

PLASMA MEMBRANE.

Since the days of Janseen and Janseen (1590) the cell of ROBERT HOOK has fallen into the lap of several discussion regarding its shape, structural organization and physiological activities. The resultant of discussion is that, there is a unit membrane which plays a role in shape and physiological activity of the cell. This unit membrane is the plasma-membrane found even in protoplasmic masses such as Bacteria (GALE 1957).

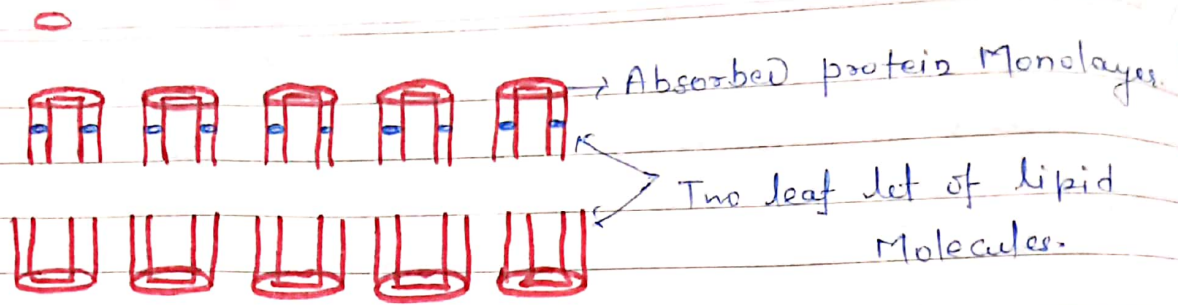
STRUCTURE:

Because of its great importance in physiological inexcusable studies have been made with the hope of determining its physiochemical Constitution. If we trace the origin of our present knowledge regarding the structure of the plasma membrane we firstly remember E. Overton (1895) who was of the idea that lipid were important in the cell membrane in structure.

At 1917 Langmuir suggested that lipids of entrance of air and water arrange themselves in a monolayer of with the polar ends of the molecules directed towards the water entrance and the non polar ends of the air entrance.

Overton and Grendel (1925) suggested that lipid was arranged in the membrane as a bimolecular leaflet in which the hydrophilic polar groups were at the inner and outer surface and the hydrophobic carbon chain were directed towards each other in the interior of the membrane.

Davelli and Davson (1935) proposed that plasma membrane consists of one or more bimolecular lipid leaflet with each polar surface having on its a monolayer of a protein.



ROBERTSON (1959) studied the plasma membrane of RBC with the help of electron microscope and come to the conclusion that the plasma membrane had three layers of total thickness $75\text{Å} - 100\text{Å}$ each protein layer having thickness of $20\text{Å} - 35\text{Å}$. Robertson gave a concept of unit membrane meaning that all membranous structure of a cell have a similar structure of three layers if there are more layers they are the multiples of the unit membrane.

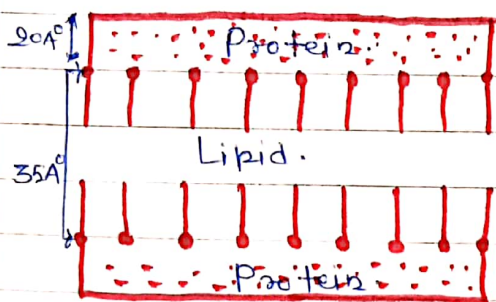
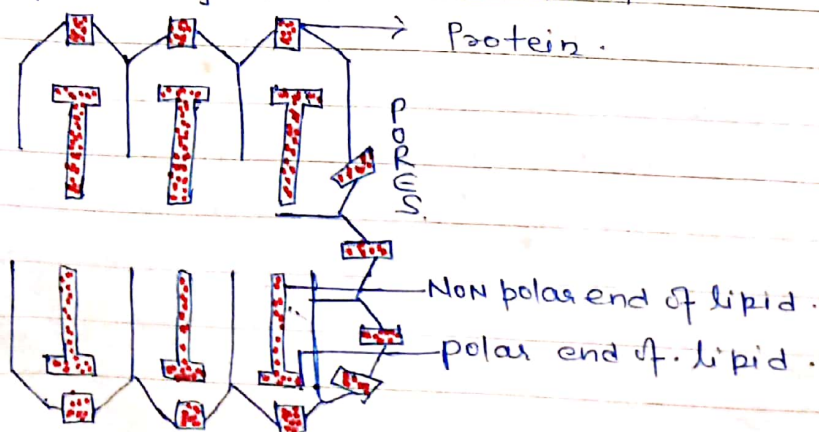


