

Classes by Top Faculty

molecules to join this lattice structure.

- Water maintains molecular conformations and stabilises structural organisation of living organisms.
- In aqueous body fluids, proteins and nucleic acids become folded and coiled to assume specific 3-dimensional forms suitable for biological activity.
- Interaction between water and phospholipid molecules arranges the latter into the lipid bilayer of the membrane.
- Water ionizes to a small but significant extent into H⁺ and OH⁻, depending on temperature.
- The high specific heat and mobility of water distribute heat uniformly throughout the body and helps in heat loss from skin.
- High latent heat of vapourisation of water causes elimination of excess heat through evaporation which helps in maintaining the constant body temperature.

METABOLISM

Metabolism is defined as the sum total of all the reactions taking place in the cell.It is of two types

- 1. Anabolism- All the biosynthetic processes which are taking place in the cell are called anabolism. For example the synthesis of cholestrop from acetic acid, synthesis of proteins from amino acids
- Anabolic processes require energy
- It is also called as constructive metabolish
- 2. Catabolism- All the degradation processes in which complex molecules are converted into shiples and energy is released in it are called catabolism.
- Encertable glucose is concerted into lactic acid in skeletal muscles.
 t is also called as destructive metabolism

Turnover of biomolecules means that they are continuously being changed into other biomolecules and are also made from other biomolecules simultaneously in a living cell.

ORGANIC COMPOUNDS

Organic or biological molecules may be small and simple. Often these simple molecules assemble and form large and complex molecules, called macromolecules.

These include four main classes:

- Carbohydrates
- Lipids
- Proteins
- Nucleic acids.

All macromolecules except lipids are formed by the process of **polymerisation**,

a process in which repeating subunits termed monomers are bound into chains of



Classes by Top Faculty



Fig. 10.6 Beewax

Proteins

- Proteins are the most diversed macromolecule ..
- The term protein was coined by Mulder and is derived from the Greek word *proteios* meaning 'of the first rank'.
- Proteins give the organisms their unique qualities , structure and behavior to a great extent.
- The building blocks of proteins are **amino acids**, which exist in about 20 different naturally occurring forms.
- There are infinite variety of proteins which are formed by various combinatons of amino acids.
- Essential elements in protein are C,H,O,N.
- All amino acids have a basic skeleton consisting of a carbon (acarbon) linked to an amino group (NH_2) , a carbox group (COOH), and a hydrogen atom (H).
- The variations among the armo acids occur at the N group, which is different in each amine acidend imparts the unique characteristic to the molecule and to the pretent the contains it
- A covalent bond called **peptide bond** (Fig. 10.7) forms between the amino group of one amino acid and the carboxyl group of another amino acid and this helps to produce proteins of varying lenth by joining amino acids.
- •
- Peptide usually refers to a molecule composed of a short chain of amino acids, such as a dipeptide (two amino acids), a tripeptide (three) and a tetrapeptide (four).
- A **polypeptide** contains unspecified number of amino acids, but usually has more than 20.
- It is often a smaller subunit of a protein.
- A protein usually contains a minimum of 50 amino acids.
- The terms polypeptide and protein are often interchangeably used, though not all polypeptides are large enough to be considered proteins.

Fig. 10.7 Peptide bond

Structure of Proteins

• Protein is synthesised on the ribosome as a linear sequence of amino acids which

B-6, Qutub Institutional Area, New Delhi -110016 | <u>www.neetprep.com</u> | Phone: (011)41082172



Classes by Top Faculty

are held together by peptide bonds.

- Just after the synthesis is completed, the protein folds into a specific three dimensional form. According to the mode of folding, four levels of protein organisation (Fig. 10.8) have been recognised i.e., **primary, secondary, tertiary** and **quaternary**.
- Primary protein structure is a straight chain of amino acids linked by peptide bonds form primary structure of proteins and is the most unstable .Newly formed proteins on ribosomes have primary structure.
- The first protein to have its primary structure determined was insulin.
- Secondary protein structure arises when various functional groups exposed on the outer surface of the molecule interact by forming hydrogen bonds. This causes the peptide to twist into a coiled configuration called the α -helix or many peptide chains to fold into a flat, β -pleated sheet (Fig. 10.8b).
- Some proteins contain both types of secondary configurations.
- Tertiary protein structure arises when the secondary level proteins undergo further folding by additional bonds between functional groups, such as disulfide bonds (between sulfur atoms on two different cysteins of protein molecule), hydrophobic bond, Ionic bond, (Fig. 10.8c).
- Majority of proteins and enzymes exhibit tertiary structure.
- e complex proteins in which more than one polypeptide forms a large multi unit protein (Fig. 10.8d).
- The quaternary structure in proteins that are composed of two or more polypeptide chains which are united by difference types of bonds in specific orientation with respect to one another and the stabilize the protein.
- •
- The individual polypeptide chains of the protein ar Called subunits and the active protein itselfits called multimer

Fig. 14.8 Levels of protein organization (a) primary (b) secondary (c) tertiary (d) quaternary

- •
- Agents such as soap, detergents, acid, alcohol and some disinfectants disrupt the stabilising inter-chain bonds and cause the molecule to become non-functional.

The Nucleic Acids

- Nucleic acid function as genetic material of the cell.
- There are two kinds of nucleic acids, namely, **deoxyribonucleic acid** (DNA) and **ribonucleic acid** (**RNA**) (see Chapter 2).
- These were originally isolated from the cell nucleus and were also found in cells with no defined nuclei (bacteria), and in viruses later.
- Both nucleic acids are polymers of repeating units called **nucleotides**.
- Nucleotide is composed of three smaller units; a nitrogen base, a pentose (5 carbon sugar) and a **phosphate**.

B-6, Qutub Institutional Area, New Delhi -110016 | <u>www.neetprep.com</u> | Phone: (011)41082172