U.G. SEM. IV ~~B.Sc Part-I~~

M.J.C. 5 Cell. Biology ~~Subj.~~

PLASMA MEMBRANE.

Since the days of Janssen and Janssen (1590) the cell of ROBERT HOOK has fallen into the lap of several discussion regarding its shape, structural organisation 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 (GRALE 1957).

STRUCTURE:.

Because of its great importance in physiological inexorable 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. overtan (1895) who was of the idea that lipid were important in the cell membrane in structure.

At 1917 Longmuior Suggested that lipids of entrance of air and water arrange themselves in a monolayes of with the polar ends of the molecules directed towards the water entrance and the non polar ends of the air enterance.

Gorter 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 exterior of the membrane.

Danelli and Davson (1935) Proposed that plasma membrane Consists of one or more bimolecular lipid leaflet with each polar surface having on its a monolayes of a protein.

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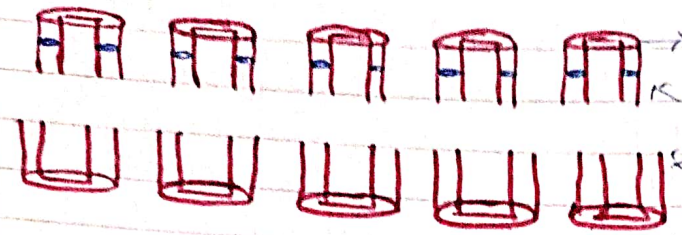


ROBERTSON (1959) studied the plasma membrane of RBC with the help of electron microscope and Come to the Conclusion that the plasma membrane had three layers of total thickness 75 A° – 100 A° each protein layer having thickness of 20°A – 35°A. Robertson gave a Concept of Unit membrane measuring that all membranous structure of a well have a similar structure of three layers if there are more layers they are the Multiples of the unit membrane.

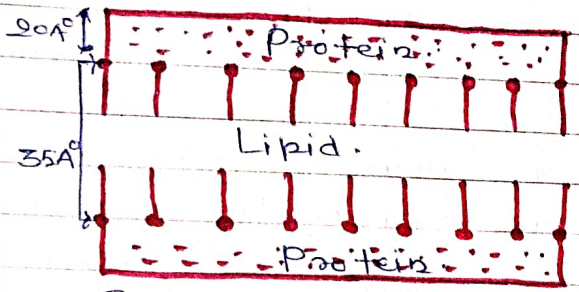
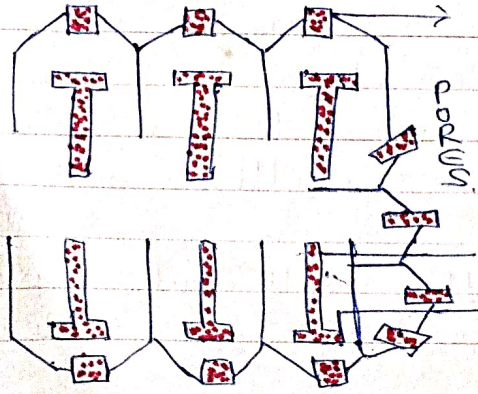


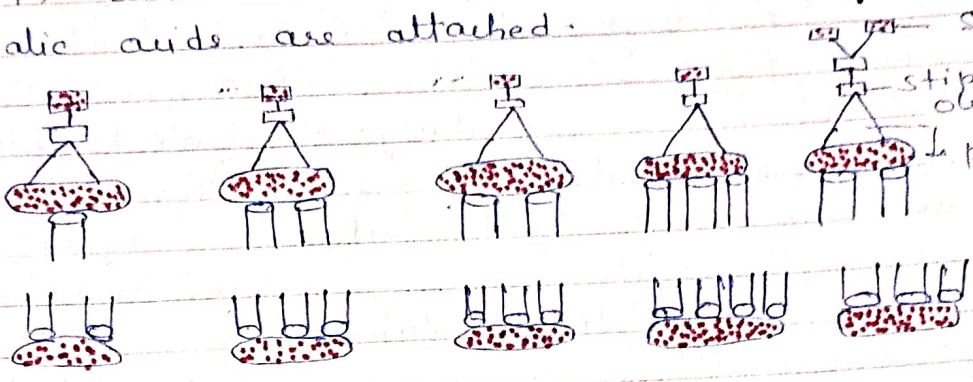
Fig:- Unit Membrane Model.

SJostrand (1963) found thom plasma membrane not only was a triple layered structure, its also Coutain discoutiniuties the pores. The pores of 7 - 10A° in diamiter.



