Membranes

The membranes for a cell not only provide shape to the cell but also there is considerable activity at the membranes surfaces especially at the plasma membrane in contact with the extracellular space. The correct model form membrane structure was proposed in 1972 and is known as the fluid mosaic model. This model is still valid with only minor modifications.

The Structure of Membranes

Membranes of a cell are between 7 and 10 nanometres thick, and are composed of two layers of phospholipid, which form a bilayer.

Phospholipids are made up of a polar, hydrophilic area containing a phosphate group bonded to glycerol and a non-polar hydrophobic area. In the bilayer, the hydrophobic (water hating) parts all point towards each other and the hydrophilic (water loving) areas point outward.

It is the different properties of each end of the molecule that cause the phospholipids to arrange themselves in this way. The hydrophilic heads of the molecules always appear on the outside of the membrane where water is present, while the hydrophobic tales orientate inside the double layer away from water. The whole structure is flexible or fluid because the phospholipids can float into a position anywhere in the membrane. There is much evidence to support the plasma membrane as fluid mosaic. Further evidence has come from using radioactively labeled phospholipids. Research shows that these molecules move not only within their own layer but also with two layers of the membrane.

Embedded in the bilayer are different molecules that contribute to the functions of membranes. Cholesterol is often present in animal cells and is most commonly found in the plasma membrane. Cholesterol molecules align themselves with the phospholipids making the membrane more rigid and less permeable to water-soluble molecules.

There are also different types of proteins in the bilayer. Integral proteins are embedded in the bilayer, whereas peripheral proteins are attached to the surface. Many of the proteins on the outer surface are glycoproteins, that is they have a carbohydrate group attached to them. Some of these serve as hormone binding sites and have special shapes to recognise the specific hormones to which the cell will respond. Others are important in cell to cell communication and adhesion. Some integral proteins are enzymes immobilised within the membrane structure and perfectly placed to carry out sequences of metabolic reactions.

Finally there are proteins that span the bilayer acting as channels for ions and molecules to pass by by passive transport or forming pumps that use active transport move molecules into or out of the cell .