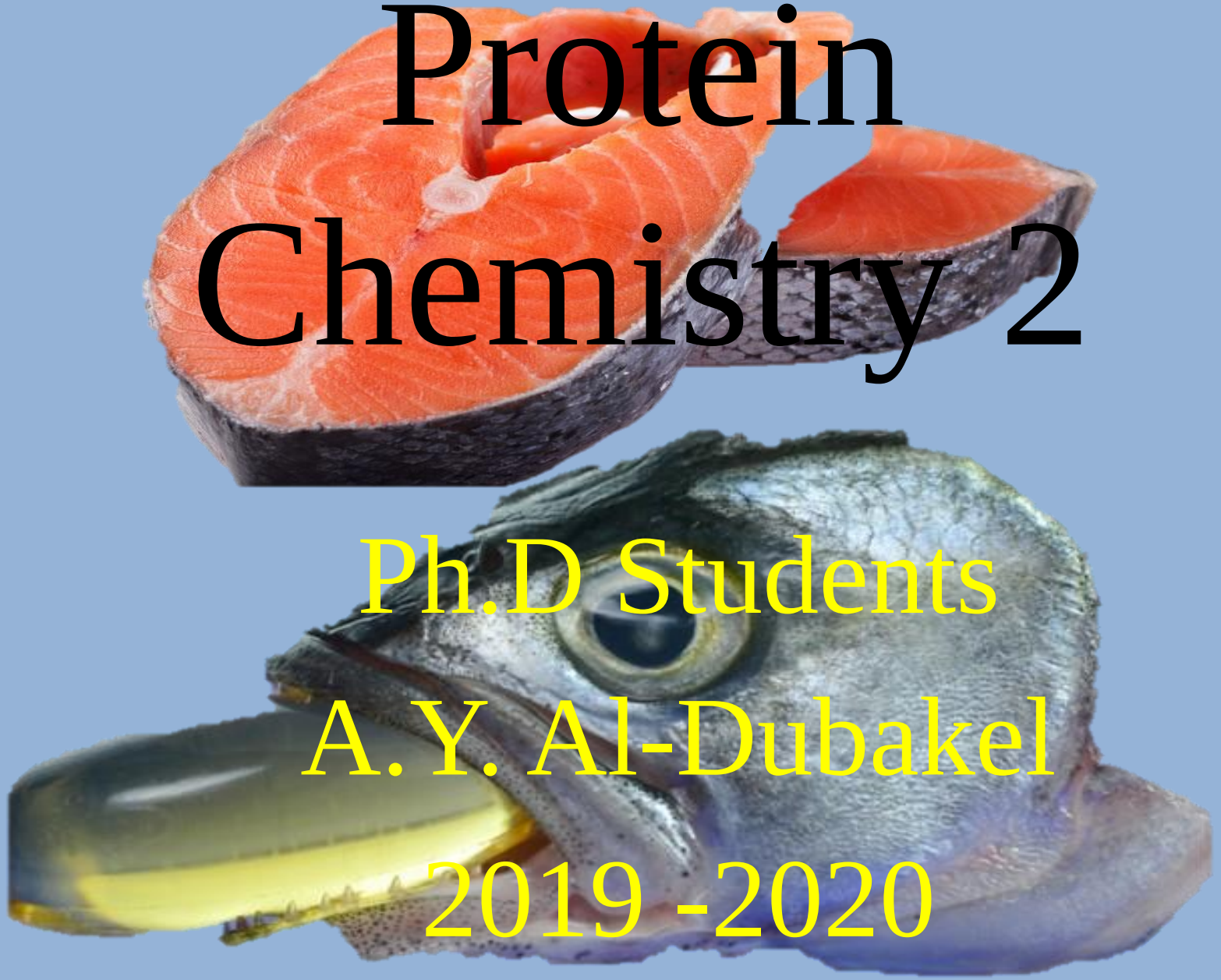
