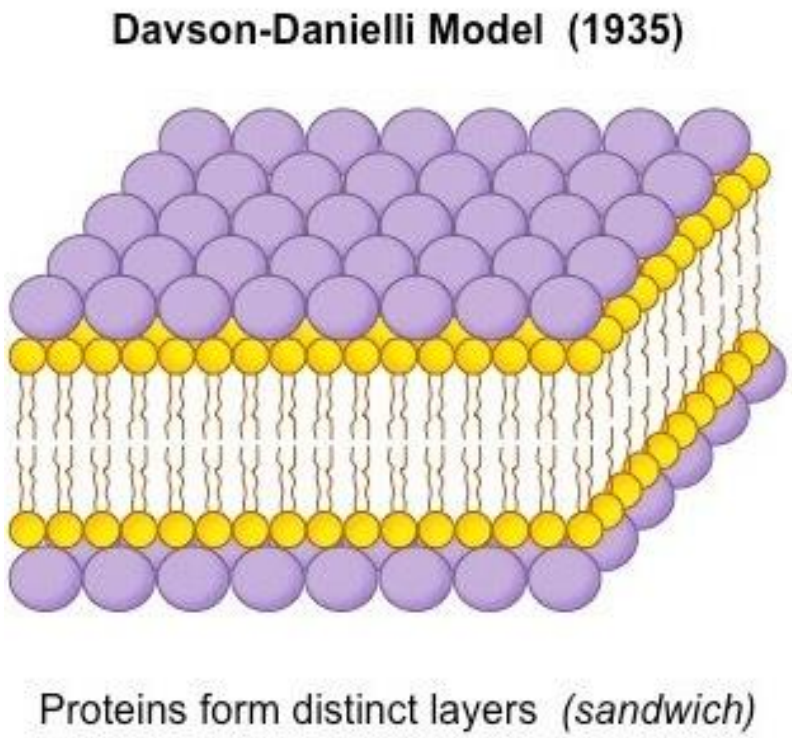
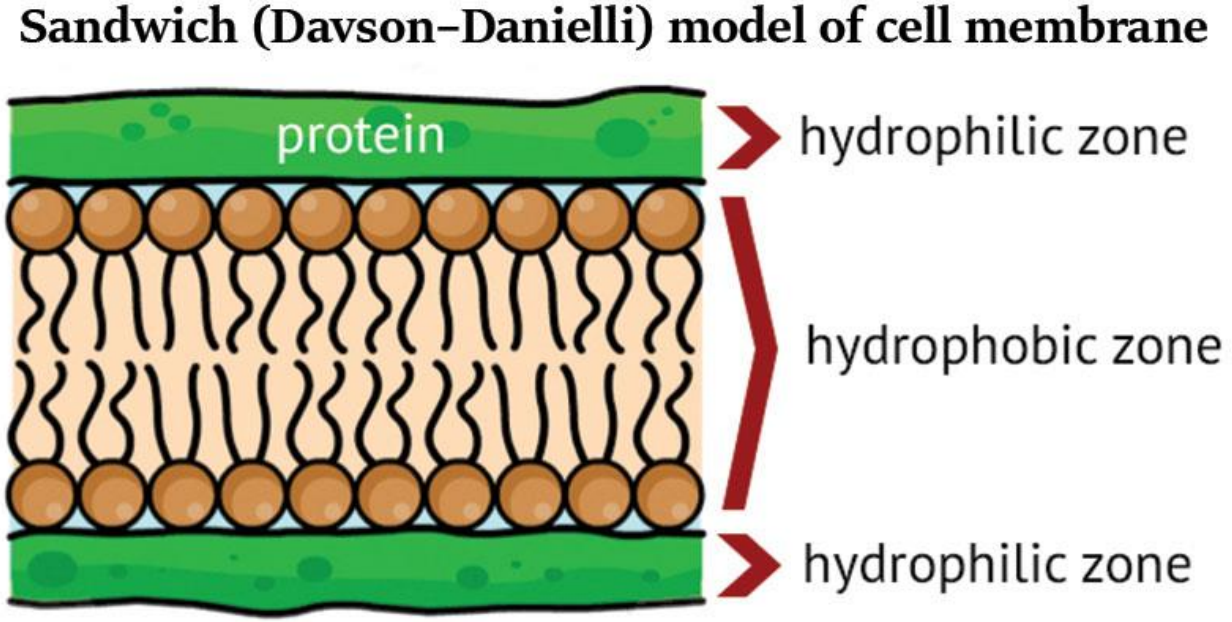
Plasma Membrane

