

DANTULARI NARAYANA RAJA COLLEGE  
(AUTONOMUS)

ADIKAVI NANNAYA UNIVERSITY

SEASON – 2022

DEPARTMENT OF BIOCHEMISTRY

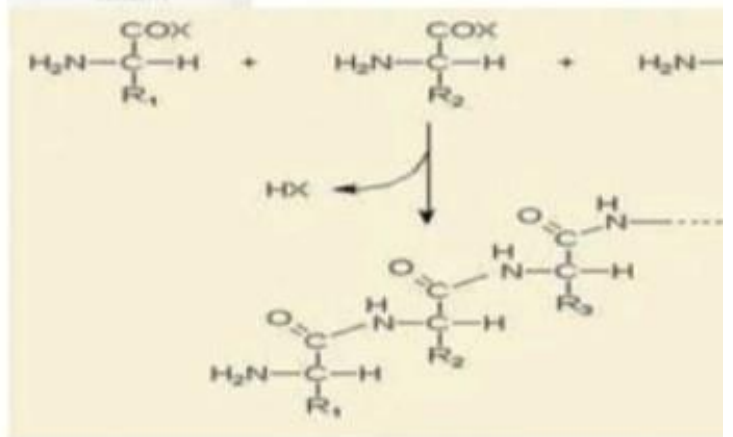
GUIDANCE BY

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M.SC M.PHIL

# PROTEINS

- Term was coined by **J.Berzelius(1838)**.
- Polymers of amino-acids
- Interlinked by **peptide bond formed by dehydration synthesis**.
- Molecular weight ranging from **4500daltons to 40 million daltons**.
- Each polypeptide chain has two specific ends-
  1. N-terminus.
  2. C-terminus.



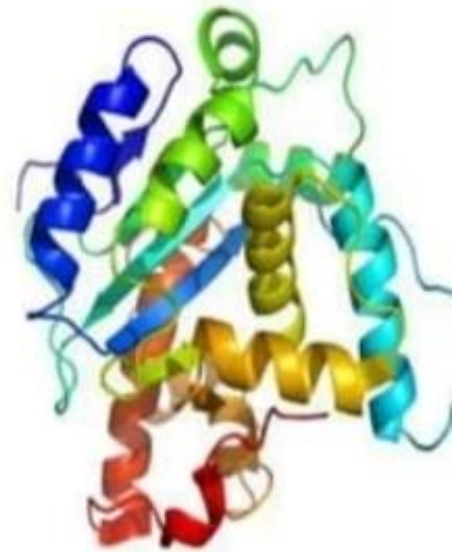
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## STRUCTURAL ORGANIZATION OF PROTEINS.



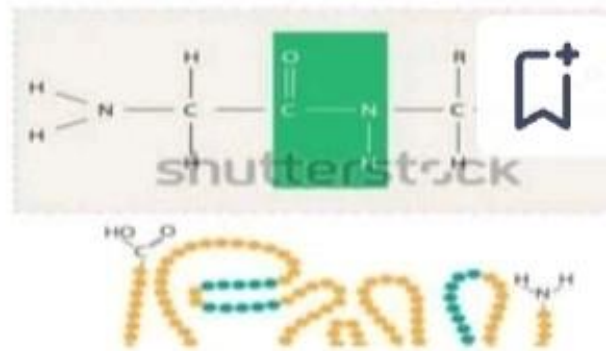
PROTEINS HAVE FOUR LEVELS OF STRUCTURE:-

1. Primary Structure.
2. Secondary Structure.
3. Tertiary Structure.
4. Quartenary Structure.



## PRIMARY STRUCTURE

1. Linear sequence of amino acids.
2. Joined together by a **Covalent Bond**- known as -"PEPTIDE BOND".
3. Formed between alpha amino group of one amino acid and alpha carboxyl group of another amino acid.
4. Joining of amino acids by peptide bond form a polypeptide chain (when more than 30 amino acids).
5. Its sequence is determined by nucleotide triplet in DNA.
6. e.g.-enzyme- RIBONUCLEASE and INSULIN hormone.



