Tuesday, 14 June 2022 10:39 AM

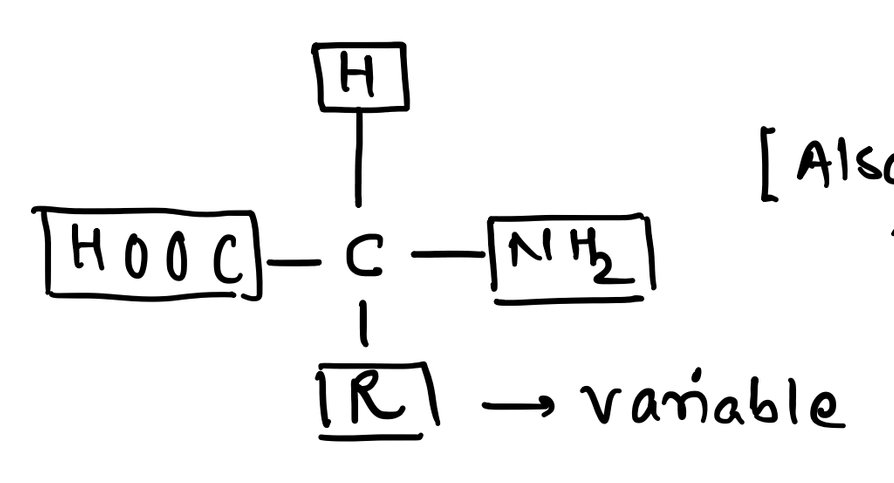
(2) **Proteins** :- They are heteropolymer. (C,H,O,N)

Monomeric unit → α-amino acid.

Polypeptide → 2+ should contain at least 50 a.a.

Aminoacids :-

They organic compound containing an amino group and an acidic group as substituents on the same carbon i.e., the α-Carbon ∴ they are called α-amino acids.



[Also k/a Substituted methane]

→ variable grp.

* Based on nature of 'R' grp there are many amino acids

* Only 20 types are found in proteins. (Magic 20)

* Physical and physical properties of amino acids are due to '$-NH_2$ grp', '$-COOH$' grp and 'R' functional group.

① Neutral amino acid :- Glycine, alanine, Valine, Leucine, Isoleucine
1 NH_2 1 COOH

② Acidic :→ Aspartic acid, Glutamic acid
2 COOH 1 NH_2
↓ amide: Aspargine; ↓ amine: Glutamine