(Sandwich model)





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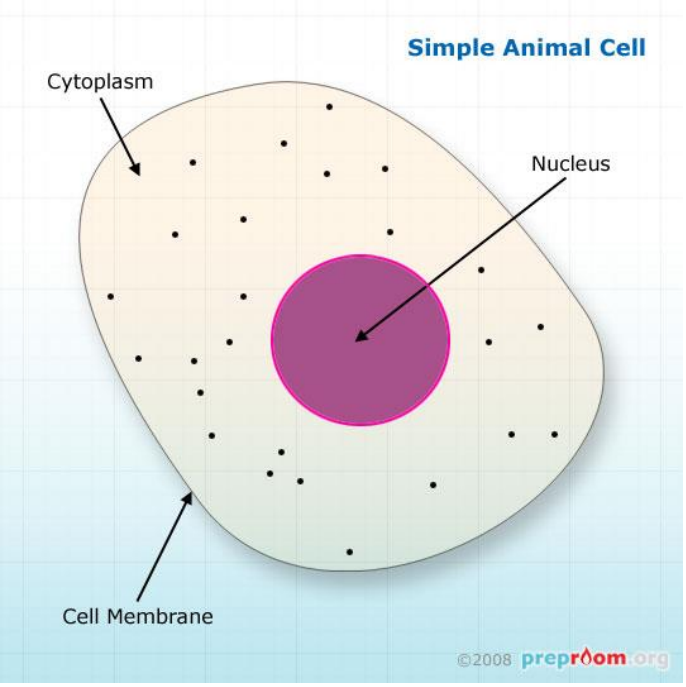
What is Plasma Membrane ???

- The plasma membrane, also called the cell membrane or Bio Membrane is the membrane found in all cells that separates the interior of the cell from the outside environment.



