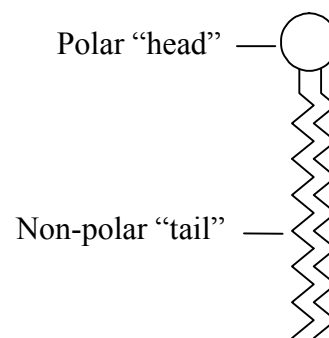


Biological membrane structure

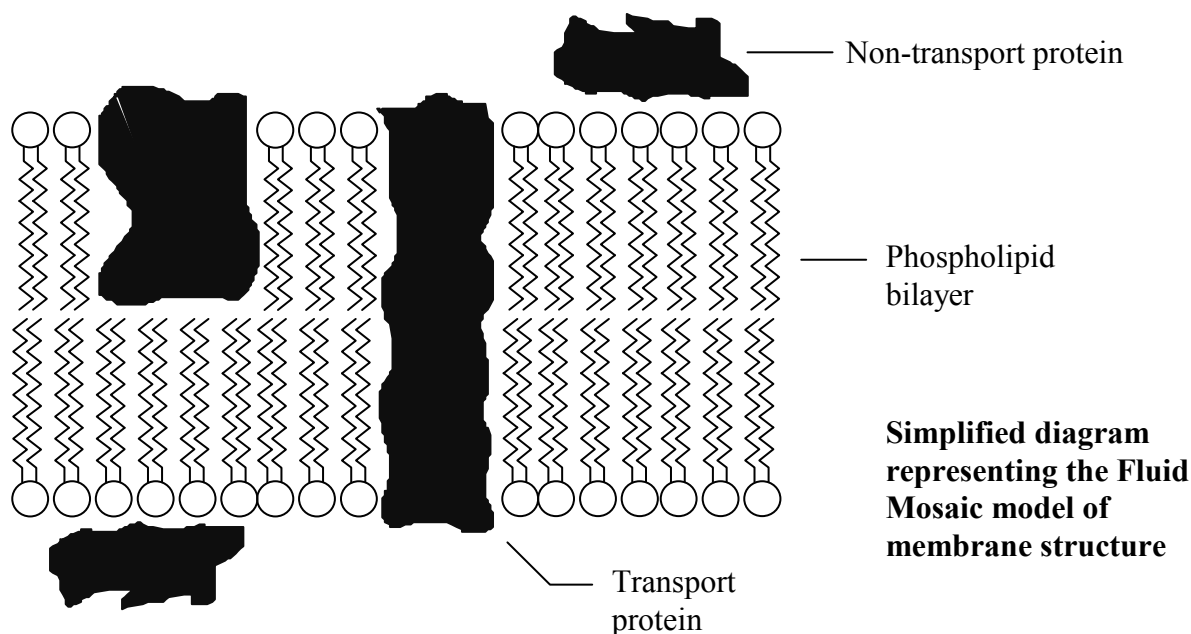
Phospholipids

The structure of phospholipids can be simplified as shown in the diagram on the right. When phospholipids are placed in water, they tend to aggregate to form “micelles”. This allows the polar head groups to interact with each other and with the water molecules, and the non-polar alkyl chains to interact strongly with each other.



Lipid bilayers

There are two types of micelle (spherical and bilayer). However, it is the bilayer structure which is the most important of the two for cell structure. The lipid bilayer is stabilised by interactions with various membrane proteins. The most successful model of membrane structure is the **fluid mosaic model**, in which the membrane proteins are often said to be *icebergs* in a lipid *sea* (see the diagram below). In reality, the proteins are rarely free to move laterally in the membrane because they are usually anchored to other proteins – the **cytoskeleton**.



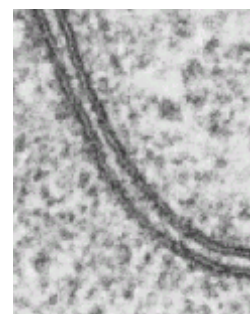
There are two basic types of membrane-associated protein:

- peripheral (extrinsic or external) proteins; and
- integral (intrinsic or internal) proteins.

The extrinsic proteins are often globular proteins bound to the bilayer surface by ionic interactions.

The intrinsic proteins expose hydrophobic side groups on their surface which allows them to be located within the hydrophobic environment of the alkyl chains. Some intrinsic proteins span the entire thickness of the lipid bilayer (about 7.5nm) and are also known as **transmembrane proteins**; they are often involved in transport of polar solutes across the membrane.

The photomicrograph on the right shows the plasma membranes of two cells close together – the classic “tramlines” are just visible.



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