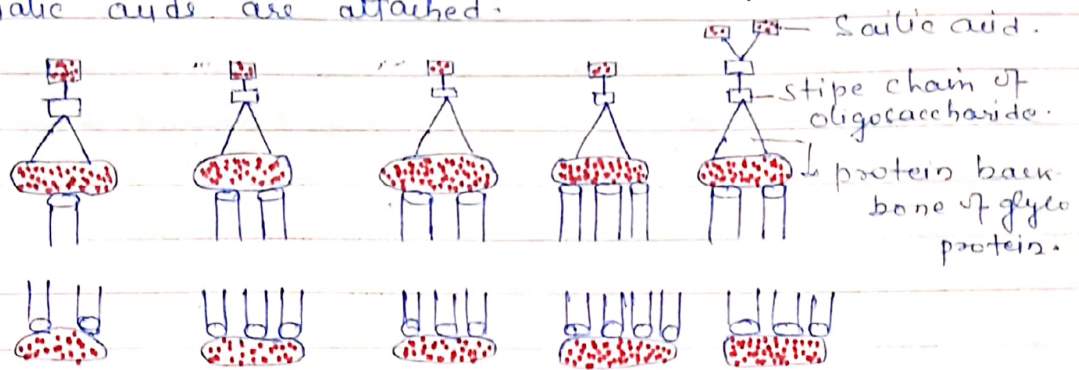
Fig:- Unit Membrane Model.

Sjostrom (1963) found that plasma membrane not only was a triple layered structure, it also contains discontinuities the pores. The pores of $7 - 10\text{Å}$ in diameter.



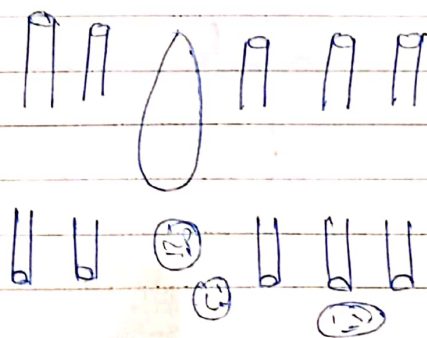
Standard Membrane Model.

According to Greater membrane model in between the two layer and the outer and inner layers are different. The outer protein layer is of glycoproteins with which the lateral chains of oligo saccharide and Sialic acids are attached.



According to Benson (1966) there is a hydrophilic association between protein and lipid.

Recently the fluid Mosaic is proposed by Singer and Nicholson (1972). According to this Model protein do not always form a sand which covering the entire hydrophilic surfaces of the lipid bilayers. According to this view. There are two categories of protein peripheral (extrinsic) and integral (intrinsic).



Eg:

FUNCTION:-

- ① It gives a definite shape to the shell.
- ② It separates the internal structure of cell from the external environment.
- ③ Through plasma membrane substances are exchanged i.e. between external and internal environment of the cell.

In addition to the above functions the plasma membrane performs of the following physiologically important functions.

(A) OSMOSIS:- This is a process by which molecules pass from higher to lower concentration through a semi-permeable membrane. The permeability of many substances particularly non-electrolytes is almost directly proportional to their lipid solubility. It has been observed that substances of high lipid solubility penetrate the membrane more easily than those of low lipid solubility.

(B) PHAGOCYTOSIS:- The ingestion of solid particles by cell through plasma membrane is called phagocytosis. During this process pseudopodia surround the food particles and ingest it directly. Among mammals this property is highly developed in the granular leucocytes. This phagocytosis involves two distinct phenomena (a) Adhesion of particles to the mass of protoplasmic end. (b) The actual penetration of the particle into the cell.

