BACTERIAL CELL

Ques With the help of suitable diagrams describe the electron microscopic structure of Bacterial Cell?

Ans In recent 20 years, through Electron microscope the Bacterial Cell has been studied in detail. It reveals that it is prokaryotic in Cellular Organisation; being Complicated and following main structures are visible:

1. Capsule
2. Cell wall
3. Plasma membrane (Mesosomes)
4. Cytoplast - a) Ribosomes
   b) Flagella
   c) Pili
5. Nucleoid
6. Special structures - i) Endospore
   ii) Stalk

The detailed ultrastructure of Bacterial cell is given below:-

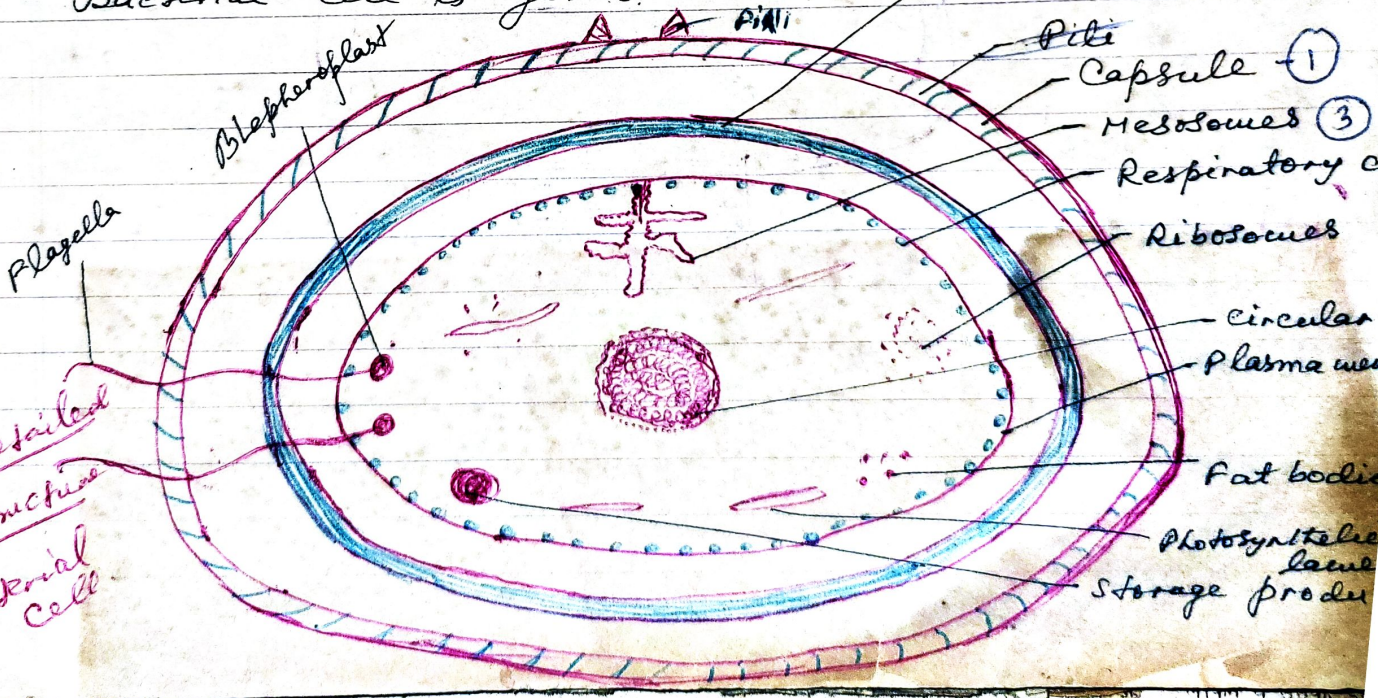
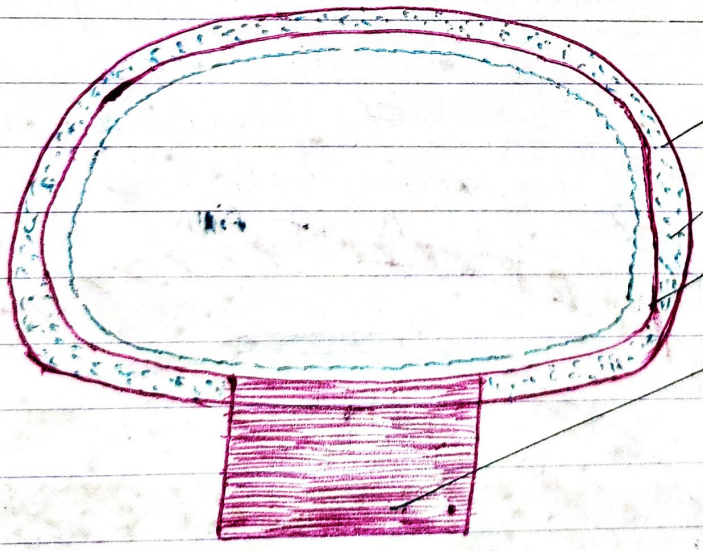


