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B.Sc. III. (Zool. Sub.)

PROTEINS

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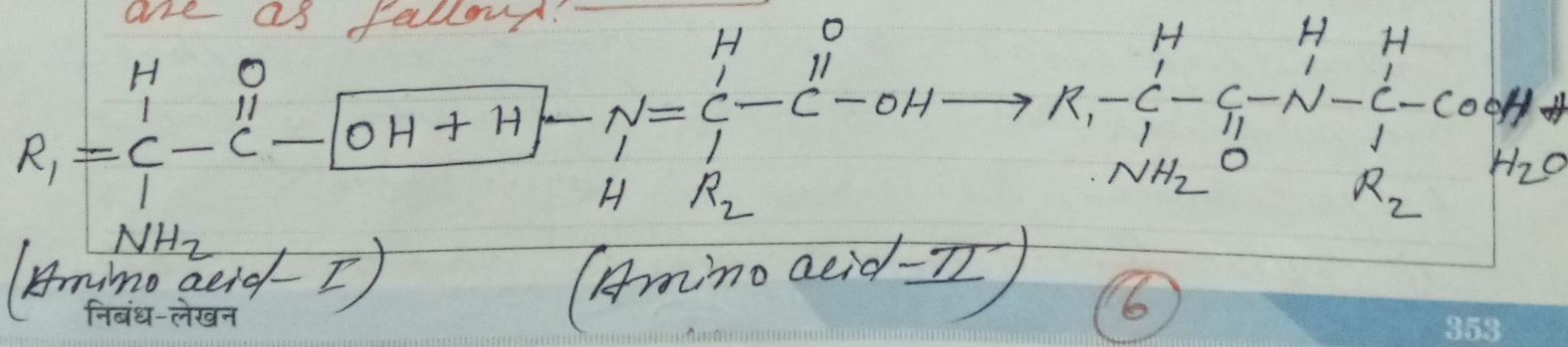
(3) DERIVED PROTEINS. — These proteins are made by hydrolysis and some other activities of simple and compound proteins. Some examples are proteins, peptones, peptides, proteoses etc.

Structure: — Protein is an important macromolecule which is made by many monomeric units called amino acid. The smallest protein i.e. insulin is made by 51 amino acids and the largest protein i.e. haemoglobin is made by 600 amino acids. Amino acid is a type of organic acid in which one carboxylic group ($-COOH$) and one amino group (NH_2) are present. Amino group is connected with α carbon atom. When two amino acids are conjugated together then carboxylic group of one amino acid is linked with amino group of other amino acid with the elimination of one water molecule. Due to linkage of carboxylic group and amino group a bond ($=CO-NH$) is formed called peptide bond. If two amino acids are connected with peptide bond then it is called dipeptide, if three amino acids are connected then it is called tripeptide and if more than three amino acids are connected then it is called polypeptide, the name of any peptide is called on proper sequence and name of

amino acids. For example if any tripeptide is made by glycine, alanine and serine then it is called glycyl-alanyl-serine. About 20 types of amino acids are take part in the formation of any protein. In plant all 20 types of amino acids are formed by cells. but in animals some amino acids are not formed. Those amino acids which are formed in the body of animals are called non essential amino acids and those which are not formed are called essential amino acids. The essential amino acids of human being are as follows:—

- (1) Leucine (2) Isoleucine (3) Valine
- (4) Lysine (5) Tryptophan (6) Phenylalanine
- (7) Methionine (8) Threonine

