Plasma Membrane Structural Organisation

Structure of Plasma Membrane and Its Different Models

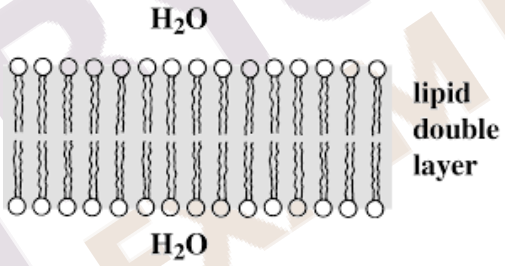
Plasma membrane is the membrane which surrounds the cell's cytoplasm. It is the outermost layer in case of animal cells. In case of plants, fungi and bacteria, they possess an outer cell wall inside to which is present plasma membrane. Plasma membrane is a semi permeable membrane which selectively allows specific substances to pass through. The plasma membrane is made up of two major components:

a. Lipids
b. Proteins

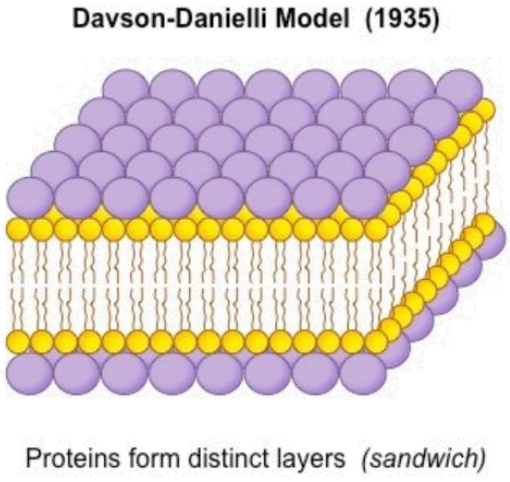
Occasionally, apart from these components, carbohydrate side chains are also evident in animal cell's plasma membranes. Various scientists tried to explain the structure of a typical plasma membrane from time to time, out of which the most accepted model of plasma membrane is one that was given by Singer and Nicolson.

Models of plasma membrane:

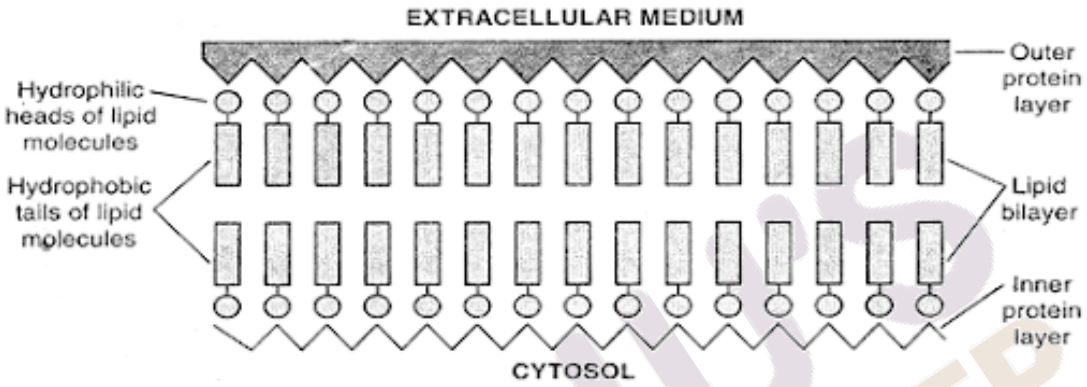
1. **Lipid Bilayer Model**- In 1902, Overton observed that substances soluble in lipids could selectively pass through the membranes. On this basis he stated that the plasma membrane is composed of a thin layer of lipid. It was known as the Lipid Bilayer Model by Overton.



