جامعة المستقبل
AL MUSTAQBAL UNIVERSITY
كلية العلوم

DEPARTMENT OF BIOCHEMISTRY

PROTEIN BIOCHEMISTRY

LECTURE 2

BY

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PROTEINS

- The Molecules which yields amino acids upon hydrolysis are called proteins.
- Proteins are natural polymer of amino acids.
- The number of amino acids in a protein molecule may range from two to several thousands.
- Protein molecules contain Nitrogen, Carbon, Hydrogen and Oxygen.

PROTEINS

- Proteins are the basis for the major structural components of animal and human tissue.
- They act as biological catalysts (Enzymes), form structural parts of organisms, participate in different cell reactions, act as molecules of immunity and also provide fuel.

CLASSIFICATION OF PROTEINS

(a) Simple Proteins

- Those which give one amino acid only upon hydrolysis.

(b) Conjugated Proteins

- Those which give an amino acid and a non-protein group upon hydrolysis.

(c) Derived Proteins

- Those which are derived from simple and conjugated proteins.

STRUCTURE OF PROTEINS

- Depends upon the spatial arrangement of polypeptide chains.
- Three arrangements are possible.
- Four structures:
  i. Primary structure
  ii. Secondary structure
  iii. Tertiary Structure
  iv. Quaternary Structure

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The Primary Structure Of Proteins

- The sequence of amino acids in a polypeptide chain is called a primary structure.
- Amino Acids are linked with one another through peptide bonds.

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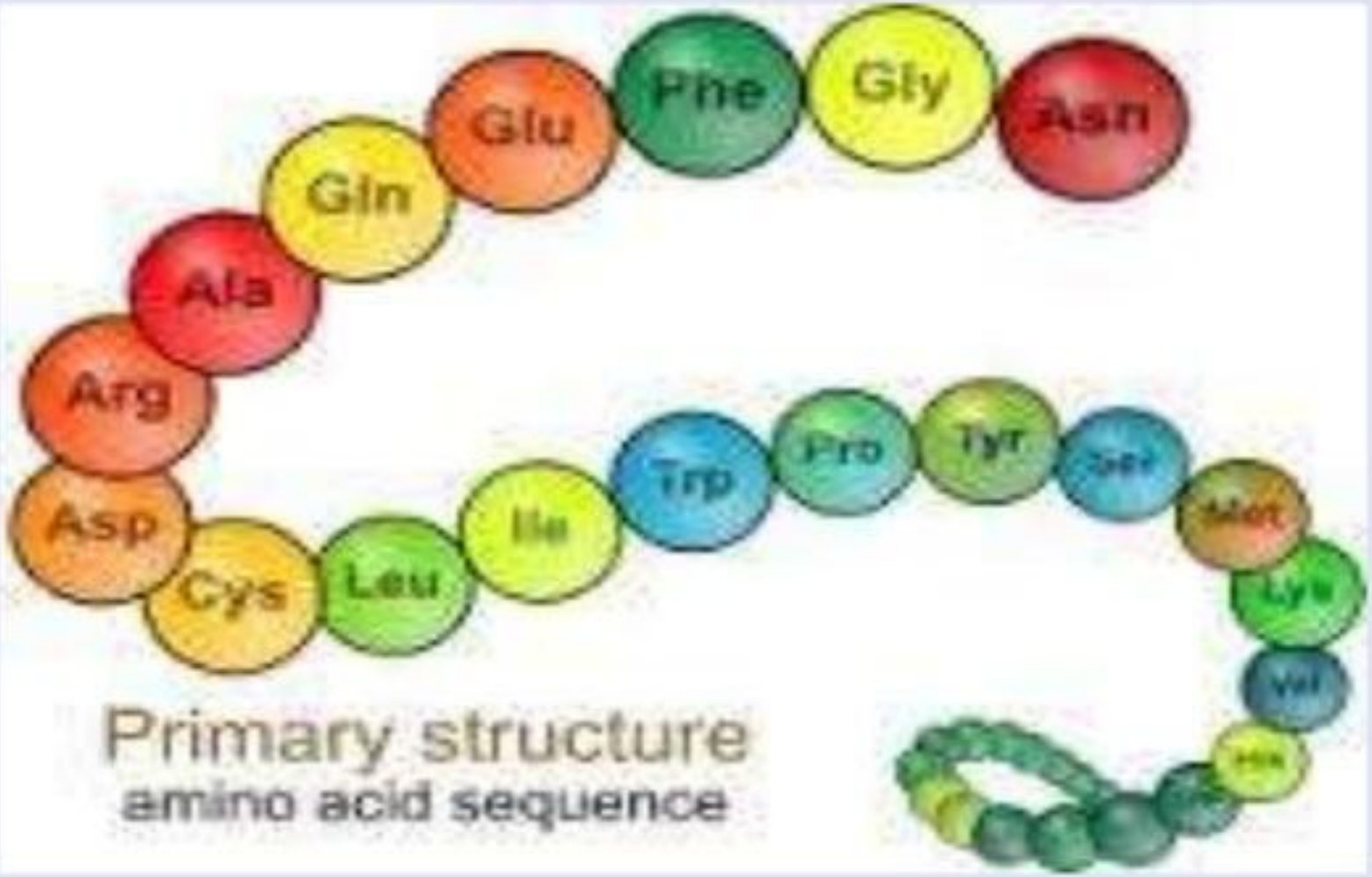
The Primary Structure Of Proteins



