Proteins → Proteos ↷ Prime Importance

- Most abundant Organic molecule in Cell

→ Eukaryotic → 18 %.
→ Prokaryotic → 15 %.

"Proteins are polymers of Amino Acids"

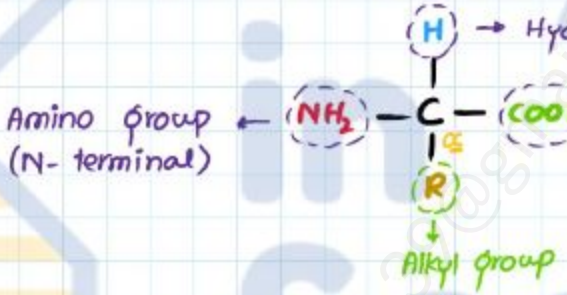
Elements → Essential (C, H, O, N)
Elements → Non-Essential (S, P, Fe, I, mg)

Amino Acids ⇌ Protein
(H_2O (Dehydration) / H_2O (Hydration))

- Total Types → 170 Types
- Protein Formation → 25 Types
- Abundantly → 20 Types

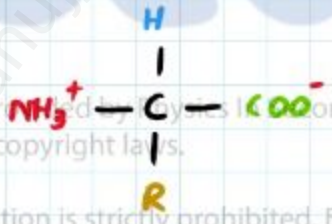
Essential Amino Acid → 10
→ Which can not be prepared by body.

Non-Essential A. Acids → 10
→ Which are prepared by body.



R = H → Glycine
$R = CH_3$ → Alanine

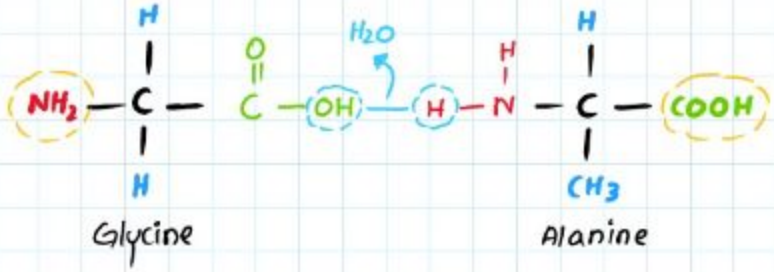
ZWITTER ION / INTERNAL SALT



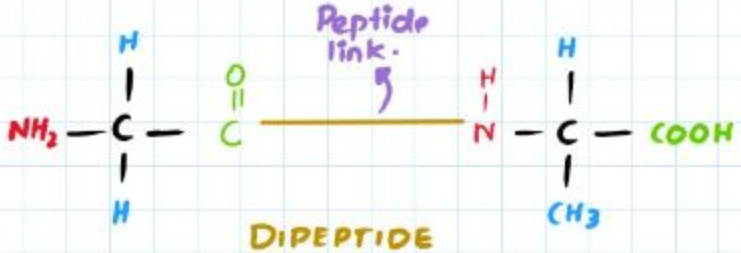
SULPHER CONTAINING
→ Methionine
→ Cysteine
(Disulphide bridges)

PROTEIN FORMATION → Translation (Ribosomal Dependant Reaction)
→ Amino Acid Polymerization

N-terminal → C-terminal
NH_2 → COOH



Peptide



DIPEPTIDE
(Glycalanine)

1000 A. Acid
→ One Protein
→ 10 polypeptide chain.
→ Peptide ?

1000 − 10 = ?
990

NAME	AMINO ACIDS	PEPTIDE
DIPEPTIDE	2	1
Tri Peptide	3	2
Tetra "	4	3
Penta "	5	4
Hexa "	6	5
Hepta "	7	6

→ One polypeptide chain of 200 Amino Acid.
→ Peptide linkage ?

199 Peptide/ Amide

Q = 10 different types of Amino Acids → Dipeptides ?

n^2 = 10^2 → 10 × 10 = 100 Dipeptides

STRUCTURES OF PROTEIN

PRIMARY STRUCTURE
- No. of Amino Acids
- Sequence of Amino Acids

- Short termed
- Quickly converted into higher level of Organization
- Last to break

→ Normal Hb
(2 α, 2 β)

