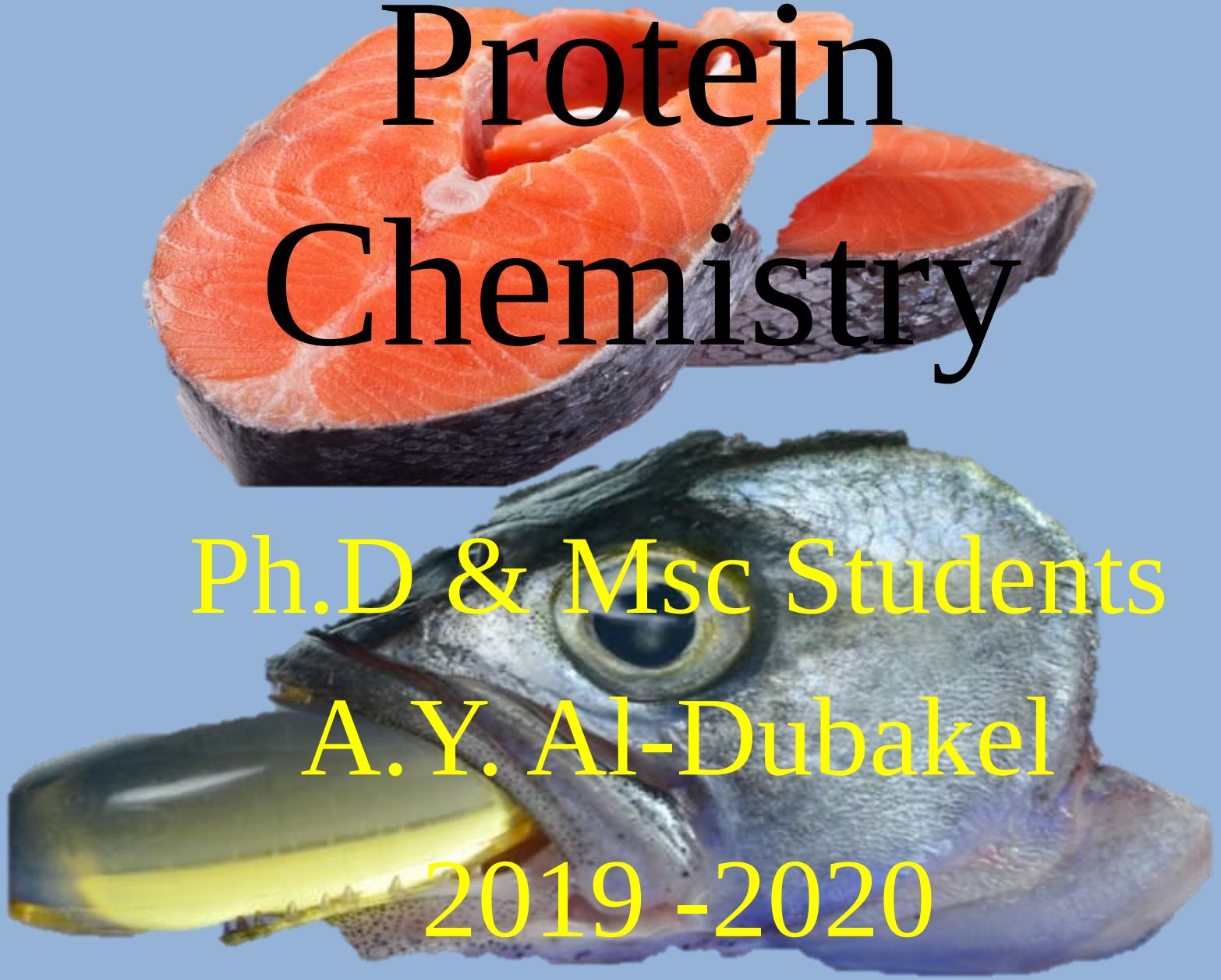
Protein Chemistry



Ph.D & Msc Students

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