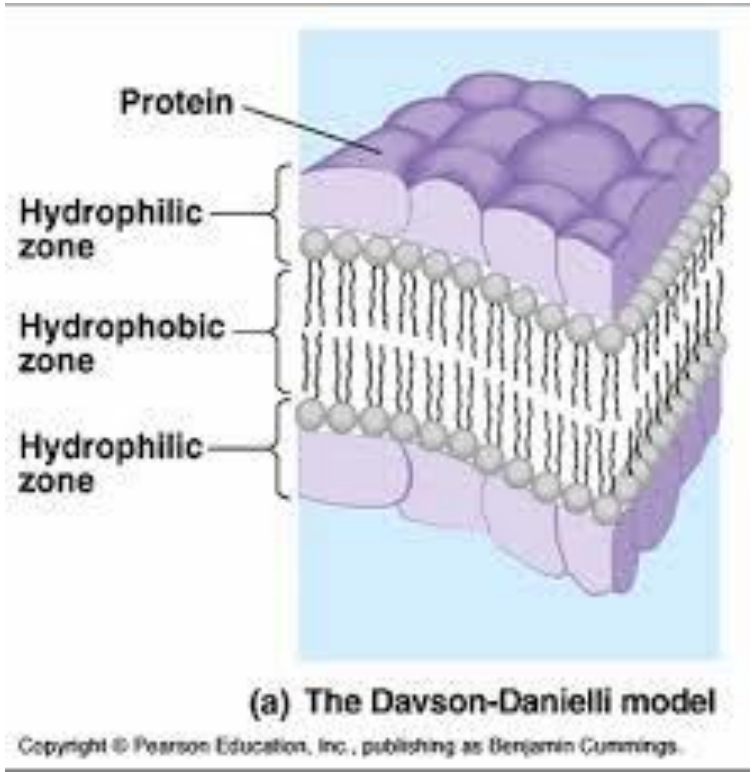
Model of Plasma membrane

1. Sandwich model - Danielli and Davson in 1935

2. Unit membrane model - David Robertson in 1959

3. Fluid Mosaic Model - Singer and Nicolson in 1972

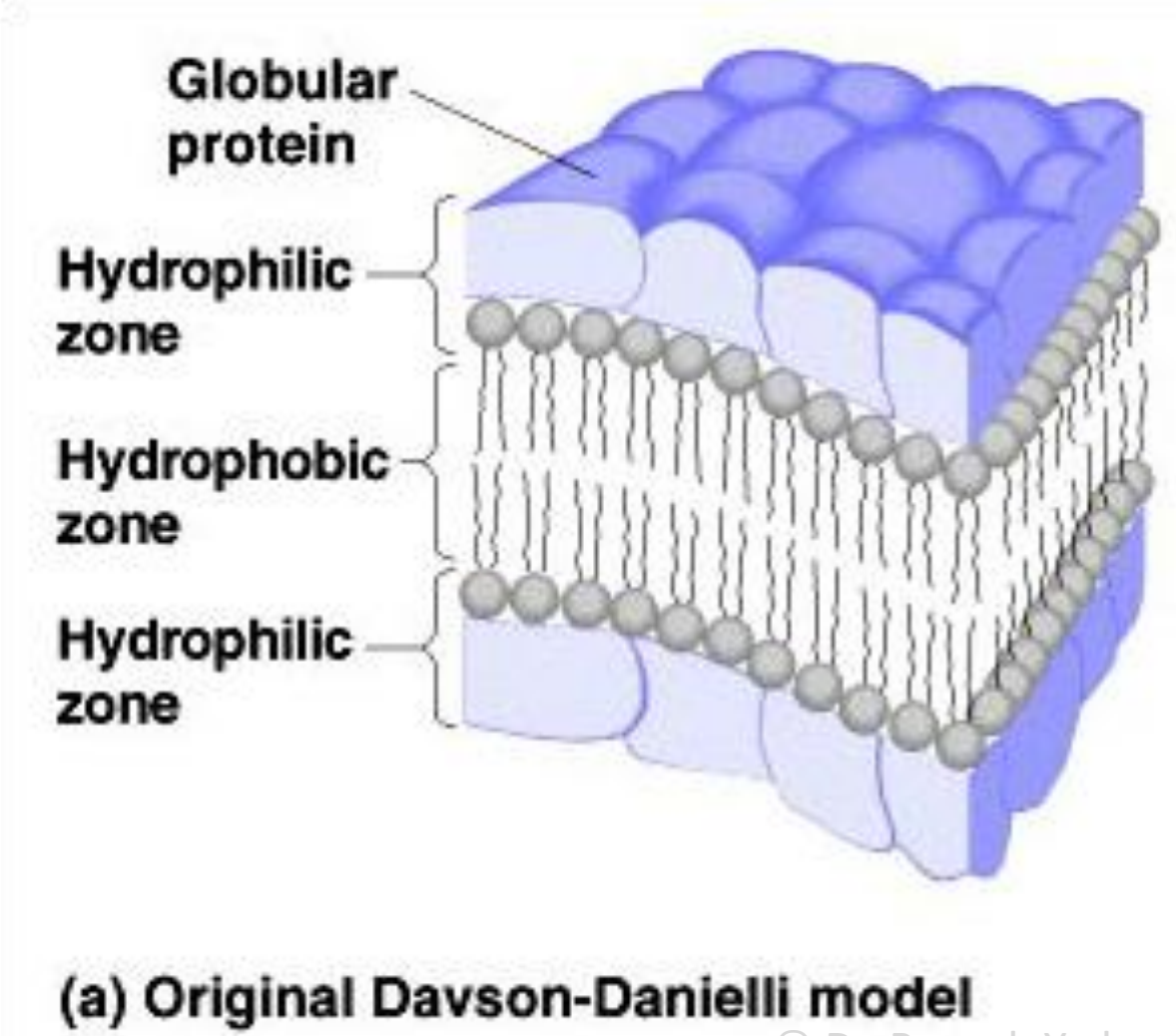
Sandwich model



- **Danielli and Davson** in 1935

Sandwich model concept

- The model describes a phospholipid bilayer that lies between two layers of globular protein.
- It was the first model that attempted to describe the position of proteins within the lipid bilayer found in membranes.
