

Biomolecules

SYNOPSIS

- * The basic structural and functional unit of living organism is the "cell".
- * Photosynthesis takes place in the presence of light followed by dark reaction which does not need light.
- * Most of the biochemical reactions take place in dilute neutral solutions (pH = 7) at body temperature and 1 atmosphere pressure involving complex mechanisms
- * Carbohydrates were considered as hydrates of carbon as most of them have general formula $C_x (H_2O)_y$.
- * Fructose is a ketohexose. It is also called Laevulose and fruit sugar.
- * A glycoside bond is formed when hydroxy group of the hemiacetal carbon of one monosaccharide condenses with a hydroxy group of another monosaccharide to give -O-bond.
- * Lactose occurs in milk and also called as milk sugar.
- * Carbohydrates containing large number of monosaccharide's units joined through glycosidic linkages are called polysaccharides.
- * Starch easily hydrolyses in saliva by an enzyme amylase.
- * Glycosides are carbohydrate derivatives obtained by the replacement of anomeric -OH by some other substituent and are termed -O-, N-, S-, glycosides etc, depending on the atom attached to the anomeric carbon.
- * Amylopectin is a branched chain polymer and is water soluble.
- * Cellulose is the principle structural component of vegetable matter.
- * Cellulose is formed in the photo synthesis process.
- * Animals like cattle, sheep consume cellulose and with the help of enzyme cellulase they convert it into digestible substances.

- * The carbohydrates are stored in animal bodies as glycogen
- * Honey is a carbohydrate and is an instant source of energy.
- * Streptomycin, kanamycin, neomycin and gentamicin are carbohydrate antibiotics.
- * Amino acids are organic compounds containing both amino group ($-NH_2$) and carboxylic acid ($-COOH$) i.e. they are di functional.
- * The bond between two amino acid molecules is peptide bond 'or' amide bond, and the resultant is known as dipeptide'.
- * The amino acids, which can not be synthesized, in the body but can only be supplied to the body through diet, are called "**essential amino acids**".
- * Amino acids exist as zwitterion, showing acidic character due to group NH_3^+ and basic character due to COO^- group.
- * Peptide bonds and disulphide bonds and have three dimensional structures.
- * The forces that stabilise secondary and tertiary structures are H-bonds, disulphide linkages, Vander Waals forces and electrostatic forces of attraction.
- * Peptides are formed by the condensation of two or more same or different -amino acids. They contain peptide linkage $-CO - NH-$.
- * The non protein component of enzyme molecule is called a prosthetic group.
- * The prosthetic groups attached to the enzyme at the time of reaction are called **coenzymes**.
- * Nucleic acids are biologically significant polymers of nucleotides with polyphosphate ester chain.
- * The repeating units of nucleic acids are called nucleotides.
- * Pyrimidines and purines are nitrogen containing hetrocyclic bases
- * The bond present between sugar and base is called N – **Glycoside bond**.
- * **AMP, ADP, ATP, d AMP, d ADP** etc are called Nucleotide subunits.
- * The double helix structure of DNA was proposed by Watson and Crick.

- * DNA strands are twisted but base pairs are planar and parallel with each other.
- * The DNA rotates at both sides i.e. right hand side or left hand side.
- * The mRNA carries the genetic information from nucleus to the cytoplasm and then it gets passed to protein.
- * The place of DNA where the RNA is synthesized is called **Promoter site** and is initiated by **enzyme**.
- * The process by which the genetic message in DNA that has been passed to mRNA is **decoded** and used to build proteins is called translation
- * A difference of single base in the DNA molecule causes a change in the amino acid sequence which leads to mutation.
- * DNA printing is based on the facts that a sequence of bases on DNA is unique for a person.
- * The two strands serve as **templates** for the synthesis of complementary **new strands**.
- * The synthesis of identical copies of DNA is called **replication**.
- * The region, where the replication starts in DNA, is called **replication fork**.
- * The second strand is discontinuous and joined together by an enzyme is called **DNA ligase**
- * The human cell contains 23 pairs of **chromosomes**.
- * The total DNA of human cell contains **2.9 billion base pairs**.
- * Lipids are naturally occurring carbon compounds related to fatty acids and include esters of fatty acids or substances capable of forming such esters.
- * Lipids are important dietary components on account of their higher calorific values.
- * Animal sources of fats are ghee, butter, curd & fish oils. These fats contain more saturated fatty acids.

- * Vegetable sources of fats are vegetable oils like ground nut oil, gingerly oil, mustard oil, cotton seed oil, sunflower oil, coconut oil etc. These fats contain more unsaturated fatty acids.
- * These fatty acids contain even number of carbon atoms and are both saturated and unsaturated carboxylic acids
- * Waxes are insect secretions or protective coating on animal and plant leaves.
- * Hormones are molecules of carbon compounds that transfer biological information from one group of cells to distant tissues or organs.
- * Hormones are liberated directly into the blood stream and are carried from there to the remote tissues or viscera, called **target organs**.
- * Plant hormones are called **growth hormones**.
- * Hormones are all generally proteins but not all of them are proteins.
- * **Testosterone** is the principal male sex hormone produced by testis. This is responsible for the development of male secondary sexual characteristics such as deep voice, facial hair and sturdy physical nature.
- * Synthetic testosterone is used to promote tissue and muscle growth.
- * **Estradiol** is the main female sex hormone. It is responsible for the development of secondary female sex characteristics. These are breast development, shrill voice and long hair. This also takes part in the control of menstrual cycle.
- * **Progesterone** is useful for preparing the uterus for the implantation of the fertilized egg. These are also useful as birth control agents.
- * Sanger was awarded Nobel Prize in 1958 for determining the structure of insulin.
- * Vitamins are naturally occurring low molecular weight carbon compounds, which are essential dietary factors.
- * Their absence in the human body causes deficiency diseases or disorders.
- * Plants can synthesize all vitamins. Animals can synthesize few but not all vitamins.

- * Human body can synthesize vitamin 'A' from carotene.
- * Vitamins are widely distributed in nature in plants and animals. All cells in the body can store vitamins to some extent.
- * Vitamins are designated by English alphabets A, B, C, D, E, K.
- * Vitamins in low concentrations catalyse biological reactions.
- * The daily dose of vitamins for an individual depends on his or her age, size and rate of metabolism.
- * A lack of one or more vitamins leads to characteristic deficiency symptoms.
- * Vitamin D₂ is also called sunshine vitamin. Since it is obtained by sunlight, irradiation of ergosterol present in oils and fats.
- * Pro vitamins are the biologically inactive compounds which can be easily converted into.