③ Basic :→ Arginine, Lysine
2 NH_2 1 COOH

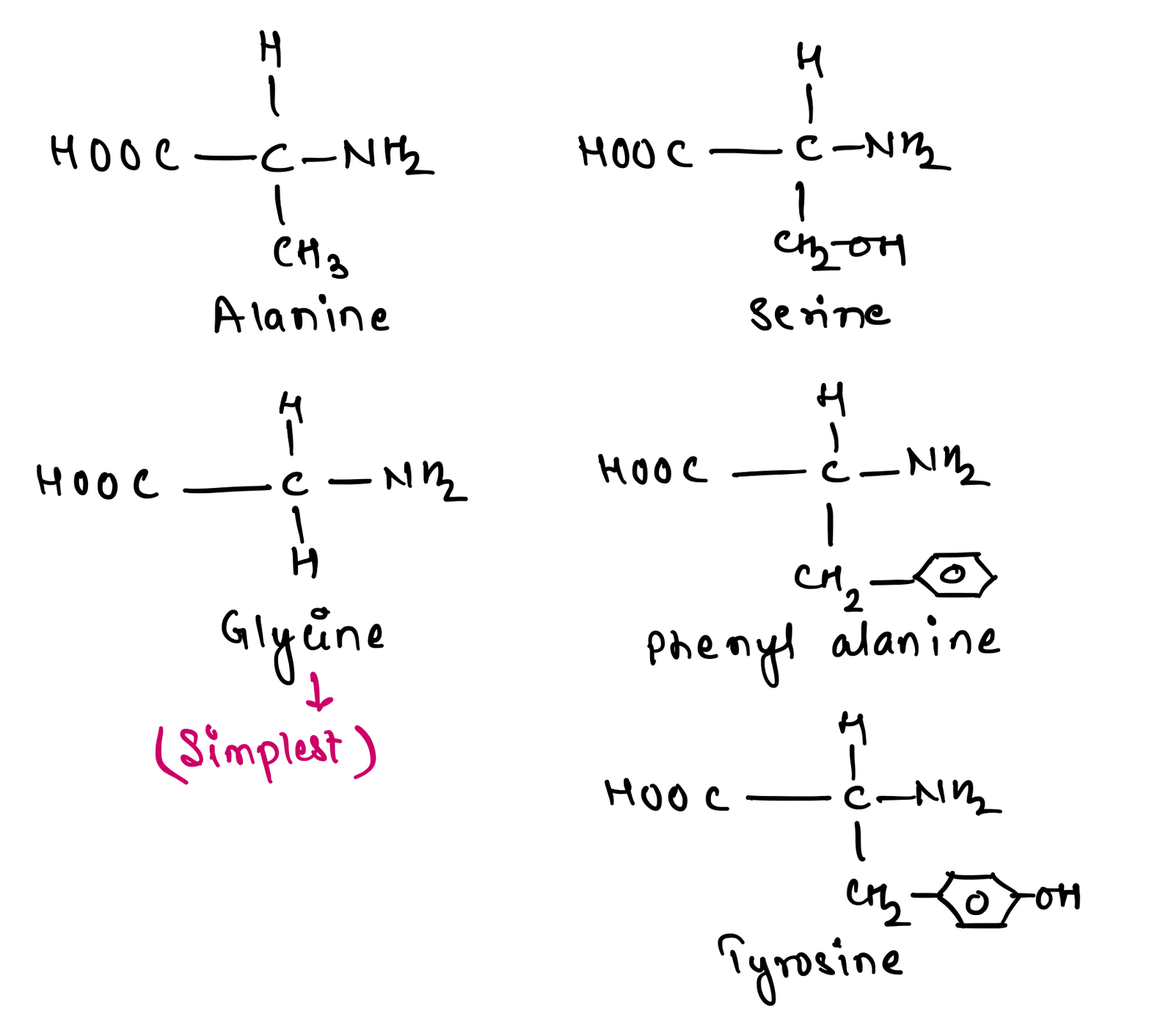
④ S-containing :→ Cysteine, Methionine

⑤ Alcoholic :- Serine, Threonine

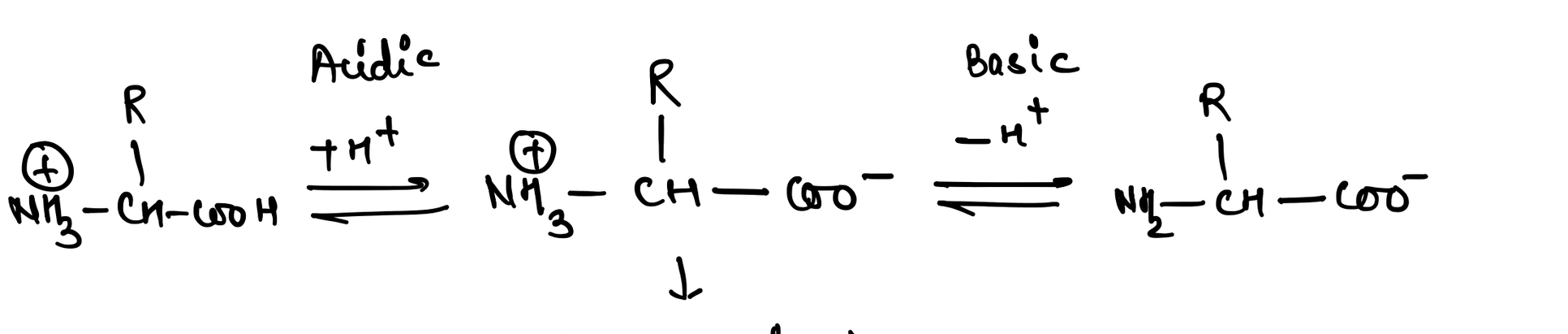
⑥ Aromatic :- Phenylalanine, Tyrosine, Tryptophan

⑦ Heterocyclic :- Histidine, Proline

Tryptophan → (most complex)



* A particular property of aminoacids is ionisable nature of $-NH_2$ and $-COOH$ groups.