- Danielli and Davson proposed that, two layers of protein lined the central phospholipid bilayer.

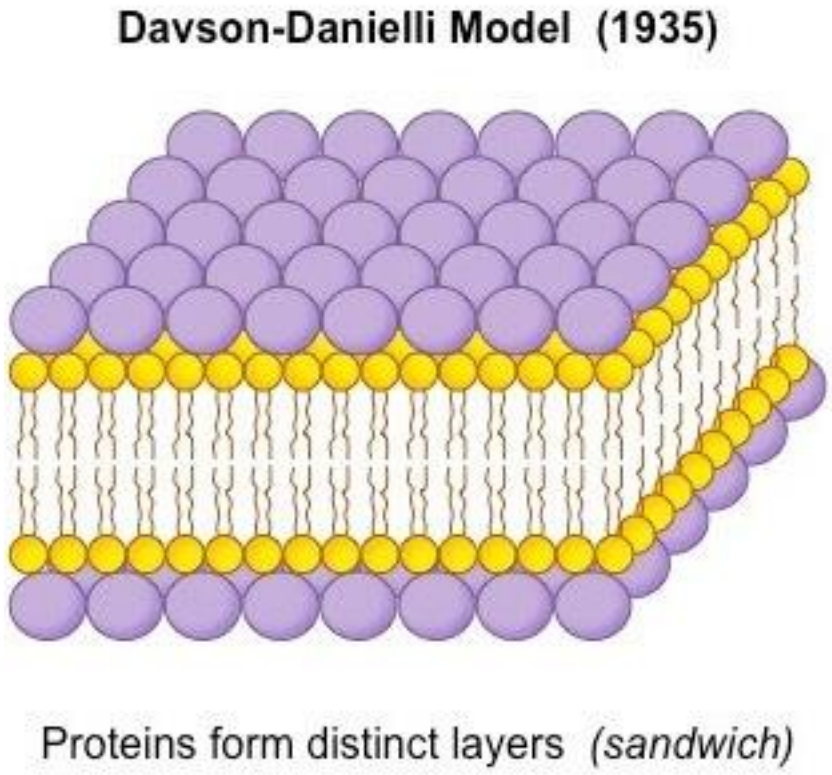


(a) Original Davson-Danielli model

Sandwich model concept

- The model was also described as a 'lipo-protein sandwich', as the lipid layer was sandwiched between two protein layers.

- The Davson–Danielli model predominated until Singer and Nicolson advanced the fluid mosaic model in 1972.