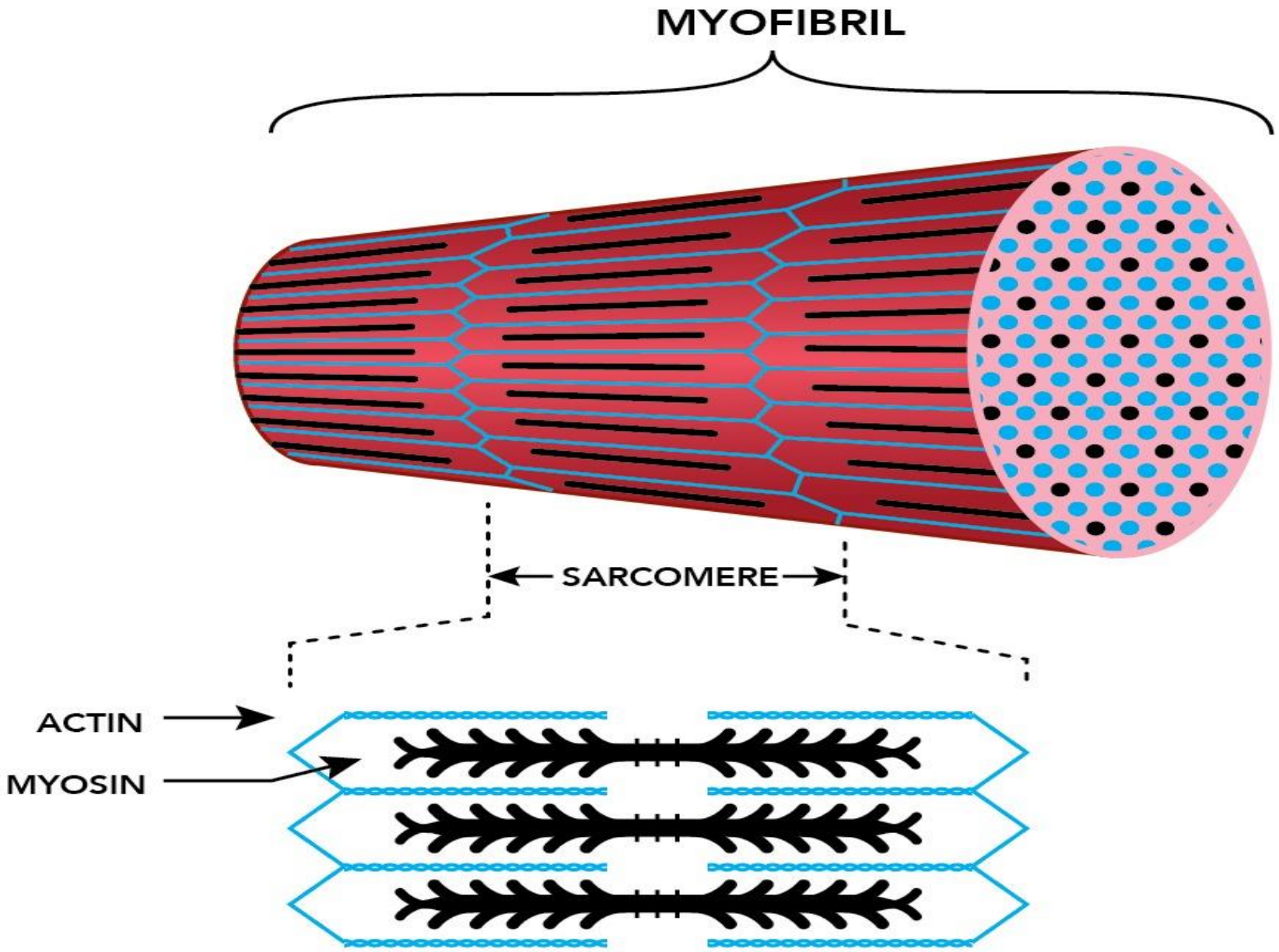
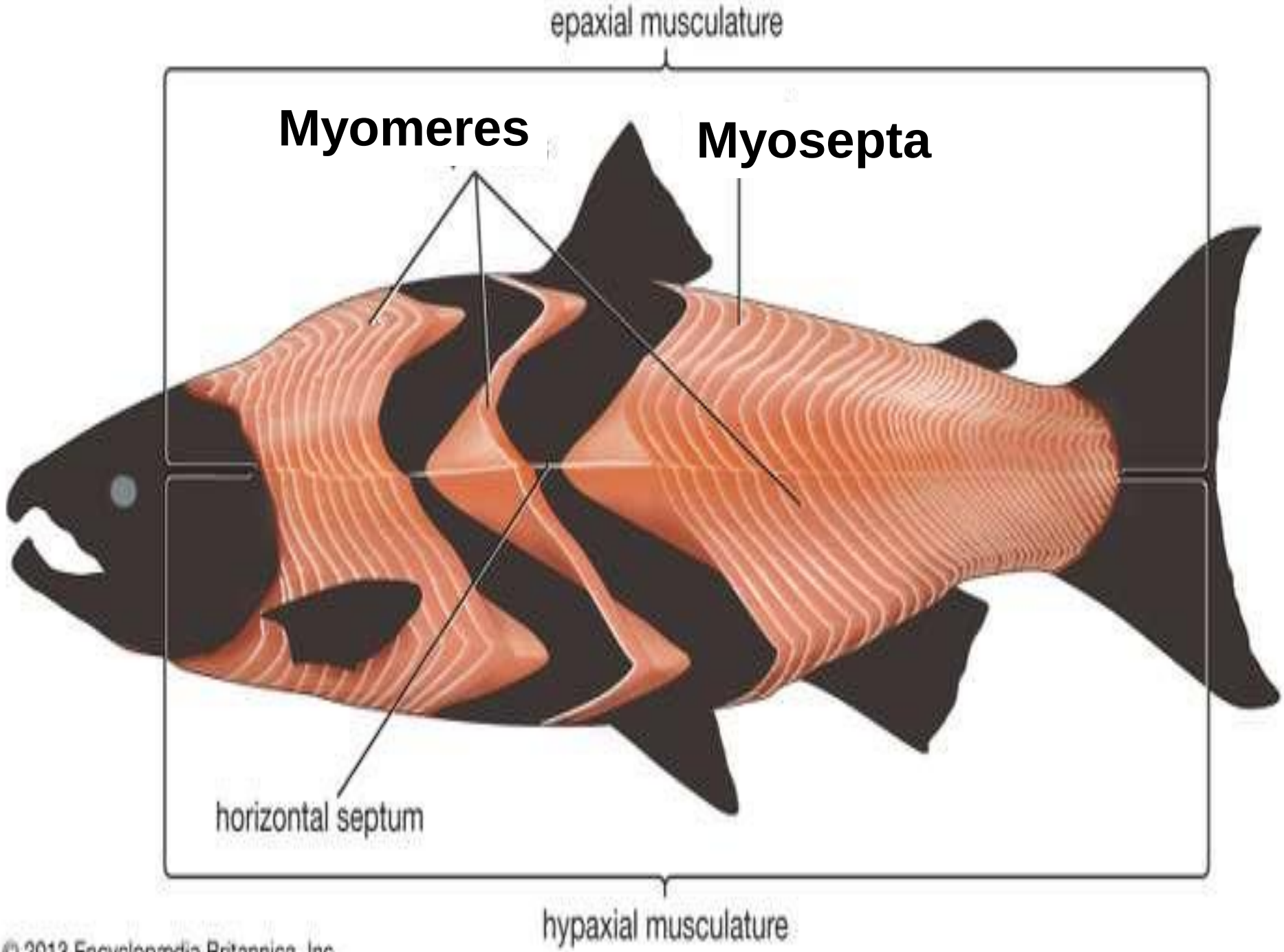