↓

(Zwitter ionic form)

↓

" occur at isoelectric pH of that amino - acid"

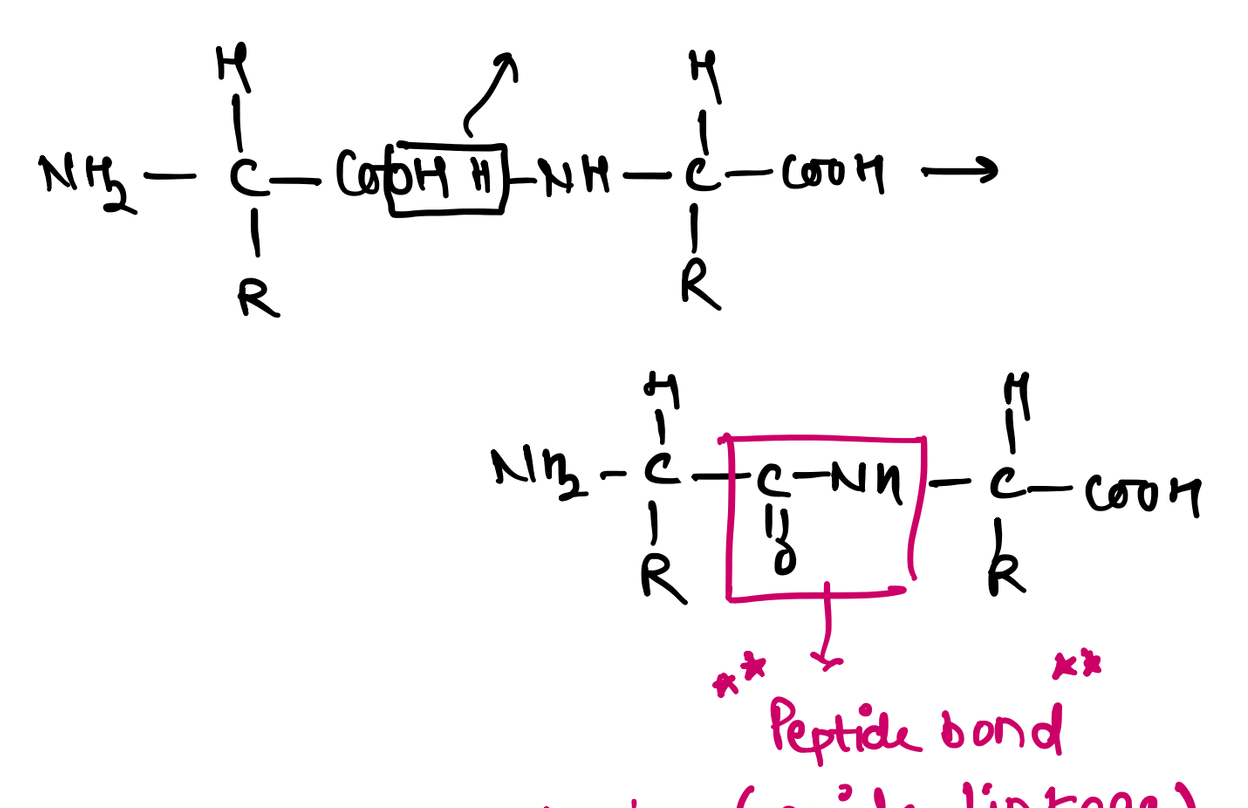
* On the basis of synthesis by animal body

Essential a.a.
(our body can't synthesize them ∴ they should be present in our diet/food)

Non-essential a.a
(They can be synthesized by our body)

** ILL PMT TV (funda)
Isoleucine, Leucine, Lysine, Phenyl alanine, Methionine, Tryptophan, Threonine, Valine

** " Arginine & Histidine are Semi-essential amino acid "



chemically (amide linkage) = Peptide linkage

* Some uses :-

Tyrosine → precursor of thyroxine, adrenaline, melonin

Tryptophan → Precursor of IAA, nicotinamide, serotonin, melatonin

Biologists study Protein structure up to ④ level of organisations. → 1°, 2°, 3° & 4° (quarternary)

