrane. The extensions of P.M (mesosomes) are in the form of vesicles, tubules & lamellae. They help in cell wall formation, DNA replication and distribution of daughter cells. They also help in secretion processes, to increase the surface of the P.M. & enzymatic content. In cyanobacteria, thylakoids are present which contain pigments.

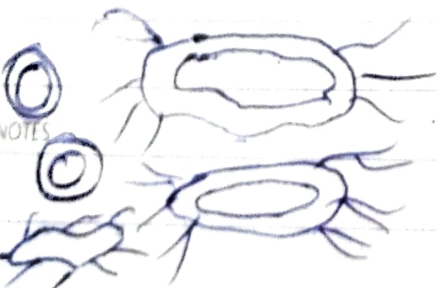
Bacterial Cells may be motile or non-motile. Or motile form flagella (a thin filamentous extension of cell wall) present. Besides flagella pili and Fimbriae are also surface structures but they do not help in motility. They help in adhesion.

RIBOSOME & INCLUSION BODIES

In prokaryotes ribosomes are associated with P.M. of the cell. They are about 15nm to 20nm size & are made of 2 subunits - 50S & 30S. Which when present together form 70S prokaryotic ribosomes. Ribosomes are the site of protein synthesis. Several ribosomes may attach to a mRNA & form a chain called Polyrribosomes or Polyosomes. The ribosomes of a polyosome translate the mRNA into proteins.

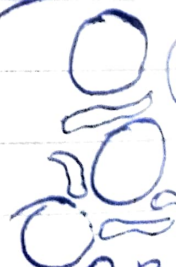
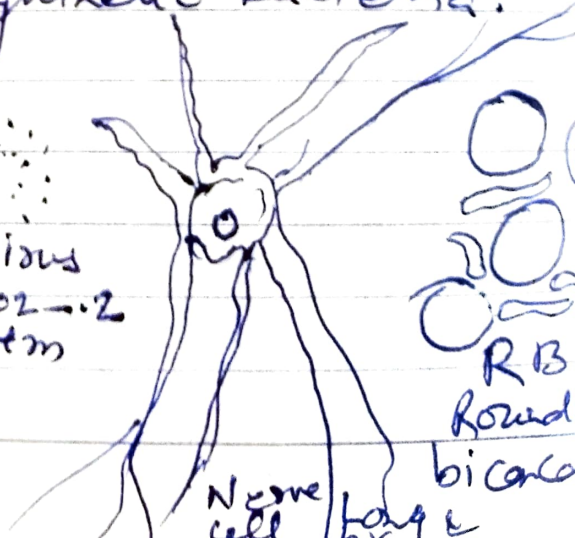
INCLUSION BODIES -

Reserve material in cells are stored in cytoplasm in the form of inclusion bodies. These are not bounded by membrane lys. & lie free in the cytoplasm. Ex. Phosphate granules, cyanophycin granules and glycogen granules are found in blue green or purple green photosynthetic bacteria.



Typical bacterial
(1-2 μ m)

PPLO
0.1 μ m
virus
0.02-0.2 μ m



RB
Round
biconcave

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4
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EUKARYOTIC CELL

In all protists, plants, animals & fungi the eukaryotes are found. 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 they have a variety of complex locomotory & cytoskeletal structures. Their genetic material is organized into chromosomes.

All eukaryotic cells are not identical. Plant & animal cells are different as the plant cell possesses cell wall, plastids & a large no. of vacuoles which are absent in animal cells. On the other hand animal cells have mitochondria & centrioles etc.

Later we will discuss other cytoplasmic organelles of animal cells.

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