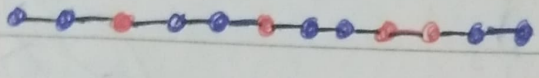
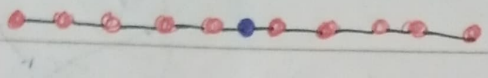
Simple Protein Classification :- (3D structure)

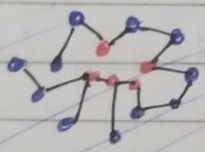
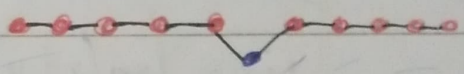
There are two main classes of 3D protein structure :-
1) Globular Protein
2) Fibrous Protein

Let's look at two Polypeptide chain :-

1) 
2) 

Here • - hydrophobic amino acid
• - hydrophilic amino acid

If these chains are placed in H_2O :-

1) 

2)

H_2O

Globular Protein — Fibrous Protein

(#) In Polypeptide (1), ~~• hydrophobic amino acid~~
- hydrophilic amino acids face outside & interact with H_2O
- hydrophobic amino acids curl inwards & avoid H_2O

In Polypeptide (2),
- hydrophic amino acids goes towards H_2O to interact
- hydrophobic amino acids avoid H_2O all together

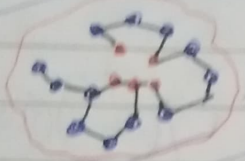
(*) Hence, Polypeptide (1) forms ball-like/spherical shape
Polypeptide (2) forms thread like shape

1) In Polypeptide (1), No. of • < No. of •
2) In Polypeptide (2), No. of • > No. of •

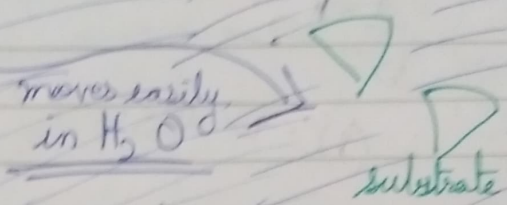
Characteristics of Globular Proteins (Eg:- Haemoglobin (in RBC))

- H_2O soluble proteins
- spherical / ball shaped
- usually has metabolic functions
  - involved in chemical reactions
    - → enzymes
    - → antibodies