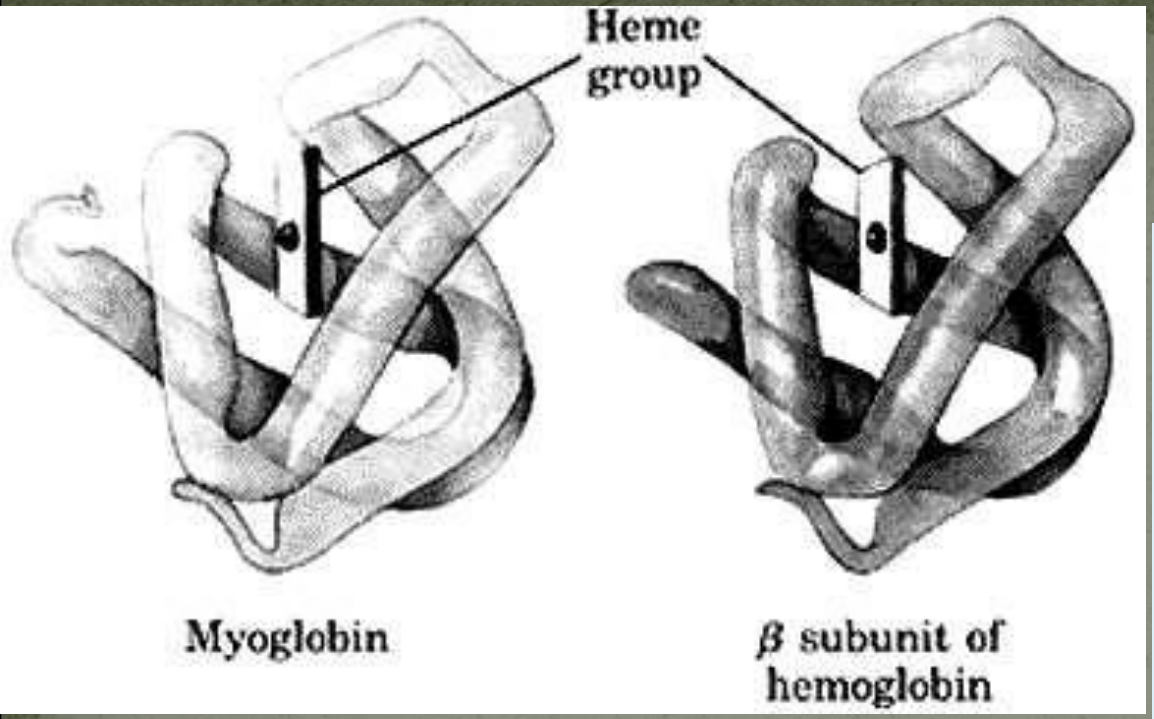
Protein Chemistry 2



