

20/12/21 Proteins and Amino Acids

→ Proteins are the most abundant organic molecule of the living system

→ They occur in every part of the cell and constitute about 50% of the

cellular dry weight

→ proteins form the fundamental basis of structure and function of life

Definition

Proteins are nitrogenous organic compounds which have large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms

or

Proteins are polymers of amino acids

Functions of proteins

These are

→ Proteins perform a great variety of specialised and essential functions in the living cells.

→ These functions may be grouped as

① Static (structural) functions

② Dynamic functions

Structural functions → Proteins are primarily responsible for structure and strength of body

Key Collagens and elastin found in bone matrix, vascular system.

→ The dynamic functions of proteins are more diversified in nature

→ These include proteins acting as enzymes, hormones, blood clotting factors, immunoglobulins, etc

Elemental Composition of Proteins

Carbon	50 - 55 %
Hydrogen	6 - 7.3 %
Oxygen	19 - 24 %
Nitrogen	13 - 19 %
Sulfur	0 - 4 %

→ Besides, the above, proteins may also contain other elements such as P, Fe, Cu, I, Mg, Mn, Zn etc

Classification of Proteins

→ Proteins are classified in different ways

- 1) Based on their function
- 2) Based on chemical nature and Solubility
- 3) ~~Nutrition~~ Based on nutrition

① Functional ~~Protein's~~ Classification of Proteins

① Structural proteins

eg Keratin of hair, and nails
Collagen of bone

- 2) Enzyme or catalytic proteins
pepsin
trypsin

3) Hormonal proteins
Insulin, Growth hormone

4) Contractile proteins
Actin, myosin

5) Storage proteins
Casein stores protein in milk
Ferritin stores iron in the spleen and liver

6) Transport proteins
Serum albumin, Hemoglobin

7) Genetic proteins
Nucleoproteins

8) Defense proteins
Immunoglobulins

9) Receptor proteins for hormones, drugs

B) Protein classification based on Chemical nature and solubility

→ It is based on the amino acid composition, structure, shape and solubility properties