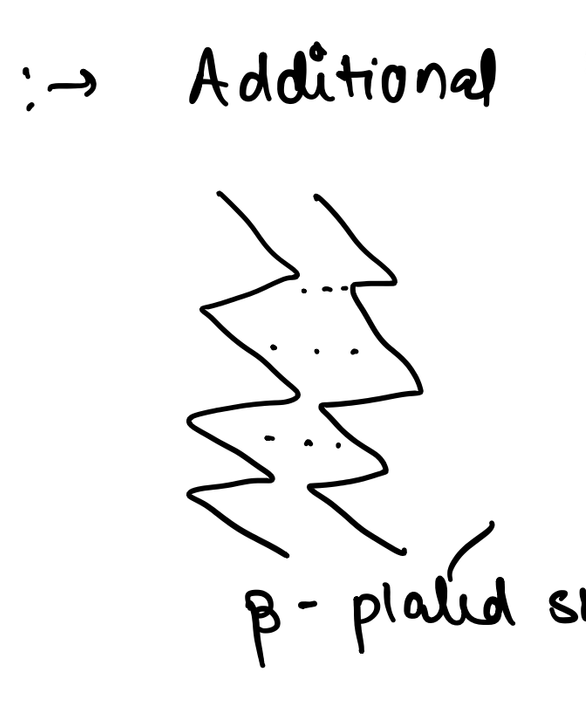
* 1° (Primary) → The sequence of amino acid i.e. positional information in a protein is called the primary structure.

left end NH_2 ——————— Right end COOH

(1st amino acid) ↓ Ⓝ-terminal amino acid

(last amino acid) ↓ Ⓒ-terminal amino acid

* 2° Structure :→ Additional H-bond is present.