Primary structure of ribonucleas



## SECONDARY STRUCTURE

The regular recurring arrangements in space of adjacent amino acid residues in a polypeptide chain .

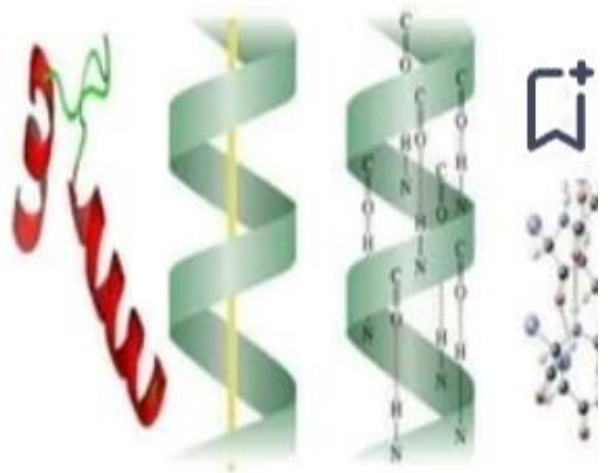
• *It is of two types:-*

1. Alpha helix Structure.
2. Beta pleated Structure.



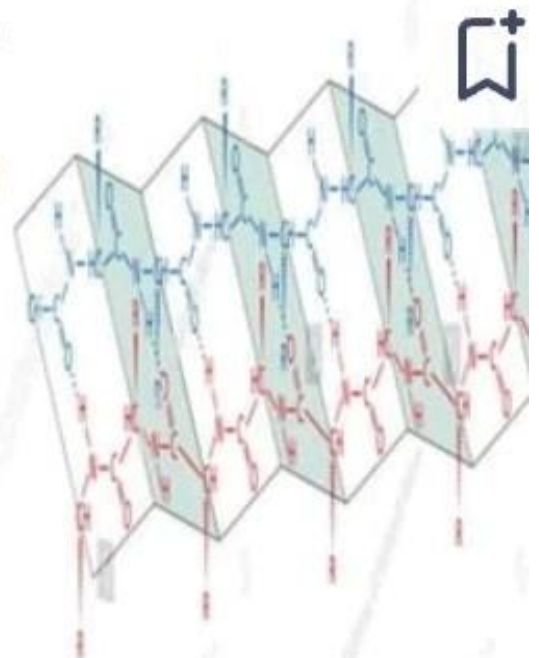
## 1) ALPHA HELIX STRUCTURE

1. When a polypeptide chain is often coiled into a regular spiral to have a 3D form.
2. It is very precise having 3.6 amino acid in each term of the helix.
3. The amino acids are so placed that their side chains are extended outwards from the spiral.
4. The helical structure is maintained by a series of regularly spaced intermolecular H- bonds formed b/w hydrogen and oxygen atom.
5. e.g.:-**KERATIN** of hair and nails.