→ Proteins are broadly classified into 3 major groups

- ① Simple proteins
- 2) Conjugated proteins
- 3) Derived proteins

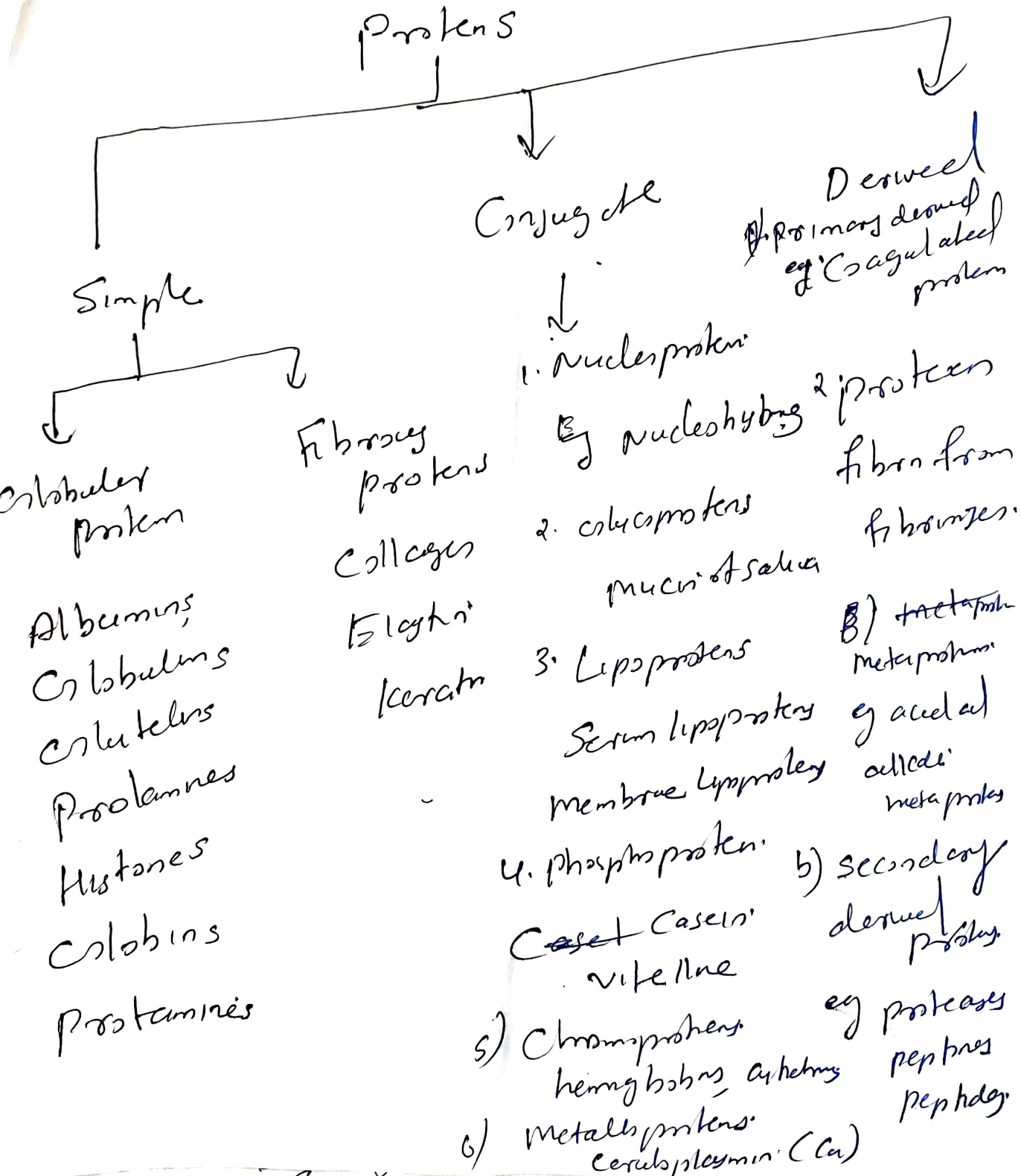
Simple proteins → They are composed

of only amino acid residues

Conjugated proteins → They contain

amino acid and non protein moiety known as prosthetic group

3. Derived proteins → These are (4)
denatured or degraded products of
Simple and conjugated proteins



3) Classification Based on Nutrition (5)

① Complete proteins

→ These proteins have all the ten essential amino acids in the required proportion by the human body to promote good growth

eg egg albumin
milk casein

2) Partially Incomplete proteins

→ These proteins are partially lacking one or more essential amino acids

and hence can promote moderate growth
eg wheat and rice proteins

3) In Complete proteins

→ These proteins completely lack one or more essential amino acids -

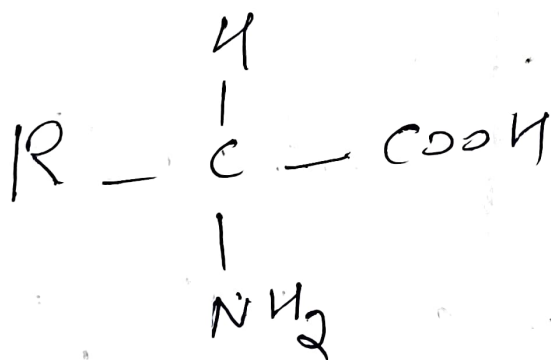
eg gelatin

Amino Acids

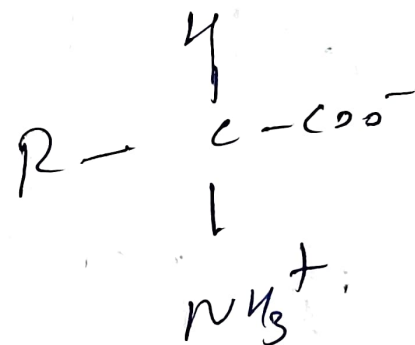
→ Amino acids are a group of organic compounds containing two functional groups (amino and carboxyl)



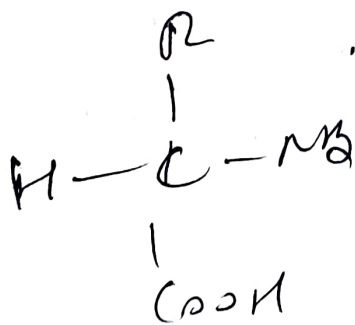
→ Amino is basic in nature and
COOH is acidic in nature



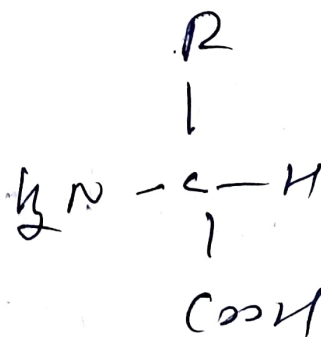
General structure



Excitatory



D-amino acid



L-Amino acid