Ph.D Students

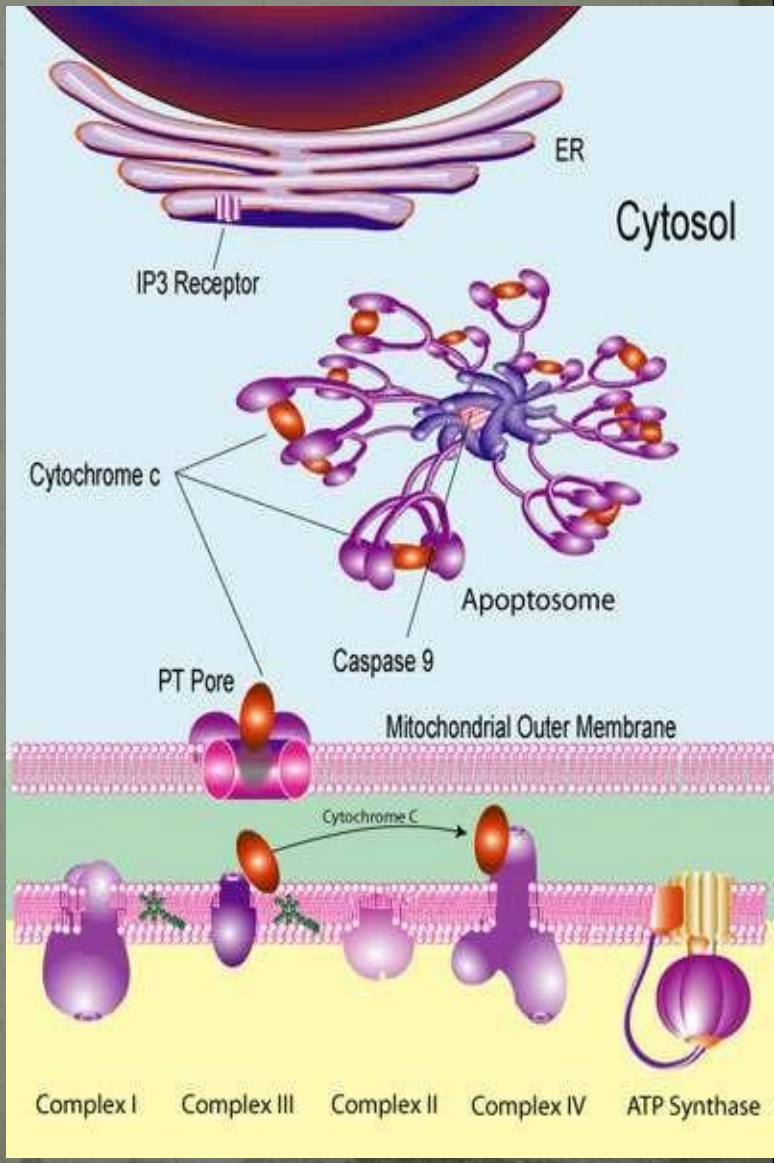
A. Y. Al-Dubakel

2019 -2020



Examples of globular proteins are

- **myoglobin,**
- **hemoglobin, and**
- **cytochrome c**



Fibrous vs Globular Proteins

Fibrous

Little or no tertiary structure.

Long parallel polypeptide chains.

Cross linkages at intervals.

Long fibres and sheets formed.

Mostly insoluble.

Most have a structural role.

Keratin

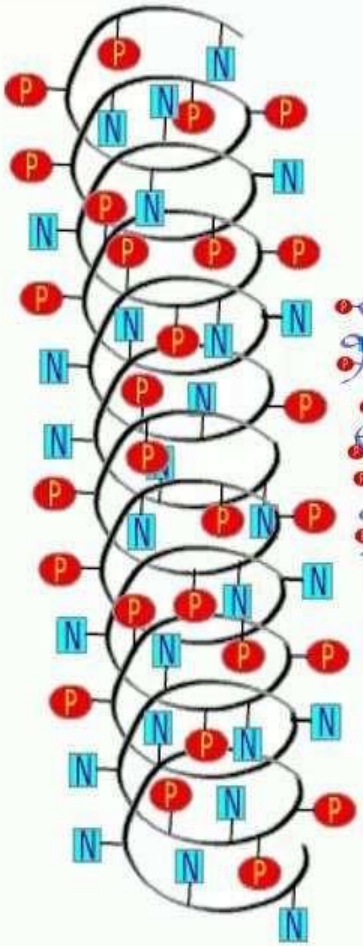
In hair and outer layer of skin.

Collagen

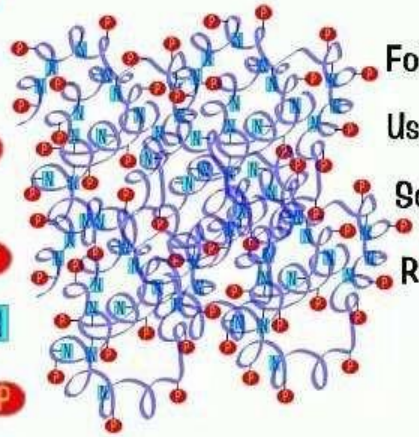
In connective tissue.

Bones, Teeth, Tendons & Walls of Blood Vessels

Silk



Globular



A complex tertiary structure.

Folded into a spherical/globular shape.

Usually soluble in water.

Some have a quarternary structure.

Roles in metabolic reactions.

Protein classification based on biological functions

From the **functional point** of view, they may be divided into several groups.