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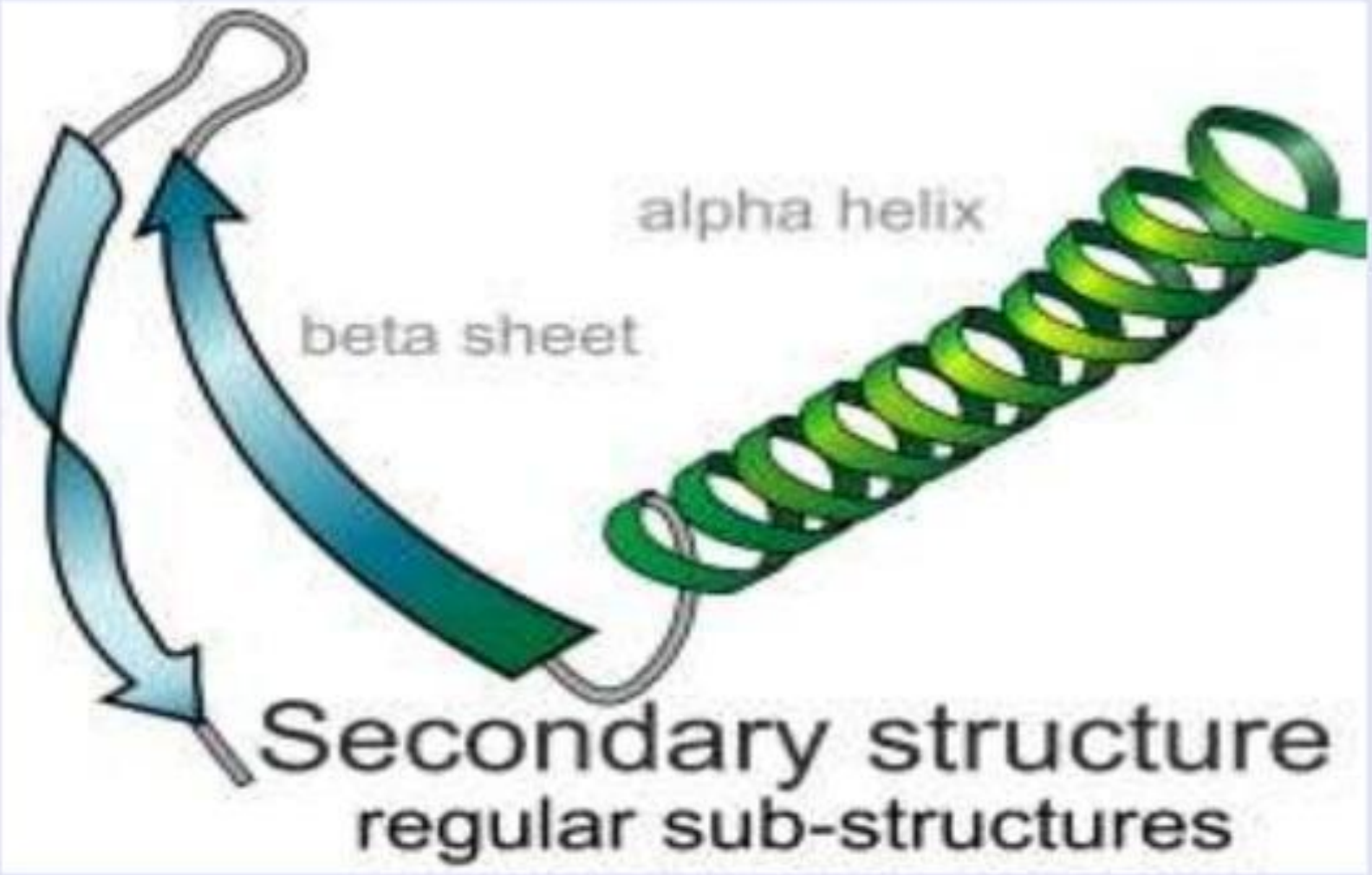
The Secondary Structure Of Proteins