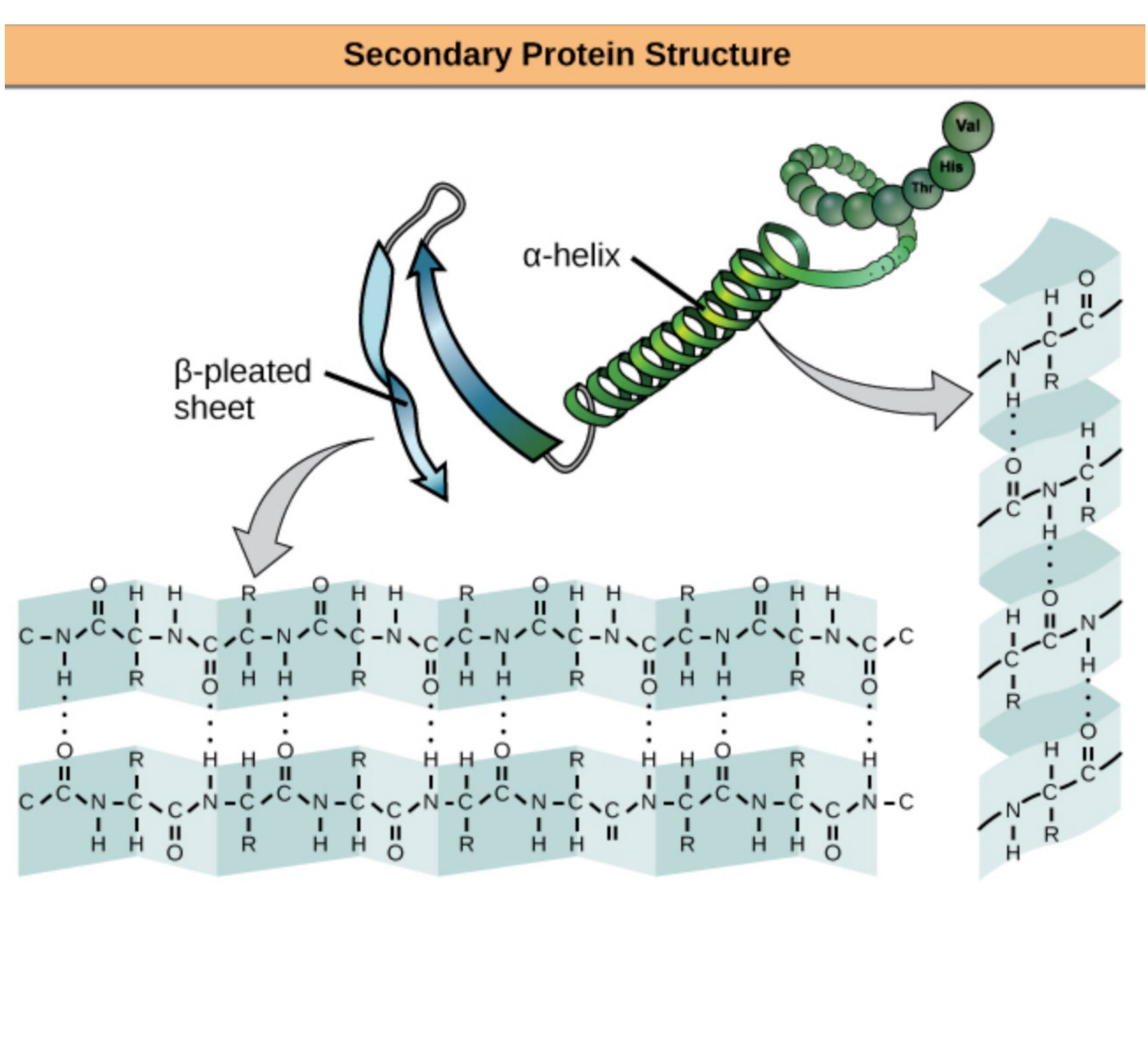


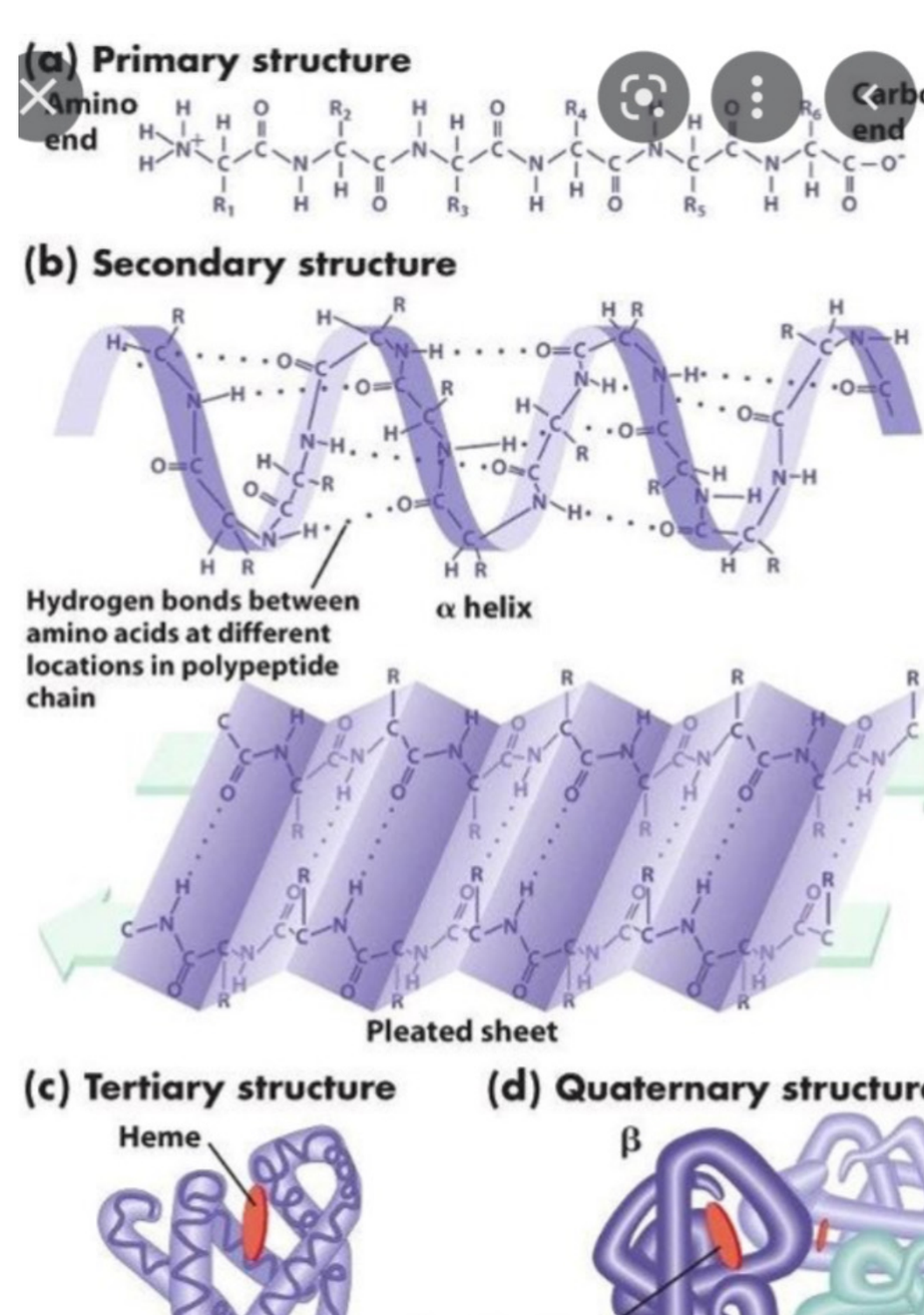
α-Helix — β-plated sheet

"only Right Handed helix are observed in proteins"

(Intramolecular H-bond) — (Intermolecular H-bond)

Eg. Keratin (Hair), myosin, tropomyosin, fibrin — β-keratin, fibroin of silk