Some important structure of protein are as follows:—

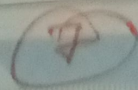


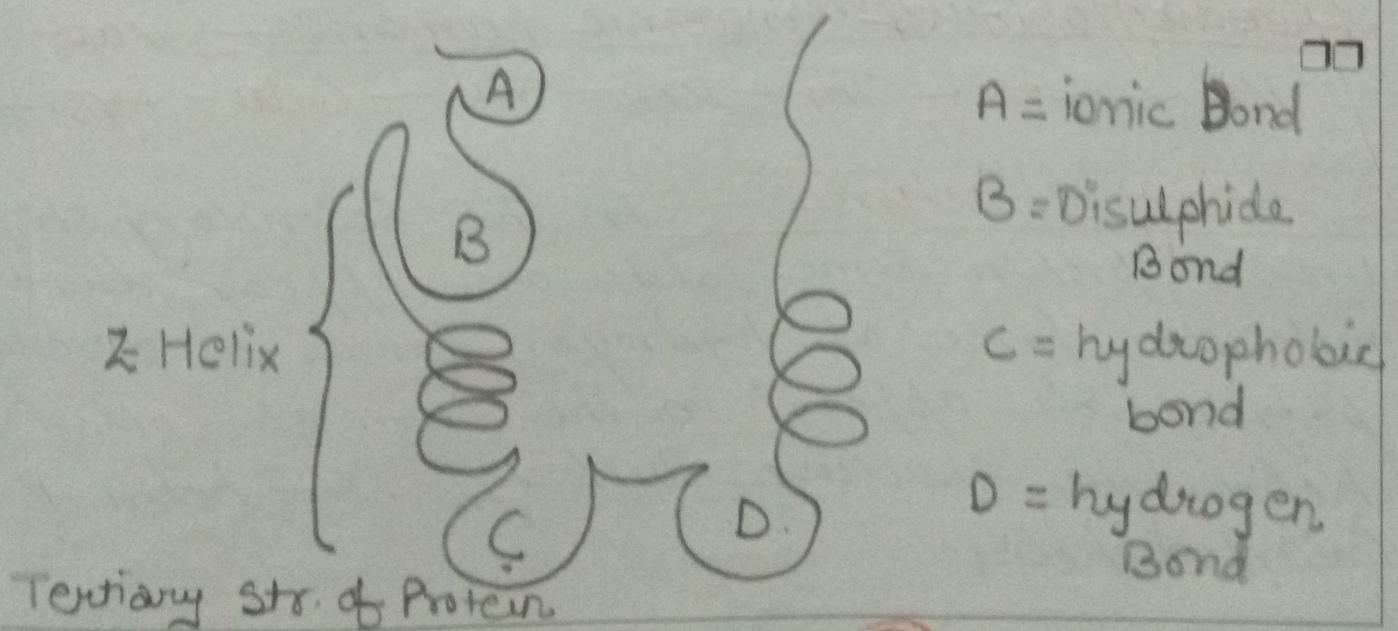
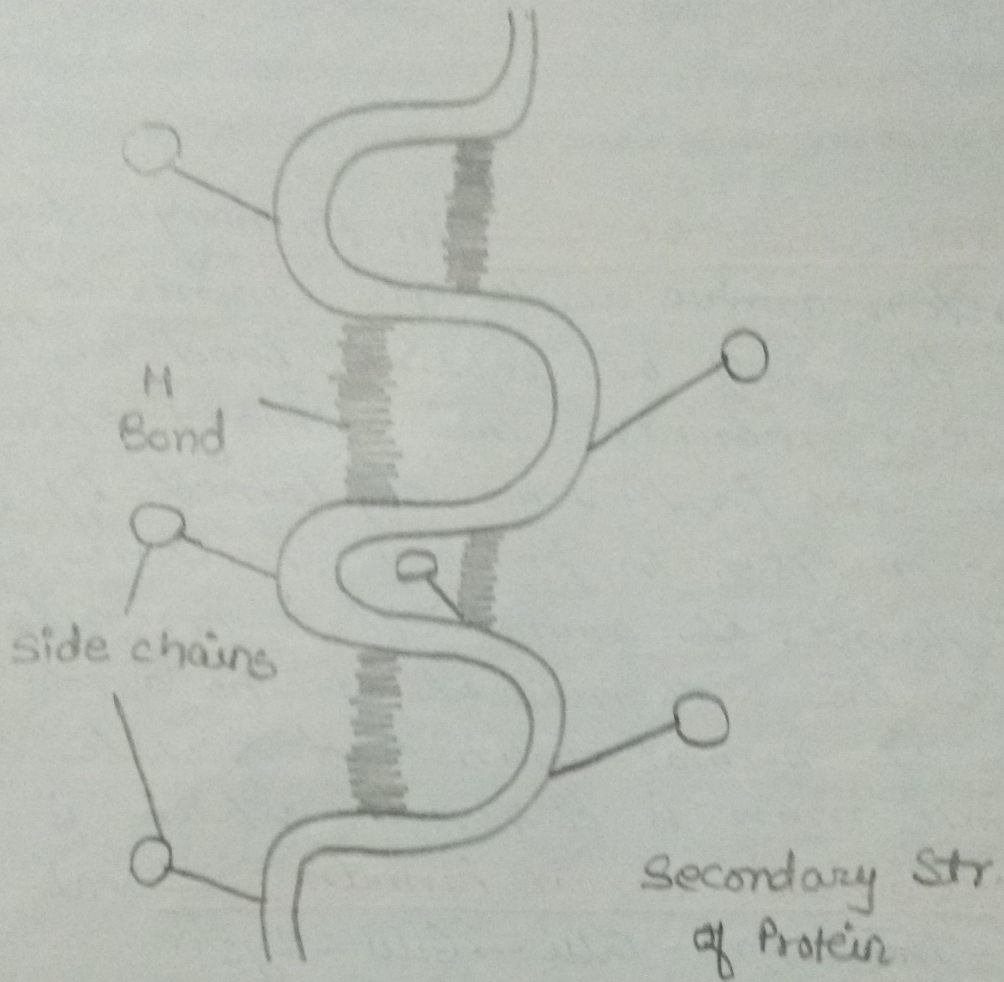
(1) Primary structure: — In primary structure of protein amino acids are connected together with the help of peptide bond and arranged in linear manner. The primary structure of insulin was first time explained by Frederick Sanger in 1954. In primary structure of protein the sequence of amino acid is irregular. For example, the sequence of amino acids in haemoglobin of normal man and sickle celled anaemic man is different which is as follows—

(i) Haemoglobin of normal human: — Val-His-Leu
— Thr — pro — Glu — Glu — Lys —

(ii) Haemoglobin of anaemic human: — Val
His — Leu — Thr — pro — Val — Glu — Lys —

(2) Secondary structure: — In the secondary structure of protein some folds are appear due to molecular force of hydrogen bonds as a result polypeptide appear in the form of coiled helix like structure such type of helix is called α helix





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<3> Tertiary structure: — In the tertiary structure of protein some bonds are present due to which many loops are formed in elongated peptide chain. Such type of helix is called α -helix. These bonds are as follows —

(a) Hydrogen bond: — it is found b/w OH group of hydroxy amino acid and COOH group of acidic amino acid.

(b) Ionic bond: — it is found b/w NH_2 group of basic amino acid and COOH group of acidic amino acid.

(c) Hydrophobic bond: — it is found b/w two nearer R groups.

(d) Disulphide bond: — it is made by cysteine

<4> Quaternary structure: — The quaternary structure of protein is made by polymerization of proteins with tertiary structure.

Functions: — (i) proteins are necessary for formation of new protoplasm and growth of body as well as repairing of damage part of body.

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(ii) Proteins are necessary for formation of heat and energy.

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(iii) Proteins are necessary for formation of some useful chemicals like thyroxine, adrenaline etc.

(iv) Proteins are necessary for development immune system of body.

(v) Proteins are necessary for control the metabolic activities of body.