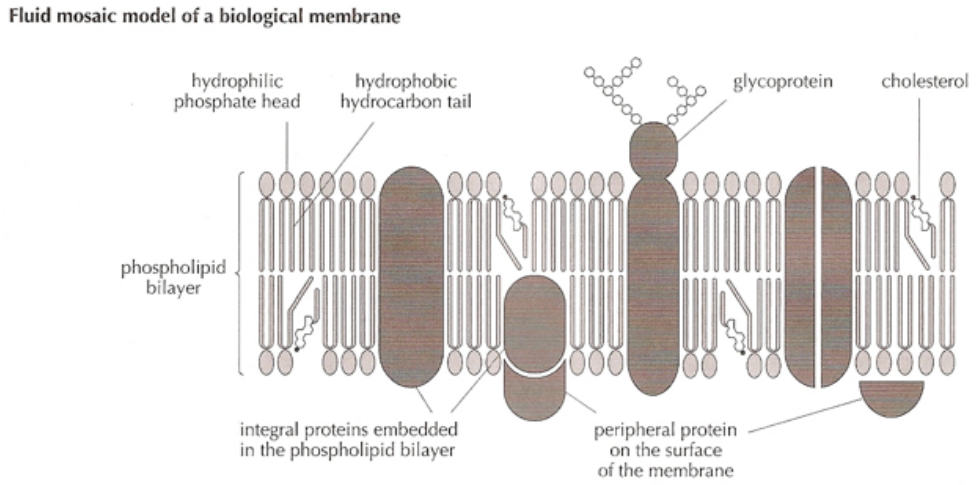
1.3 Membrane structure



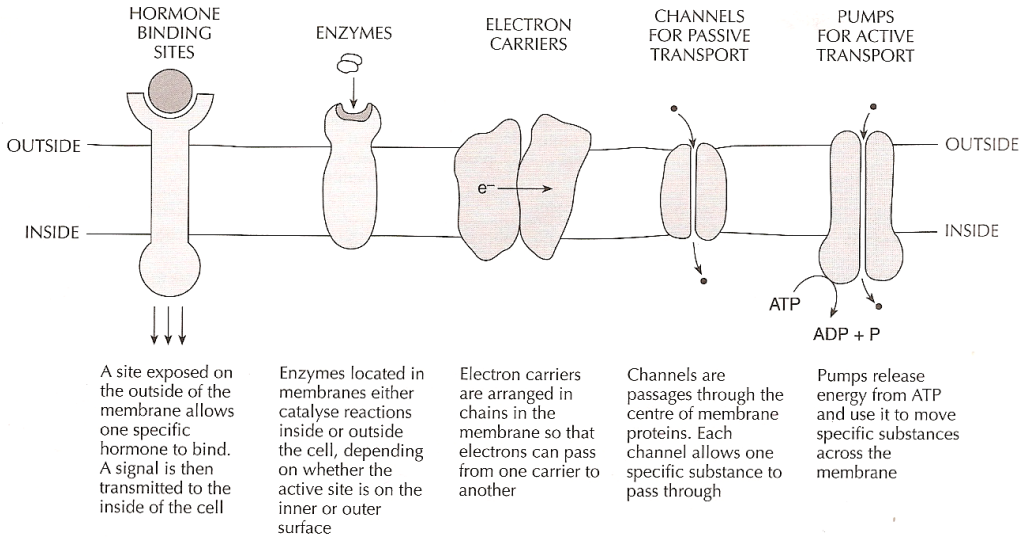
Phospholipids:

The attraction between the hydrophobic tails in the centre and between the hydrophilic heads and the surrounding water makes membranes very stable. This happens because hydrophobic molecules are not attracted to water but to each other. Substances with this property (i.e being hydrophilic and hydrophobic) are called **amphipathic**.

Cholesterol:

It is a component of animal cell membranes. In mammalian membranes cholesterol reduces membrane fluidity and permeability to some solutes.

Membrane proteins:



The Davson-Danielli model:

In the 1930's Davson and Danielli proposed layers of protein adjacent to the phospholipid bilayer, on both sides of the membrane.

They proposed this because they thought it would explain how membranes, despite being thin, are a very effective barrier to the movement of some substances.

Analysis of the falsification of the Davson-Danielli model that led to the Singer-Nicolson model:

1. Freeze-etched electron micrographs

A technique is used to rapid freeze cells and then fracturing them. The fractures occur along lines of weakness. Globular structures scattered through freeze-etched images of the centre of membranes were interpreted as transmembrane proteins.

2. Structure of membrane proteins

Proteins were extracted from membranes and were found to be very varied in size and globular, so were unlike the type of structural protein that would form continuous layers on the periphery of the membrane. Also part of them was hydrophobic, so they would be attracted to the hydrocarbon tails of phospholipids in the centre of the membrane.

3. Fluorescent antibody tagging

Red and green fluorescent markers were attached to antibodies that bind to membrane proteins. The membrane proteins of some cells were tagged with red markers and the rest with the green markers. The cells were fused together and within 40 min. the red and the green markers were mixed throughout the membrane of the fused cell. This showed that membrane proteins are free to move within the membrane than being fixed in a peripheral layer.

Therefore this evidence falsified the Davson-Danielli model and the model that became widely accepted was the Singer-Nicolson one. In this model the

proteins occupy a variety of positions in the membrane. This gives the model its name – the fluid mosaic model.