MYOFIBRIL
SARCOMERE
ACTIN
MYOSIN

Actin

- It constitutes about 22% of the total myofibrillar protein.
- It can be present as either a free monomer called G-actin (globular) or as part of a linear polymer microfilament called F-actin(filamentous), both of which are essential for such important cellular functions as the mobility and contraction of cells during cell division.



Functional properties of proteins-

- Protein functionality is defined as those physical and chemical properties which affect the behavior of protein in food systems during processing, storage, preparation and consumption.
- Physicochemical properties that enable proteins to contribute to the desirable characteristic of food.
- Functional properties of proteins depends on-

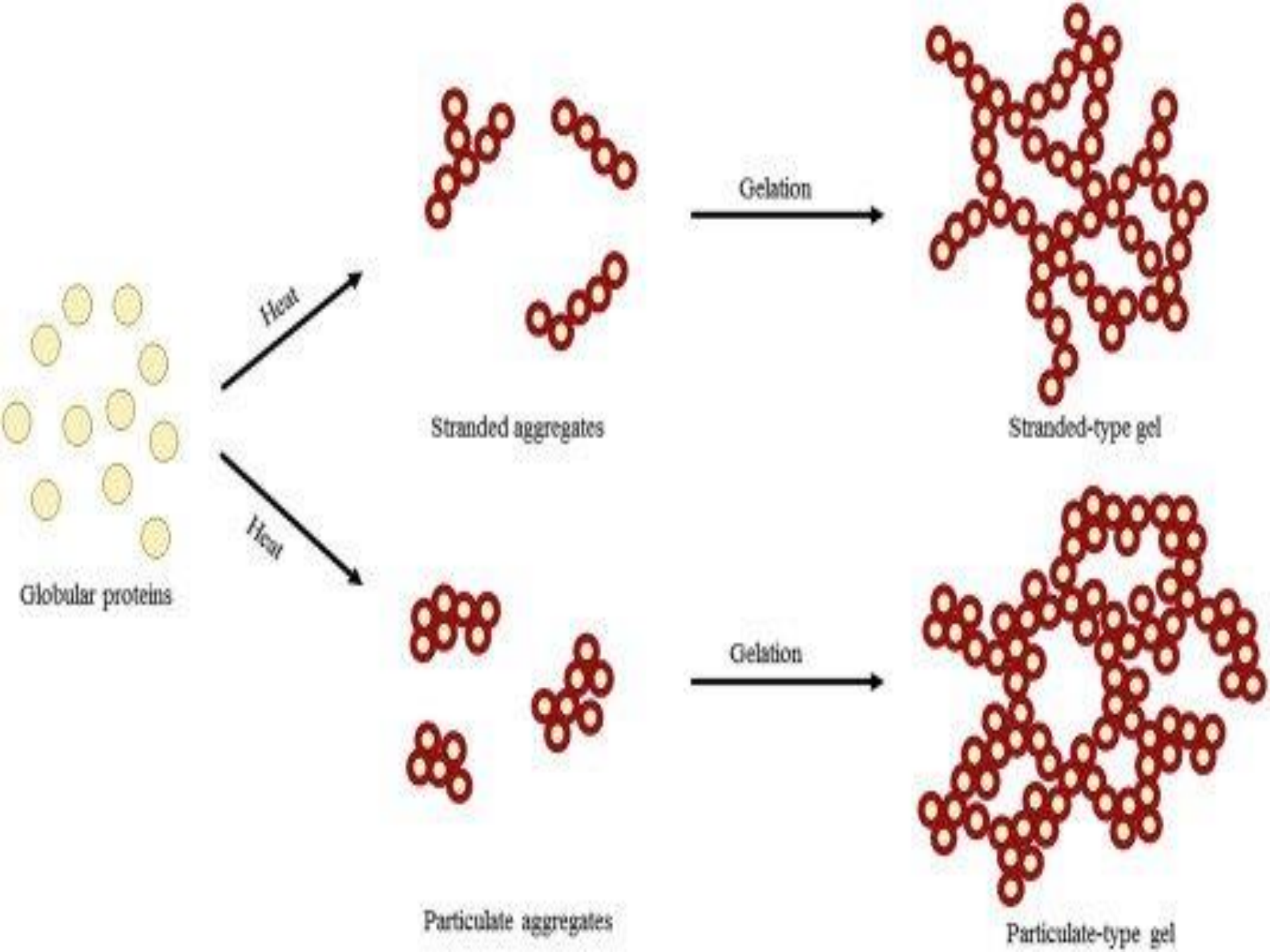
a. size
b. shape
c. amino acid composition and sequence
d. net charge and distribution of charges

- **The main functional quality of protein is**

Gel Formation-

myofibrillar proteins mainly responsible for it.

- Myosin and actin contribute most of the development of desirable gel characteristics in processed meat products. The heat-induced gelation of myosin results in the formation of a 3-dimensional network structure that holds water in a less mobile state .
- During network formation fat and water retention are enhanced and these influence the yield, texture.


Heat
Heat
Gelation
Gelation
Globular proteins
Stranded aggregates
Particulate aggregates
Stranded-type gel
Particulate-type gel

Factors affecting the gel formation

- Types of muscles-White muscle generally forms stronger gels than red muscle.
- Source of muscles-Gel forming ability of muscles from different species is complex, and is influenced by different processing conditions.
- pH- Gelation properties of myofibrillar protein are strongly pH-dependent. At the isoelectric point of myofibrillar protein (pH 5.3), either only poor gels are formed or gel formation is inhibited.