Enzymes (biochemical catalysts.(

- In living organisms, almost all **reactions are catalyzed** by

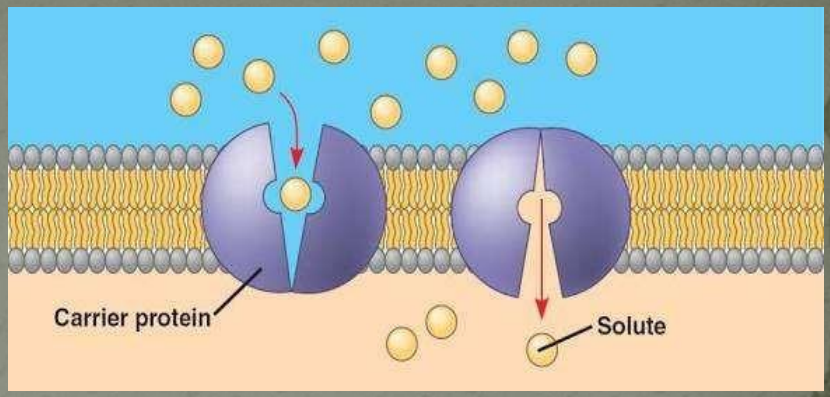
specific proteins called enzymes.

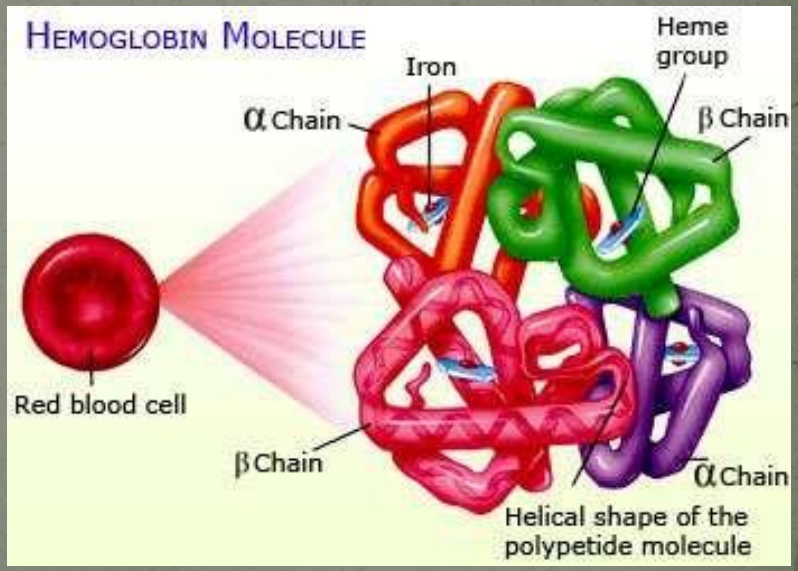
- They have a **high catalytic power**, increasing the rate of the reaction in which they are involved.
- Therefore, life as we know could not exist without their "**facilitating action.**"

Transport proteins

Many **small molecules, organic and inorganic,** are transported in the bloodstream and extracellular fluids, across the cell membranes, and inside the cells from one compartment to another, by specific proteins.

Examples are:
hemoglobin, that carries oxygen from the alveolar blood vessels to tissue capillaries.

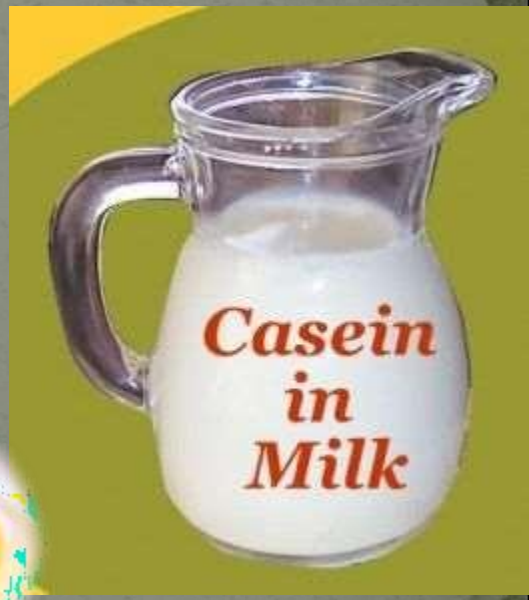




Storage proteins

Examples are:

- **ferritin**, that stores iron intracellularly in a non-toxic form;
- **milk caseins**, that act as a reserve of amino acids for the milk;
- **egg yolk phosvitin**, that contains high amounts of phosphorus;
- **prolamins and glutelins**, the storage proteins of cereals.