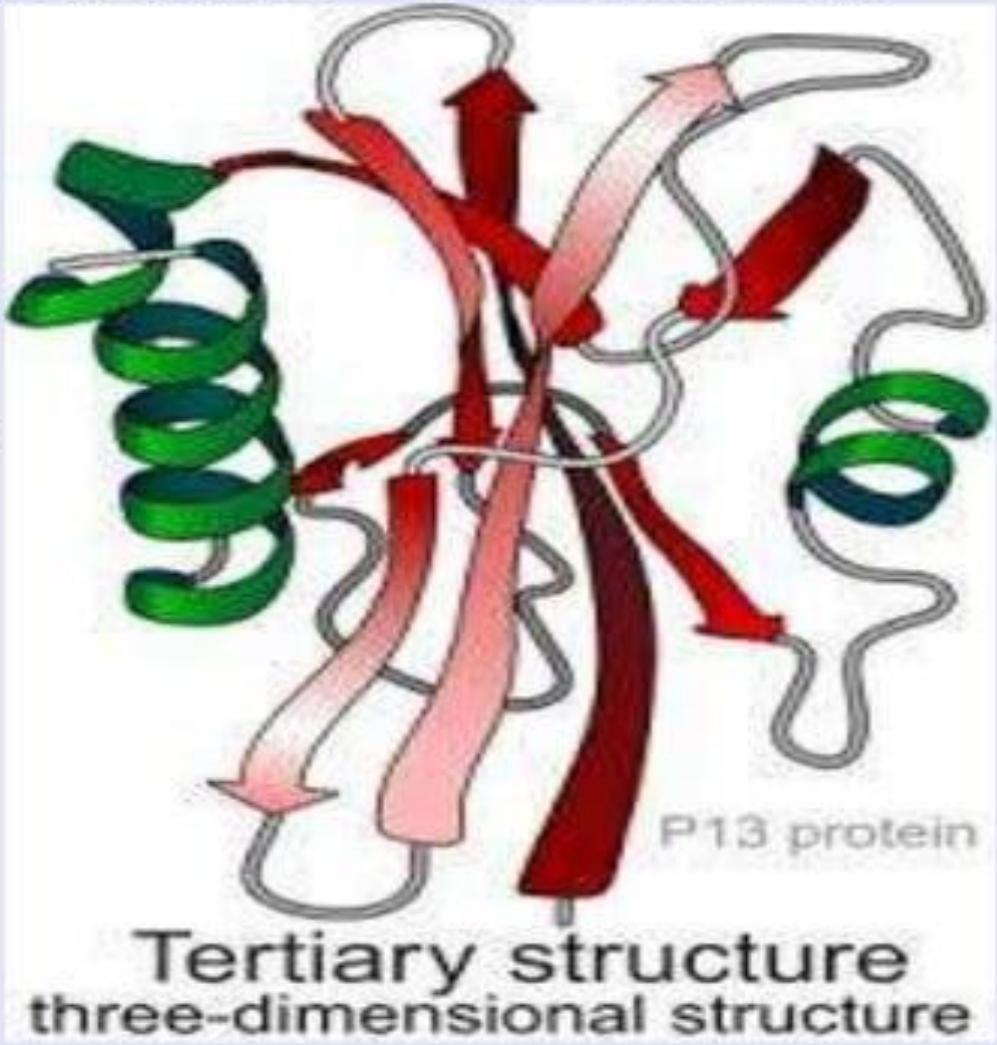
- Peptide chains may acquire spiral shape or may be present in a zig zig manner.
- This coiling of peptide chains is called the secondary structure of proteins.
- It is due to Hydrogen bonding.