Fig - Detailed ultrastructure of Bacterial cell

Capsule ⇒ Some Bacteria like *Bacillus anthracis* and *Diplococcus pneumoniae* possess a thick or thin gelatinous covering outside the cell wall called Capsule. Its function is to protect bacterial cell from injury, to prevent complete drying of the cell and to protect from viral infection. Depending upon the thickness of the capsule, it is named as Macrocapsule (More than 0.2 μ) and Microcapsule (less than 0.2 μ) If the covering is loosed, it is termed as Slime but if it is rigid and well defined, then it is termed as Capsule. Capsule is made up of poly-saccharides and polypeptides of only one and sometimes two different amino acids.



Capsule.

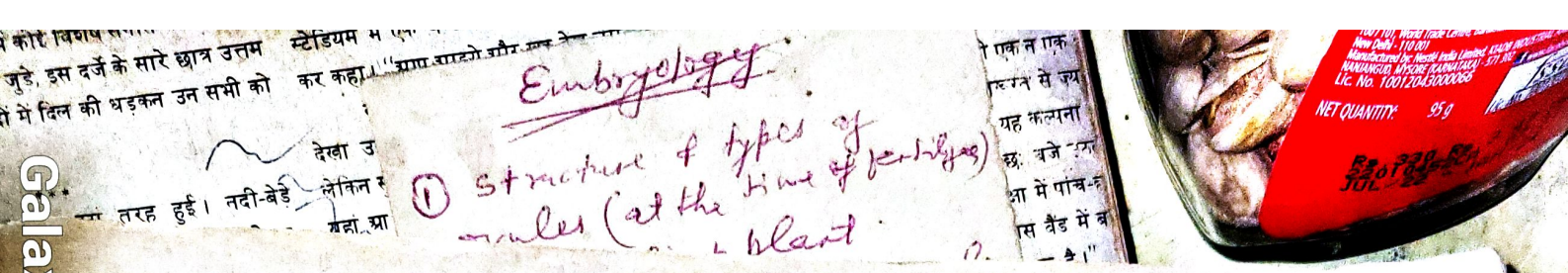
(2) **Cell wall** ⇒ Bacterial cells are surrounded by a wall made up of Mucopeptide, which is peculiar to bacteria. The amount of cell wall varies in two main divisions of true bacteria commonly known as Gram '+' and Gram '−' bacteria.

In gram positive bacteria, it is major cell wall components (85%), however in gram negative, bacteria it is present in small quantity (3 to 12%) mucopeptide. Mucopeptide is composed of large number of alternating molecules of N- acetyl Glucosamine and N- acetyl muramic acid both being derivatives of glucose. The detailed chemical composition and structure of Gm positive and Gm negative bacteria can be well marked by their differences given below:—

GRAM + (POSITIVE)	GRAM − NEGATIVE
(1) **Thickness** → Varies from 20-80 Nm and lacks the outer lipo-polysaccharide layer i.e homogenous.	Thickness is upto 2.5 Nm (thinner). It is suppressed between the cell membrane and lipo—polysaccharide layer. ie it is three layered
(2) **Chemical Compon** ⇒ Mucopeptide forms major portion of the wall 85% of the dry weight rest being simple polysaccharide which are in form of Teichoic acid. (It don't contain lipid).	(2) Muramic acid forms only 3 to 12% of the total dry wt. Major portion is contributed by Lipoprotein, lipid and polysaccharide. Thus it has lipid contents but absent of Teichoic acid

Plasma membrane → It is present just beneath cell wall. It is 75Å unit membrane with a protein layer on either side of lipid bilayer. It is mainly composed of lipid and protein but small amount of Carbohydrate, DNA, RNA have also been recorded. Lipids of plasmamembrane are mainly Glycerophospholipids. In addition several types of co-enzymes, vitamin K and [illegible]. The variety of proteins in the plasma membrane of prokaryote is more wider than Eukaryotes. Electron transport system are located in the plasmamembrane. Thus it is similar to mitochondria of higher plant. The electron transport chain of Bacteria are linearly arranged or often it may be branched.