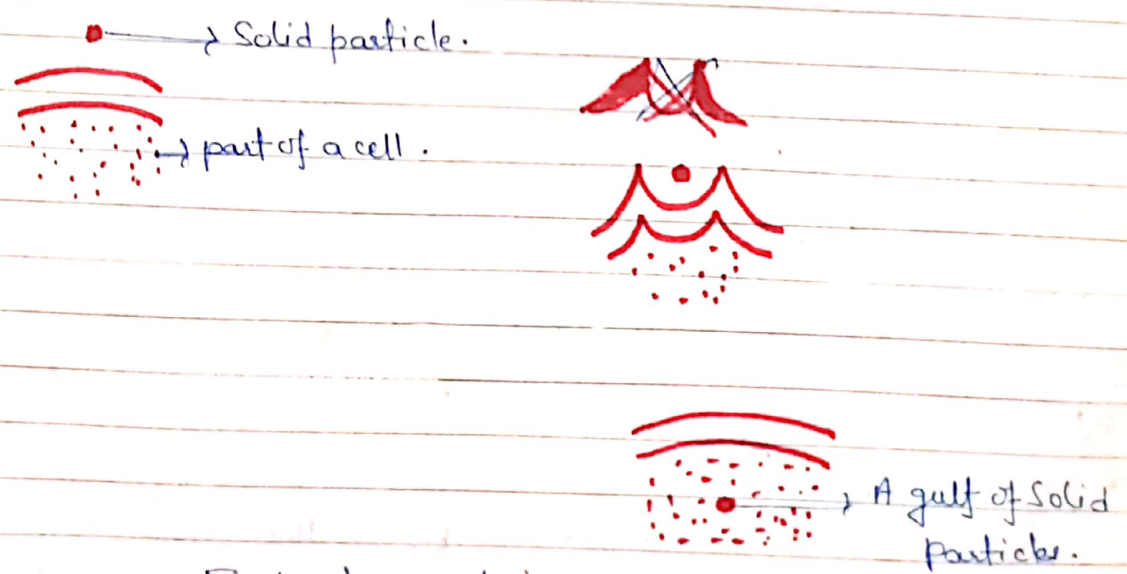


Fig: phagocytosis

③ PINOCYTOSIS:- Incorporation of liquid substances into the cell by plasma membrane is called pinocytosis. It was firstly described by Lewis (1931). First particle become absorbed at the surface of the membrane infolding of which occurs with the formation of vesicles so that the particles is released into the cytoplasm.

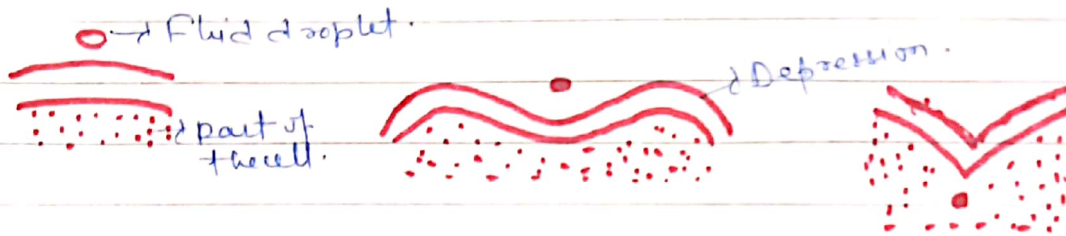
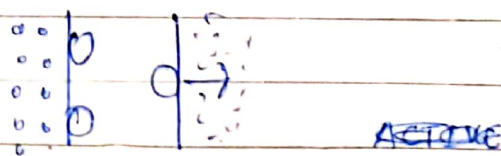


Fig: Pinocytosis.

ACTIVE TRANSPORT:-

STEIN (1960) defined it as the movement of molecules or ions in a direction opposite to that of molecules or ions in a direction of a prevailing electrochemical gradient. During this process transporters and some chemical components of the membrane form a complex which is then transferred across the membrane and the transporter is released in the cytoplasm.

For all this energy needed is derived from the high energy phosphate bond (ATP).



Active transport.