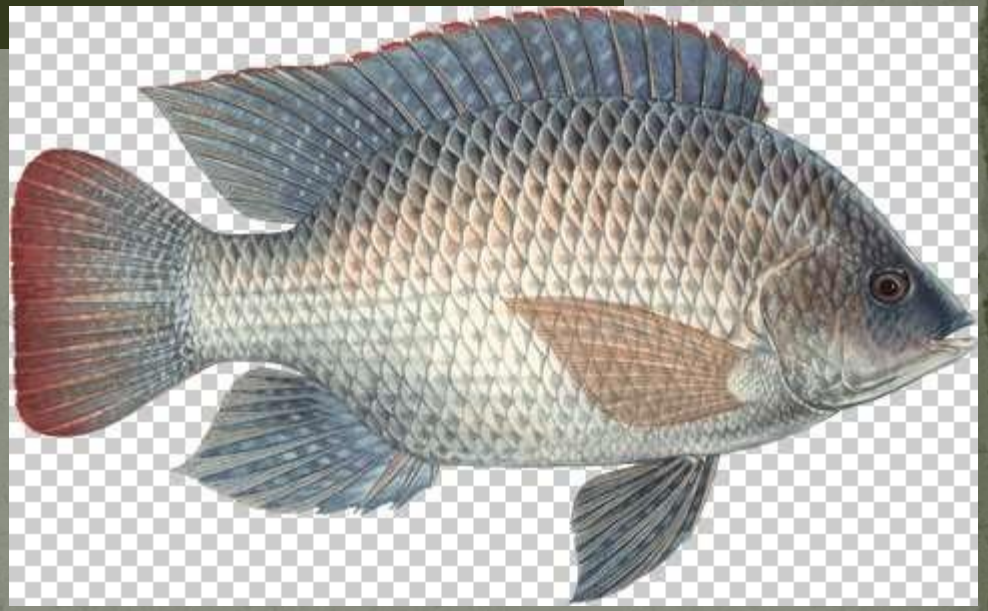
Protein functions

Class of protein	*Function*	*Examples*
Enzymic proteins	Biological catalysts	Urease, Amylase, Catalase, Cytochrome C, Alcohol dehydrogenase.
Structural proteins	Strengthening or protecting biological structures	Collagen, Elastin, Keratin, Fibroin
Transport or carrier proteins	Transport of ions or molecules in the body	Myoglobin, Hemoglobin, Ceruloplasmin, Lipoproteins
Nutrient and storage proteins	Provide nutrition to growing embryos and store ions	Ovalbumin, Casein, Ferritin
Contractile or motile proteins	Function in the contractile system	Actin, Myosin, Tubulin
Defense proteins	Defend against other organisms	Antibodies, Fibrinogen, Thrombin
Regulatory proteins	Regulate cellular or metabolic activities	Insulin, G proteins, Growth hormone
Toxic proteins	Hydrolyze (or degrade) enzymes	Snake venom, Ricin.

Protein requirement in teleost

Protein level in aquaculture feeds generally average

- **%20-18for marine shrimp**
- **%32-28for catfish**
- **%42-38for striped bass**
- **%38-32for tilapia**



Protein requirements usually lower for herbivorous fish and omnivorous fish than carnivorous fish.

Protein requirements are higher for fish reared in high density than low density systems

Protein requirements are **higher for smaller fish**.

As fish grows larger, their protein requirements usually decrease.

Protein requirements also varies with

- **rearing environment**
- **Water temperature**
- **Water quality**
- **Feeding rates of fish**
- **Genetic composistion**

- Carnivorous fish needs 40-50%
- Omnivorous fish needs 25-35%

- Warm period and tropical climate require lesser protein and carbon and vice- versa

- **Linear relationship between dietary protein requirement and Specific Growth Rate exists**

- **Warm water fish have faster SGR than temperate fish**