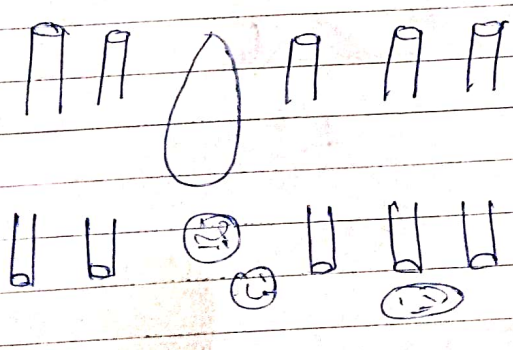
Stamdard Membrame Model.

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



According to Benson (1966) there is a hydrophylic 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 Sond which Coveri the entire hydrophillic Surfaces of the lipid bilaye According to this view. There are two Catogries of prot peripheral (extrinsic) and integral (entrinsic).



Eg:

FUNCTION:-

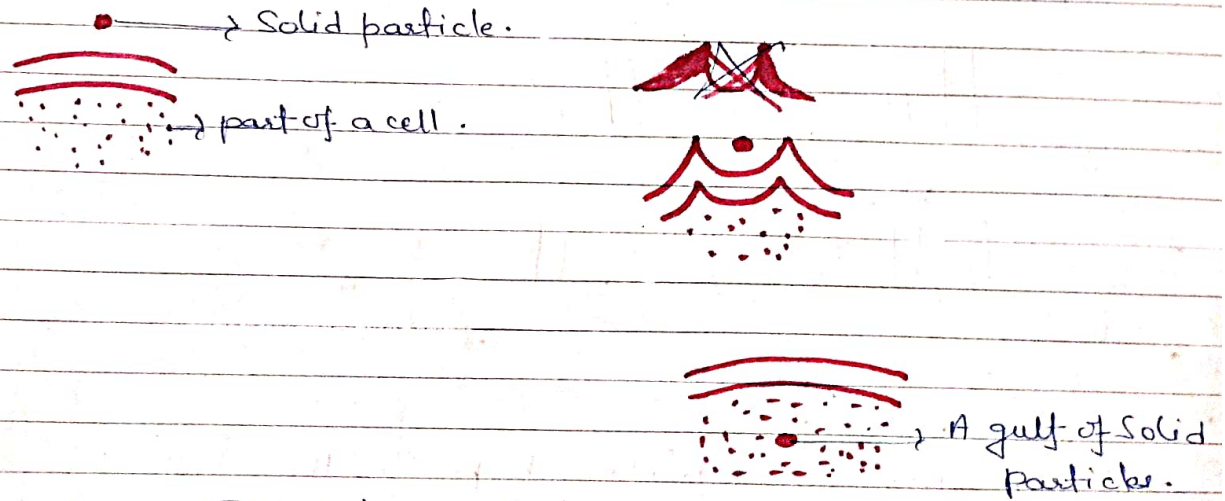
① It gives a definite shape to the shell.
② It separates the internal structure of cell from th external environment.
③ Through plasma membrane substances are exchanged i between external and internal environment of the cell

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 has pass from higher to lower Concentration through a Semi- Permiable membrane. The permeability of many substances particularly Non electrolytes is also directly propotional to there 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 ingetion of solid particles by cell through plasma membrane is called phagocytosis. During this process pseudopodia surrounded the food particles and ingest it directly. Among Mammals this property is highly developed in the granular leucocytes.

Thw phagocytosis involved two distinct phenomenon (a) Adhesion of Particles to the mass of protoplasmic end (b) The actual penetration of the particle into the cell.



Eg: phagocytosis.

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 particle is realesed into the cytoplasm.

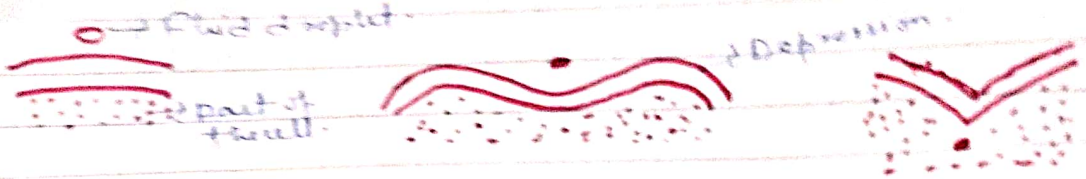
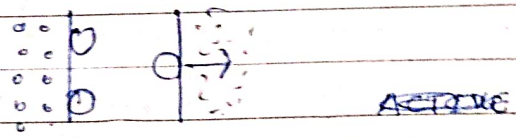


Fig:- Pinocytosis

ACTIVE TRANSPORT:-

STEIN (1960) defined its has the movement of Molecules or ions in a direction opposite to that of Molecules or ions in a direction of a preventing electrochemical gradient. During this process transportent and some chemicals Components of the membrane form a Complex which is then transfered across the membrane and the transportent is released in the cytoplasm.

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



Active transport.