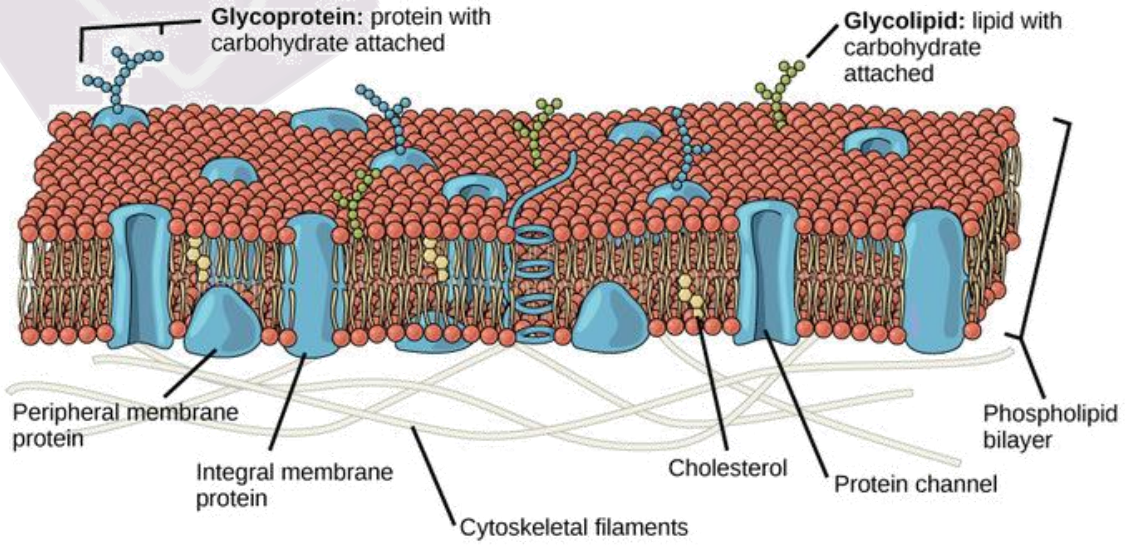
2. **Davson and Danielli**- Danielli and Davson proposed a model whereby two layers of protein flanked a central phospholipid bilayer. The model was described as a 'lipo-protein sandwich', as the lipid layer was sandwiched between two protein layers.



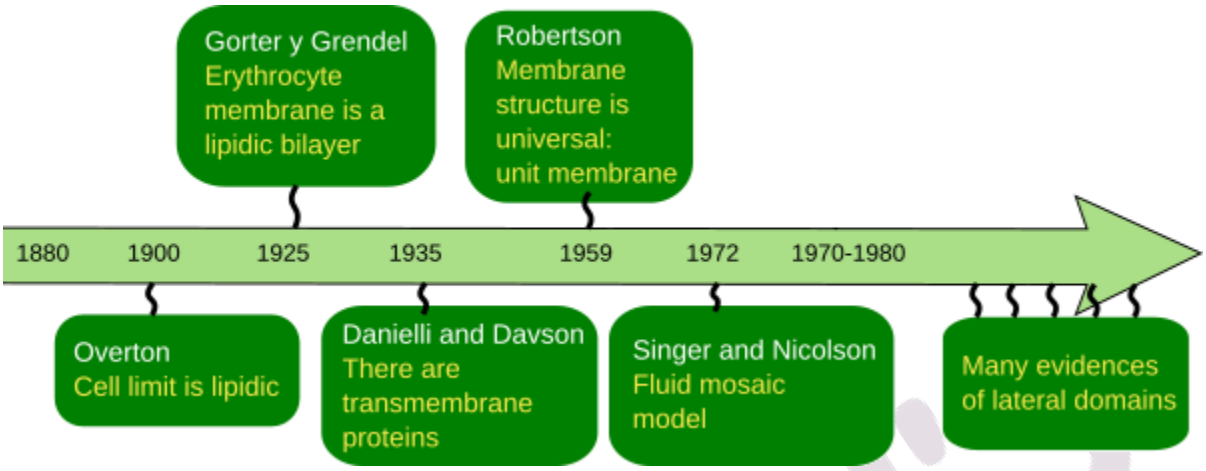
3. **Unit Membrane Model (Protein-Lipid Bilayer-Protein)** - This is also known as the unit membrane model. This model was proposed by Robertson which was based on the Davson and Danielli's model of plasma membrane. According to this concept, the biological membrane is a lipid bilayer surrounded by proteins on both the sides i.e. outer and inner sides. The external layer is a hydrophilic layer made of protein and the middle layer is a light hydrophobic layer made of phospholipids.



4. **Fluid Mosaic Model**- The fluid mosaic model was proposed by S.J. Singer and Garth L. Nicolson in 1972 to explain the structure of the plasma membrane. According to this model, plasma membrane is a fluid combination of phospholipids, cholesterol, and proteins. The plasma membrane surrounding cells has two layers (a bilayer) of phospholipids (fats with phosphorus attached). Each phospholipid molecule has a head that is attracted to water (hydrophilic) and a tail that repels water (hydrophobic). Both layers of the plasma membrane have the hydrophilic heads pointing toward the outside; the hydrophobic tails form the inside of the bilayer.Proteins are found embedded in the bilayer, giving the membrane the look of a mosaic.



The timeline for the discoveries of various plasma membrane models-



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