The Secondary Structure Of Proteins



The Tertiary Structure Of Proteins

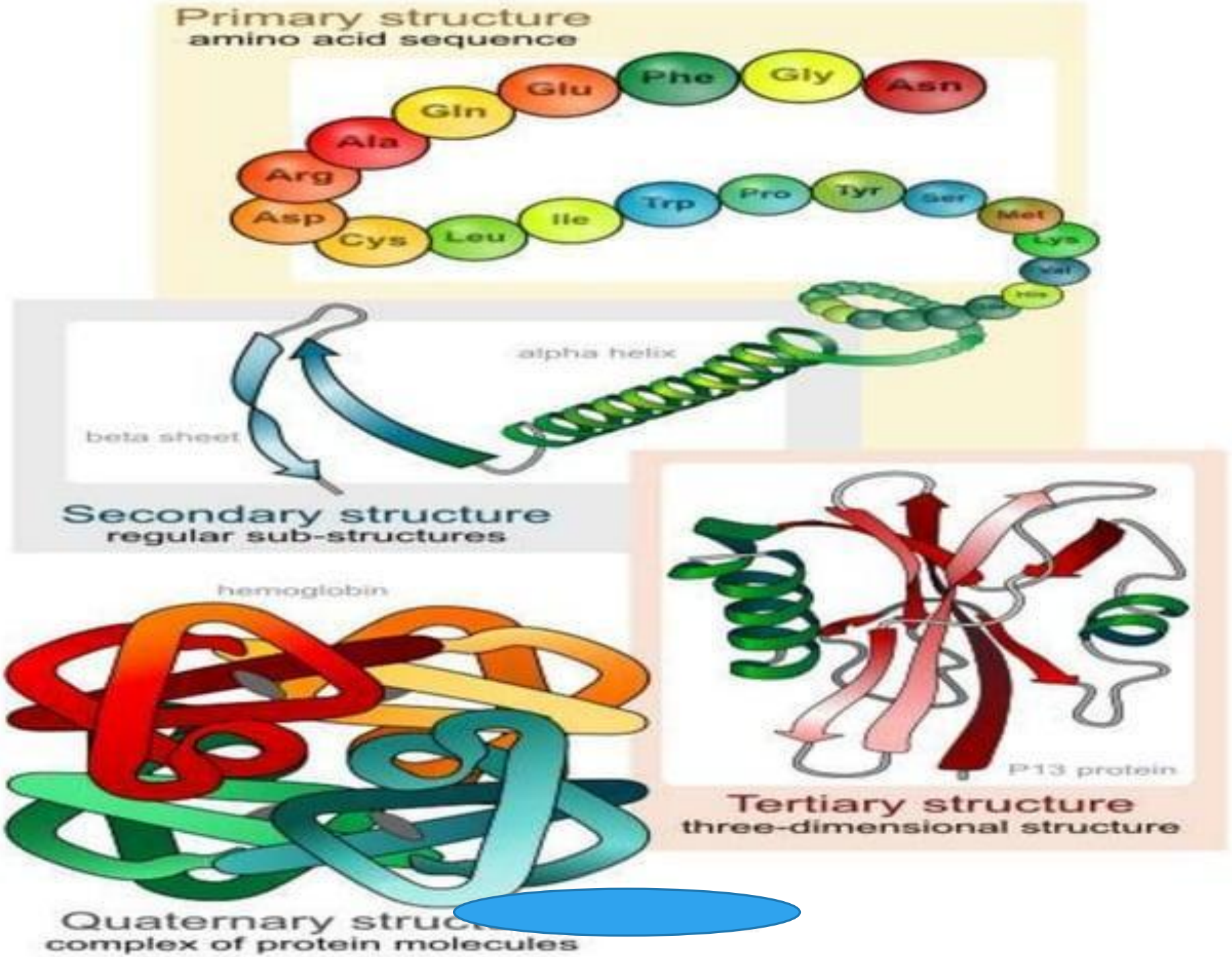
- Twisting or folding of polypeptide chains represents tertiary structure of proteins.