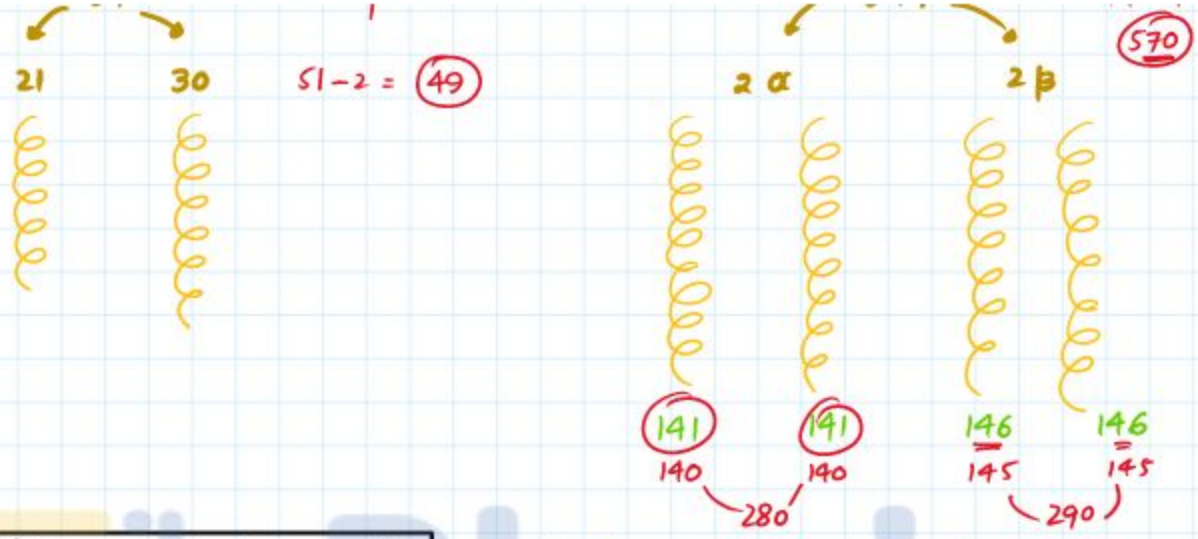
6th Amino Acid (Glutamic Acid)

→ Sickle Cell Hb
Each β-chain 6th position Amino Acid changed
6th (Valine)

F. SANGER → 1951

INSULIN
51
21 30
Peptide linkage = ?
51 − 2 = (49)

HAEMOGLOBIN
574 → 574 − 4
(570)
2 α 2 β



SECONDARY STRUCTURE → Stable / Geometrical configuration

- Fibrillar Proteins / Fibrous Proteins
- Structural Proteins

α- Helix

β- Pleated sheet

→ Bonds
- Peptide bonds
- Hydrogen bonds → Provides stability

α- Helix

Helix = 3·6 A·Acids

10 Helix , A·Acids ?

10 × 3·6 = 36

20 × 3·6 = 72

β- Pleated Sheet

→ H- bonds.

TERTIARY STRUCTURE → Globular Proteins / Functional Proteins

- Bonds
  - (H) H-bonds
  - (I) Ionic bonds
  - (D) Disulphide bridges

Globular Protein

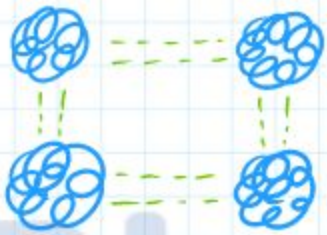
→ Peripheral (Hydrophilic A·Acids)

→ Core (Hydrophobic A·Acids)

QUATERNARY STRUCTURE → Ellipsoidal / Functional Proteins

- Bonds
  - (H) → H- bonds
  - (H) → Hydrophobic interactions
  - (I) → Ionic bonds

Haemoglobin



→ Bonds present in all structures
- Peptide linkages

→ Disulphide bonds are also found in every protein at each level.

FIBROUS PROTEINS

(F)

S → S°- structure
I → Insoluble in solutions
N → Non-crystalline
E → Elastic in Nature

EXAMPLE :

- Silk (spider web + silk worm)
- Keratin (Nails, Horns, Hoofs)
- Fibrin (Blood clot)
- Myosin (muscle)
- Collagen (connective tissues)
- Elastin (KPK)

GLOBULAR PROTEINS

→ T°/Q° structure
→ Soluble in solutions
→ Crystalline
→ Non-elastic in Nature

EXAMPLE :

- Hormones
- Enzymes
- Anti-bodies
- Haemoglobin
- Myoglobin
- Ovalabumin + Caesin (Storage of Amino Acids)
- Phosphocreatine (Provides Energy)

GENERAL QUESTIONS :

→ Most abundant Protein in Nature → Rubisco Enzyme
" " " " Body → Collagen Protein
" " " " Blood → Haemoglobin
" " " " Plasma → Albumin