## 2) BETA-PLEATED STRUCTURE.

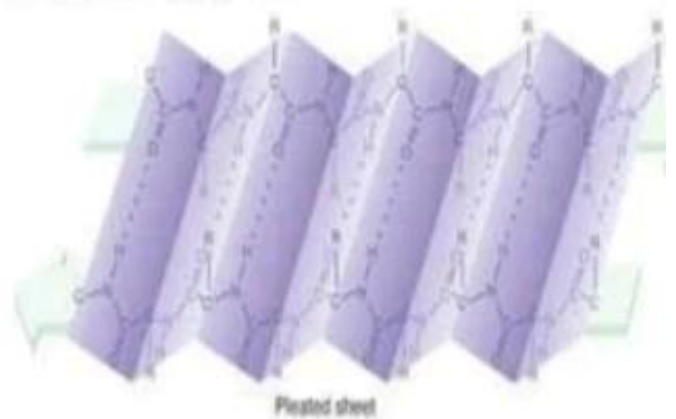
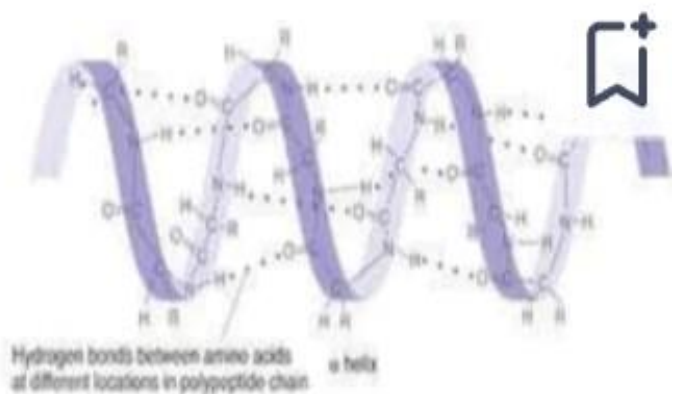
1. Two or more polypeptide chains joined together by intermolecular H-bonds and may bend into parallel folds which by H-bonding assume to form a pleated structure.
2. In a pleated structure the adjacent polypeptide chains may run in the same direction (Parallel pleated) or in opposite direction (Antiparallel pleated sheet).
3. e.g.:-Antibodies .  
Protein of silk fibre.



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## CONCLUSION

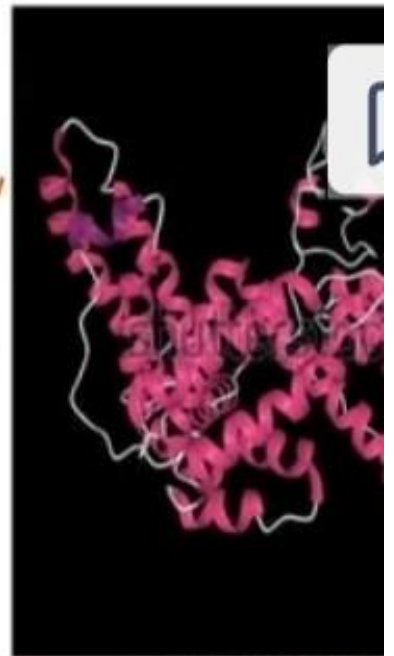
- So ,the alpha helix (random coil) and beta-pleated conformations are termed the secondary structure of proteins





## TERTIARY STRUCTURE

1. When helical polypeptide molecules fold on itself and assume a complex but **specific form-Spherical, Rod like or any form in b/w these.**
2. These geometrical shapes are known as the tertiary structure of proteins.
3. The coils and folds of the polypeptide molecules are so arranged as to hide the non-polar amino-acid side chains inside and to expose the polar side-chains.
4. The tertiary structure of a protein bring distant amino-acid side chains nearer to form active sites of enzyme protein.
5. Maintained by H-bonds, ionic, disulphide , van der walls and hydrophobic bonds formed b/w one part of a polypeptide and another.
6. The biological activity of a protein molecule depends largely on the specific-tertiary structure.
7. This structure is easily disrupted by pH, temp. and by chemicals stopping the functions of proteins.
8. e.g:-globular proteins- albumen of eggs, Hb of RBC's, gluten of wheat.



## DENATURATION OF TERTIARY STRUCTURE



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## QUARTERNARY STRUCTURE

1. When proteins consists of two or more polypeptide chains, each with primary, secondary and tertiary structure i.e. **more than one amino acid chain**.
2. Such proteins have a quarternary structure.
3. The quarternary structure of a protein is maintained by **the same types of bonds that maintain the tertiary structure**.
4. e.g:-**PHOSPHORYLASE** enzyme.  
**DNA Polymerase.**  
**Haemoglobin.**



quaternary structure  
(aggregation of two or more peptides)



# SUMMARY



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***THANKYOU***

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