The Quaternary Structure Of Proteins

- Quaternary means four.
- It is the arrangement of multiple folded protein or coiling protein molecules in a multi-subunit complex.
- A variety of bonding interactions including Hydrogen bonding, salt bridges and disulfide bonds holds the various chains into a particular geometry.

The Quaternary Structure Of Proteins

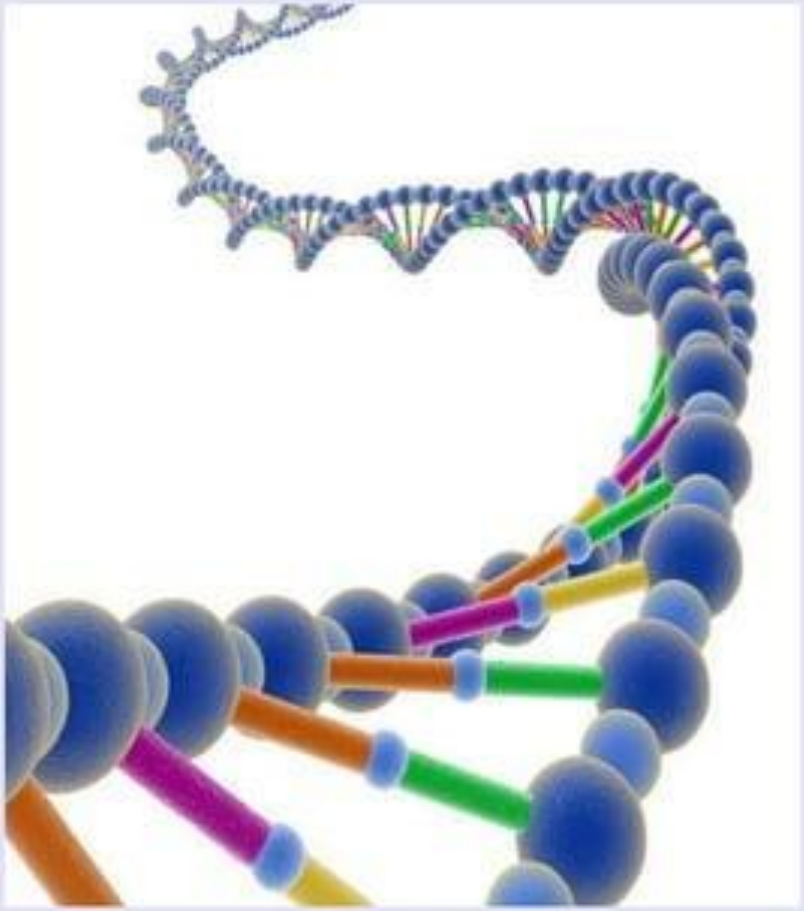

Primary structure
amino acid sequence
Glu
Phe
Gly
Asn
Gln
Ala
Arg
Asp
Cys
Leu
Ile
Trp
Pro
Tyr
Ser
Met
Lys
Val
alpha helix
beta sheet
Secondary structure
regular sub-structures
hemoglobin
P13 protein
Tertiary structure
three-dimensional structure
Quaternary struc
complex of protein molecules