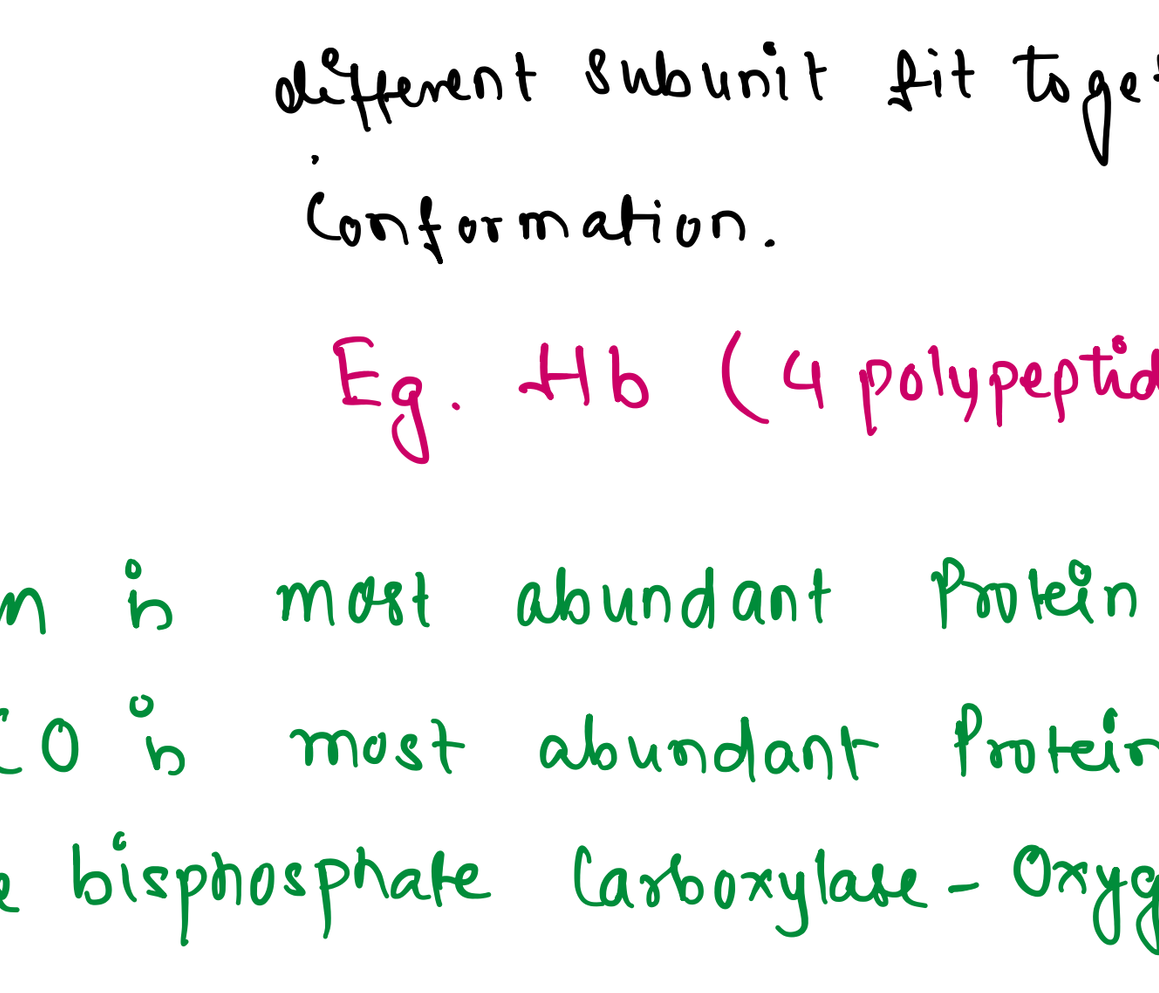
(a) Primary structure
Amino end
Carboxyl end
(b) Secondary structure
Hydrogen bonds between amino acids at different locations in polypeptide chain
α helix
Pleated sheet
(c) Tertiary structure
Heme
β polypeptide
(d) Quaternary structure
Heme group
β
α
548 × 799