Enzyme



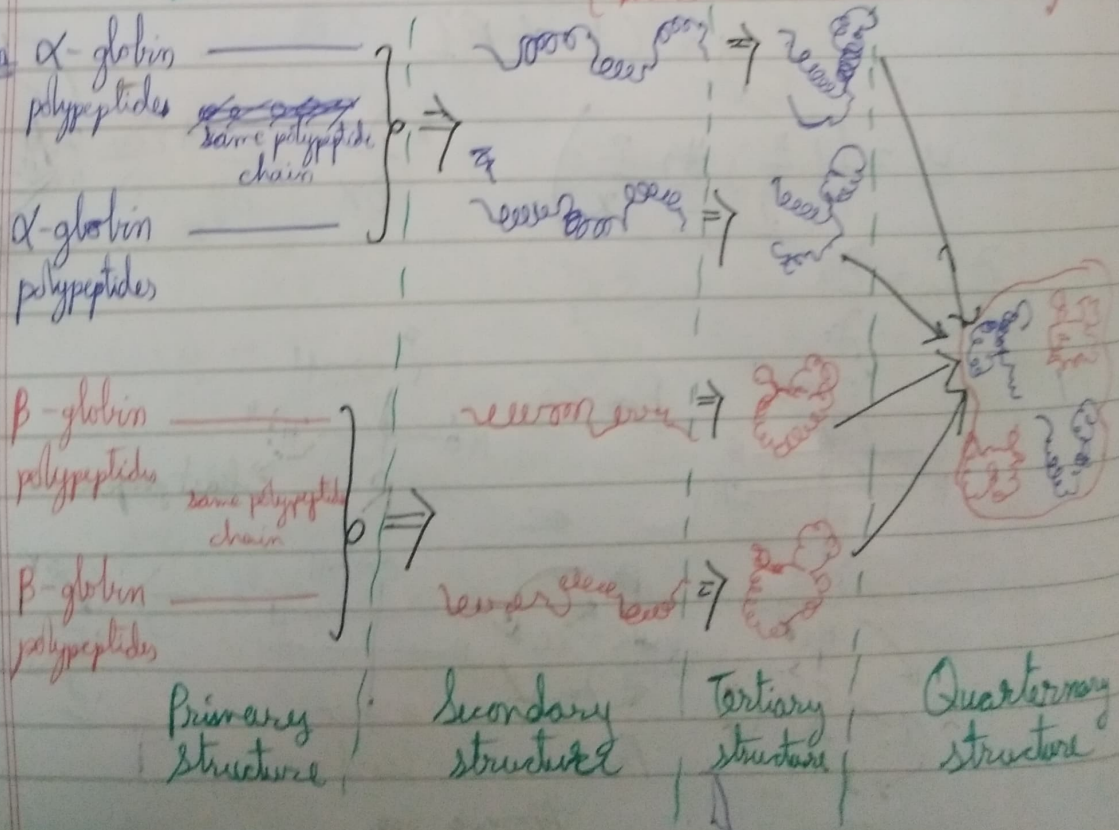
enzyme



Enzymes can move easily in H_2O because they are H_2O soluble and can move easily in watery environment (eg. cytoplasm) to carry out chemical reactions

Eg. of Globular Protein → Haemoglobin (present in Red Blood cells)

Haemoglobin

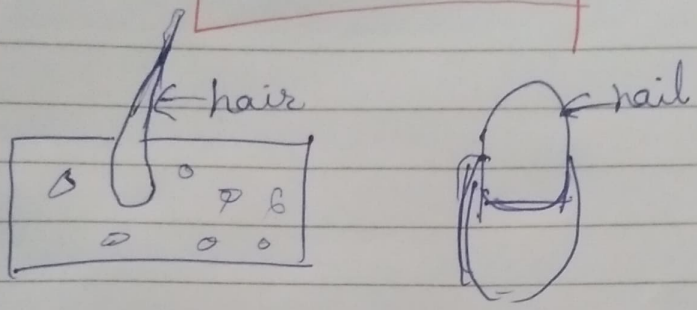


Characteristics of Fibrous Proteins (Eg:- Collagen)

- H_2O insoluble proteins
- long and narrow shaped
- usually has structural functions

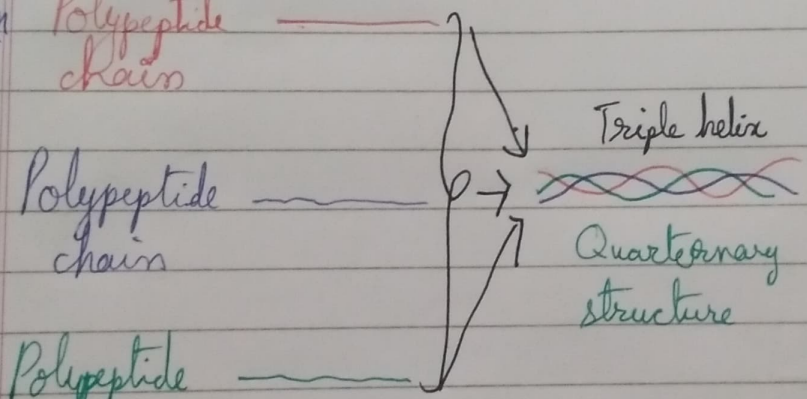
not involved in chemical reactions → keratin (hair, nails)
→ collagen (skin, bones)

Keratin

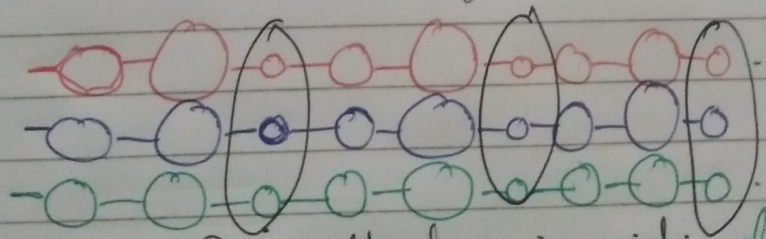


Keratin provides mechanical support and toughness for hair and nail

Collagen



On closer look at the polypeptide chain :-



Every third aminoacid is glycine (smallest amino acid)

Glycine allows these 3 polypetide chains to tightly coil around each other to form Triple helix