

## **Protein Structure**

A protein may consist of one or more poly peptide chains. The different levels of structural organization shown by proteins are primary, secondary tertiary and quaternary.

### **Primary structure.**

The primary structure refers to the number, nature and sequence of amino acids in the polypeptide chain or chains that constitute the protein. Every polypeptide carries a free amino group at one end and a free carboxyl group at the opposite end. The end at amino group is termed amino-terminal end while the carboxyl end is termed carboxy terminal end.

### **Secondary Structure.**

It refers to the folding and twisting of the polypeptide chain brought about primarily by hydrogen bonds between amide (NH) and carbonyl (C=O) groups. Two basic types of secondary structures, namely  $\alpha$  helix and  $\beta$  pleated sheet.

#### **$\alpha$ -helix.**

In  $\alpha$ -helix, polypeptide chains assume a spiral or spring like conformation. Each turn of the  $\alpha$  helix is consists of 3.6 aminoacid residues. The amino acid is  $1.5 \text{ \AA}$ . A helix are linked by hydrogen bonds.

#### **$\beta$ -Pleated sheet.**

Proteins appears to be pleated because of the special arrangement of the polypeptide chain. Poly-peptide chains are almost fully extended. The distance between adjacent aminoacid is  $3.5 \text{ \AA}$ .  $\beta$  conformation is stabilized by hydrogen bond.

## **Tertiary Structure**

The Poly peptide chain often undergoes further coiling and folding to produce the tertiary structure. It is the three dimensional structure.

The tertiary structure is stabilized by several types of bonds, namely hydrogen bonds, ionic bonds, hydrophobic interactions, van der waals forces and disulphide linkages.

Eg: - Myoglobin.

## **Quaternary Structure**

Quaternary structure is displayed by proteins containing more than one polypeptide chains. Weak bonds such as hydrogen bonds, ionic bonds, hydrophobic interactions and van der waals forces are responsible for quaternary structure.

Eg:- Haemoglobin

Quaternary structure may be categorized into homogeneous and heterogenous types.

In homogeneous class all the sub units are identical .

Eg;- Phosphorylase

In heterogeneous class the subunits are not alike.

Eg:- Insulin and haemoglobin.