Properties Of Proteins

- Found in all living organisms.
- Involved in processes such as digestion of food, cell structure, catalysis, movement, energy manipulation etc.
- Complex molecules.
- Polymers of amino acids.
- Long chains of amino acids are called Polypeptides.

Importance of Proteins

- Nucleoproteins are complex proteins and act as the carrier of heredity materials from one generation to another.

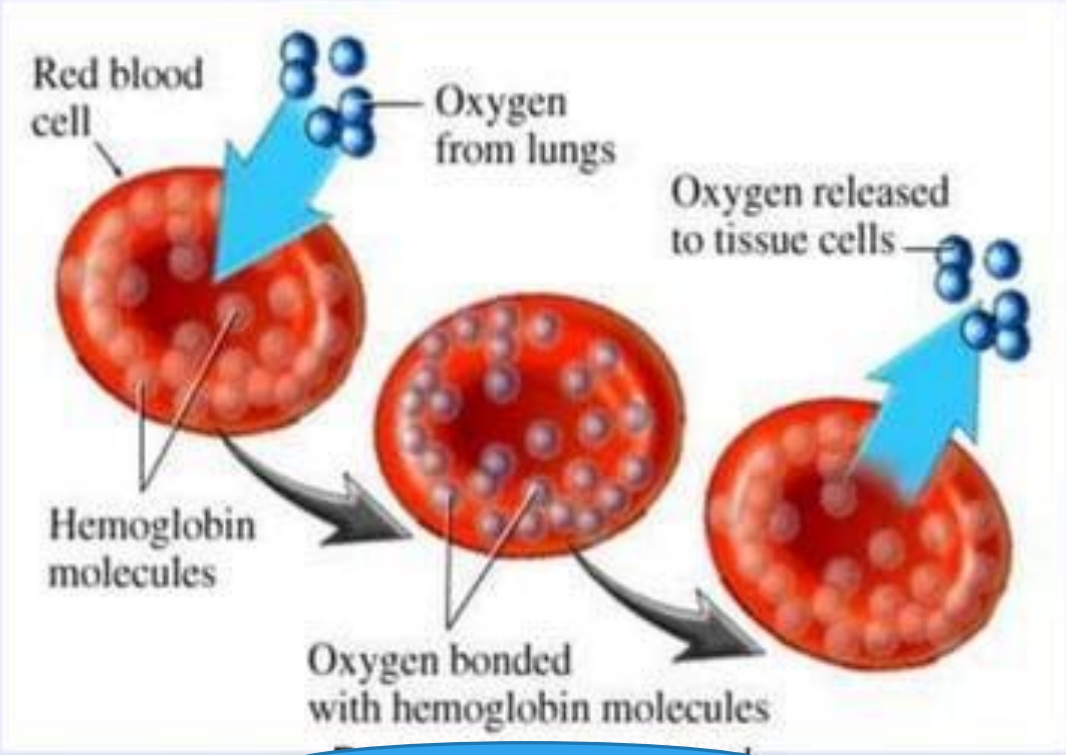


Importance of Proteins

- Enzymes are the biological catalyst and they are also proteins

Importance of Proteins

- Hemoglobin is a protein. It act as oxygen carrier.



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