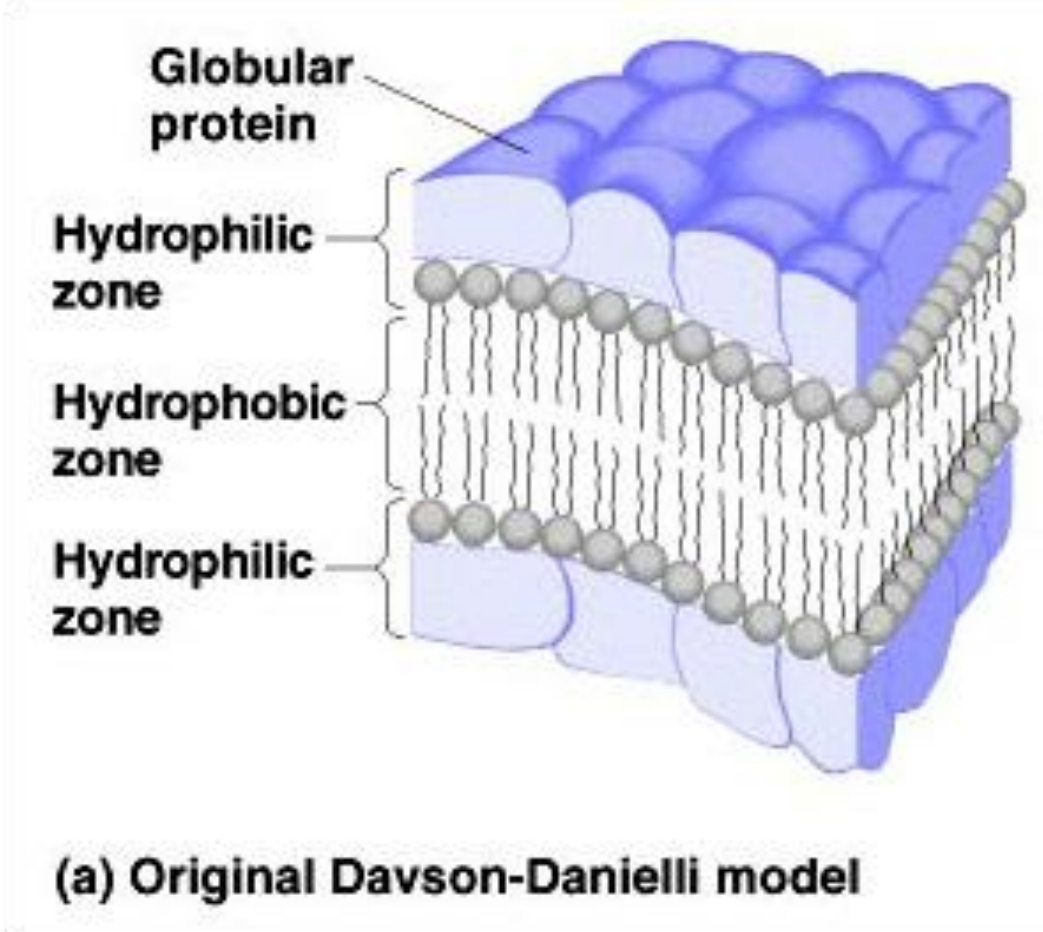


Sandwich model concept

Key Features

- Danielli and Davson, proposed a model, called sandwich model, for membrane structure in which a lipid bilayer was coated on its either side with hydrated proteins (globular proteins).

- Hence, the plasma membrane might be composed of two lipid-protein bilayers—one facing the interior of the cell and the other facing the external.



(a) Original Davson-Danielli model

Sandwich model concept

Key Features

- In this arrangement, the association between the surface proteins and bimolecular lipid leaf let would be maintained primarily by electrostatic interactions between the polar ends of each lipid molecule and charged amino acid side chains of the polypeptide layers.
- Either electrostatic or van der Waals bonds could bind other groups to the outer protein surface.
- Danielli and Davson proposed that such a membrane would exhibit selective permeability, being capable of distinguishing between molecules of different size and solubility properties and also between ions of different charge.

Sandwich model concept

Key Features

- A protein-lipid sandwich
- Lipid bilayer composed of phospholipids (hydrophobic tails inside, hydrophilic heads outside)
- Proteins coat the outer surface

Sandwich model concept

Problems in the Davson–Danielli Model

- It assumed all membranes were of a uniform thickness and would have a constant lipid protein ratio.
- It assumed all membranes would have symmetrical internal and external surfaces (No Dynamic nature)
- It did not account for the permeability of water substances (did not recognize the need for hydrophilic pores)

Thank You