Mesosomes → Specially in gram positive bacteria the cell membrane becomes invaginated and folded to form a structure called Mesosomes. It consists of cell membrane with many vesicle / tubular and lamellar foldings the lipid composition is similar to that of cell membrane but protein is differ. Many function have been suggested. They are related with the surface area of the cell and replication septum formation [illegible]



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FUNCTION ⇒ Many functions have been suggested but generally they are related with—

1) They increase the surface area of the cell.
2) It plays role during DNA Replication.
3) It is also involved in septum formation.

Fig

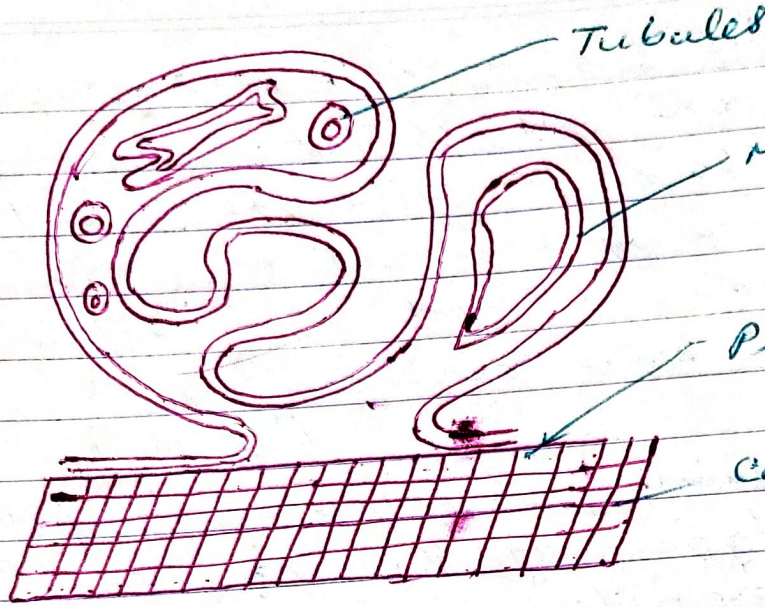

Diagramme of Mesosome.

(4) **Cytoplast** → It mainly consists of ground plasm and ribosomes:—

(a) **Ground plasm** → It is a liquid consisting of salts, sugar, Amino acid, Vitamin, soluble proteins and deposites of lipid granule. It don't contain Endoplasmic reticulum, Golgibody, Lysosomes, Mitochondria etc. Only ribosomes are prominently observed.

Ribosomes— A bacterial cell contains about 10,000 ribosomes which constitute 30% of the total weight of the cell. Its chemical composition shows that it is made up of 30 to 50% protein and 50-70% RNA. They are found freely in the cytoplasm but it may form clusters then it is termed as polysomes. Each ribosomes measures about 20 mμ in diameter and contains two units. The upper smaller unit is represented by 30S and the lower bigger unit is of 50S. The sedimentation coefficient of such ribosome is 70S.

Ques Describe structure & types of ovules. or Structure of ovule at the time of fertilization of any dicot plant studied by you?

Ans A megasporangium or ovule consists of the nucellus and one or two integuments which leave an opening called micropyle. The ovule remains attached to the placenta of ovary by a stalk called funiculus.

An ovule may arise from the base of ovary or from the inner surface of the ovary. Each ovule is attached to the placenta by a distinct stalk known as funiculus. The point of attachment of the ovule to its stalk is called the hilum. The main body of ovule consists of the parenchymatous mass - the Nucellus. Nucellus is the megasporangium proper one or two coverings or integuments of ovule arise as a collar like mass of tissue at the base of young nucellus & surround all around it except at the apex, where a narrow passage is left called Micropyle Through this micropyle pollen tube penetrates the tissue of megasporangium.

Types or forms of ovule → Mainly there are five types of ovules. One more type of megasporangium named circinotropous ovule is also has been also known.

1. Orthotropous ovule ⇒ In this type the micropyle, chalaza & the hilum lie in the same straight line & above the hilum. Here the body of the ovule is straight or upright. This is considered most primitive type of ovule. ex - Polygonaceae

Utricaceae.

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(2) Anatropous (inverted) ovule ⇒ In this type the ovule is inverted with the micropyle lying very close to the hilum & lateral to it. Here the body of the ovule is completely bent over & fused along the funicle, the fused portion of which called the raphae. This is the most common type of ovule found in angiosperms & is the characteristic of Sympetalae group.

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