- Temperature-The optimal temperature for the heat-induced gelation of myosin at pH 6 is 60 to 70 °C.

Solubility-

- Solubility of muscle protein is a function of protein structure, structure of myofibril, pH and ionic concentration.
- Solubility can be defined as the amount of total protein that goes into solution under specified condition.
- The solubility of proteins in aqueous buffers depends on the distribution of hydrophilic and hydrophobic amino acid residues on the protein's surface.
- It is used as method of separating proteins.
- The salt concentration needed for the protein to precipitate out of the solution differs from protein to protein

Viscosity-

- The resistance of fluid to flow is measured by their viscosity.
- Viscosity provides information on physico-chemical interaction among proteins by indicating structural changes that may occurs in the proteins molecules.
- Viscosity has been used to determine the degree of protein denaturation and aggregation during frozen storage.
- It is considered a more reliable index of fish protein quality than protein solubility or emulsifying capacity.

Emulsification Properties-

- An emulsion is defined as heterogeneous systems consisting of two immiscible liquid phase one of which is dispersed and other is droplet.
- The formation of emulsion requires the application of energy, when energy is applied to water and oil, the phases may be dispersed.
- Proteins by virtue of their structure and conformation act as excellent emulsifier and reduce their interfacial energy at oil water interphase. Myosin and actomyosin molecule are good emulsifiers by virtue of their having hydrophobic and hydrophilic residues.

Factors responsible for change in the quality of proteins-

- There are various factors which are responsible for the change in the quality of proteins-

a. Temperature

b. pH

c. Salt concentration

d. Acids ,bases ratio

e. Pressure.