* 3° Structure :- If long chain of protein is folded upon itself like a hollow woolen ball, the structure formed is k/a 3° structure.

- ionic bond
- Vander Waal's interactions
- disulphide bond
- Hydrophobic bond

This give 3-D view of a protein.

3° structure is absolutely necessary for the many biological activities of proteins.



* 4° structure :- Some proteins are an assembly of more than one polypeptide or subunits. These are called multimeric protein. Each polypeptide develops its own 3° structure & function as subunit of the protein. The different subunit fit together & give the conformation.

Eg. Hb (4 polypeptide 2α, 2β chain)

✓ Collagen is most abundant Protein in Animal world

✓ RuBisCO is most abundant Protein in whole Biosphere. (Ribulose bisphosphate Carboxylase - Oxygenase)

Properties of Proteins :-

1. Variety → There are thousands of proteins present in each organism.

2. Denaturation → Functional 3D-form of a protein is called native state. The state is maintained by specific bond that forms its 4°, 3°, 2° structures. These bonds are easily broken down by high temp, High energy radiation, Soap, disinfectants, detergents, alcohol etc. The phenomenon is called "denaturation"

3. Specificity :- They are highly specific in nature. Each species has certain specific proteins not found in others.

Functions :-

1. Defence Proteins — Ig or antibodies are proteins produced by B-lymphocytes. They fight against infectious agents

2. Structural proteins :- Protein constitute more than 50% of dry wt of protoplast.
⇒ elastin of ligament
⇒ collagen — Intercellular ground substance

3. Contractile Protein :- found in muscles actin & myosin.

4. Microtubules :→ Made up of tubulin Protein

5. Enzymes :→ Most of the enzymes are proteins for eg. Trypsin, Pepsin

6. Transport or Carrier proteins :→ Help in transport of nutrients across membrane. GLUT-4 ⇒ enable glucose transport into cells. ↳ Glucose Transporter.

7. Receptor Proteins :→ Help in sensory reception (smell, taste, Hormone etc)

8. Hormones :→ Some hormones are proteins GH, PTH

9. Blood clotting Proteins :→ For eg fibrinogen & Thrombin

10. Visual proteins :→ Rhodopsin & Iodopsin in eyes.

11. Protective Protein :→ Keratin

12. Storage Proteins

13. Toxins