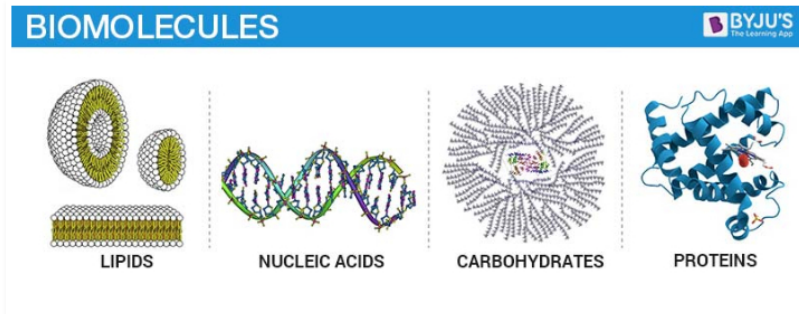


Biomolecules

Biomolecules are molecules that are involved in the maintenance and metabolic processes of living organisms. These non-living molecules are the actual foot-soldiers of the battle of sustenance of life. They range from small molecules such as primary and secondary metabolites and hormones to large macromolecules like proteins, nucleic acids, carbohydrates, lipids etc. Let us study them in brief.

Types of Biomolecules



1. **Carbohydrates** – Carbohydrates are chemically defined as polyhydroxy aldehydes or ketones or compounds which produce them on hydrolysis. In layman's terms, we acknowledge **carbohydrates** as sugars or substances that taste sweet. They are collectively called as saccharides (Greek: sakcharon = sugar). Depending on the number of constituting sugar units obtained upon hydrolysis, they are classified as monosaccharides (1 unit), oligosaccharides (2-10 units) and polysaccharides (more than 10 units). They have multiple functions viz. they're the most abundant dietary source of energy; they are structurally very important for many living organisms as they form a major structural component, e.g. cellulose is an important structural fiber for plants.

2. **Proteins** – Proteins are another class of indispensable biomolecules which make up around 50% of the cellular dry weight. Proteins are polymers of amino acids arranged in the form of polypeptide chains. The structure of proteins is classified as primary, secondary, tertiary and quaternary in some cases. These structures are based on the level of complexity of the folding of a polypeptide chain. **Proteins** play both structural and dynamic roles. Myosin is the protein that allows movement by contraction of muscles. Most enzymes are proteinaceous in nature.

3. **Nucleic Acids** – Nucleic acids refer to the genetic material found in the cell that carries all the hereditary information from parents to progeny. There are two types of nucleic acids namely, deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). The main function of nucleic acid is the transfer of genetic information and synthesis of proteins by processes known as translation and transcription. The monomeric unit of nucleic acids is known as nucleotide and is composed of a nitrogenous base, pentose sugar, and phosphate. The nucleotides are linked by a 3' and 5' phosphodiester bond. The nitrogen base attached to the pentose sugar makes the nucleotide distinct. There are 4 major nitrogenous bases found in DNA: adenine, guanine, cytosine, and thymine. In RNA, thymine is replaced by uracil. DNA has a double helical structure which is formed by hydrogen bonding between the bases of two antiparallel polynucleotide chains.

4. **Lipids** – Lipids are organic substances that are insoluble in water, soluble in organic solvents, are related to fatty acids and are utilized by the living cell. They include fats, waxes, sterols, fat-soluble vitamins, mono-, di- or triglycerides, phospholipids, etc. Unlike carbohydrates, proteins, and nucleic acids, lipids are not polymeric molecules. Lipids play a great role in the cellular structure and are the chief source of energy.

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