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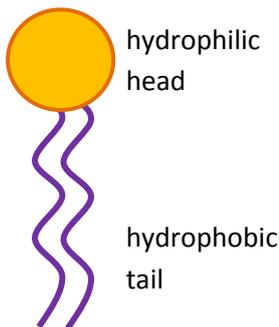
BIOLOGICAL MEMBRANES

The structure and role of cell membranes

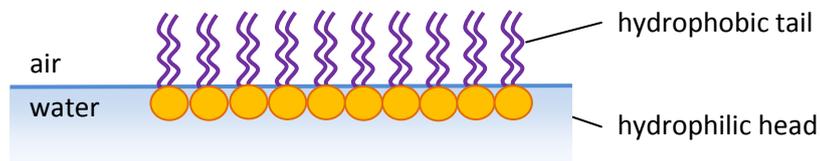
All cells have a surrounding membrane, and in **eukaryotic cells** many of the **organelles** inside the cell have their own membranes to separate them from each other. Other than separating cell components from each other, cell membranes have a number of other purposes:

-  they separate the cell contents from each other and the cell's outside environment
-  they are involved in cell recognition and signalling
-  they control the transport of certain materials going into or coming out of the cell

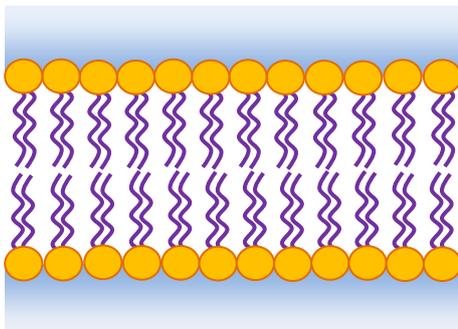
The basic structure of all cell surface membranes is the same. They consist of a number of arranged **phospholipids**.



A phospholipid consists of a phosphate head which is very **hydrophilic** (water-loving), attached to two fatty acid tails which are **hydrophobic** (water-hating). When the phospholipids are mixed with water, they arrange themselves in a layer at the surface of the water with the hydrophobic tails sticking out, as shown by below.



If phospholipids become completely surrounded by water, a **phospholipid bilayer** can form. Phosphate heads on each side of the bilayer stick into the water, while the hydrophobic fatty acid tails point towards each other in the centre. This means the hydrophobic tails are held away from the water molecules. In this state, the phospholipid molecules can move freely, just as fluid molecules do. This phospholipid bilayer is the basic structure of all biological membranes.



The bilayer creates a barrier to many molecules and separates the cell contents from the outside world. This thin layer of oil is ideal as a boundary in living systems, where most metabolic reactions take place in a water environment.

A simple phospholipid bilayer would be incapable of performing all of the functions of biological membranes. It would also be too fragile to function as a barrier within or around cells. Other components are needed to make it a fully-functional biological membrane.

All membranes are permeable to water because water molecules can diffuse through the lipid bilayer. Some membranes are up to 1000 times more permeable to water because they contain **aquaporins** (protein channels that allow water molecules through them). Cell membranes that are permeable only to water and some solutes are described as **partially permeable membranes**.