

## Biological Membranes - Their Basic Bricks

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Biological membranes, besides playing a role in the structuring of cells have also a functional role. They allow to maintain electrochemical gradients, provide a mean of communication between the inner and outer and they are involved in capturing and releasing energy.

The functional roles are possible and are influenced by the structure of biological membranes. The main components of these are mainly three classes of molecules. These are lipids, proteins and sugars.

Lipids are amphiphilic molecules which means that they consist of a part which likes water and a part which does not like it. From our daily experience we know a subgroup of lipids very well. These are fats. The head group of lipids likes to be exposed to water, it is hydrophilic. Fatty acid chains which accompany the head group are hydrophobic, meaning that this is the part of a lipid which does not want to be exposed to water. The fatty acid chains consist of a series of CH bonds. There are many different kinds of lipids which might differ in head group, in chain length or in the number of double bonds in the fatty acid chains. The most important lipid species belong to the groups of phospholipids and sterols. An example of the latter one is cholesterol. Phospholipids are characterized by the existence of phosphorus in the head group.

Proteins are bigger molecules. The building blocks of a protein are amino acids. Each protein has a given sequence of amino acids which is encoded in the genetic code. The genetic code basically knows 20 different amino acids. There are many different kinds of proteins which provide various functional roles. Many proteins are enzymes which catalyze biochemical reactions or which play a structural or mechanical role. They are also involved in cell signaling, immune response, cell adhesion and the cell cycle.

If one would take a biological membrane apart and one would weight each of the three main components one would find that concerning the membrane weight 30-80 percent of the weight comes from the lipids, 20-60 percent from the proteins and 0-10 percent from the sugars.

Biological membranes are self-organizing structures. The assembling process is an interplay of various interactions. To understand this at first we need to learn about the self-aggregation of lipids in water and about some interesting physical effects of lipid aggregates. This will follow in a separate article.

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