

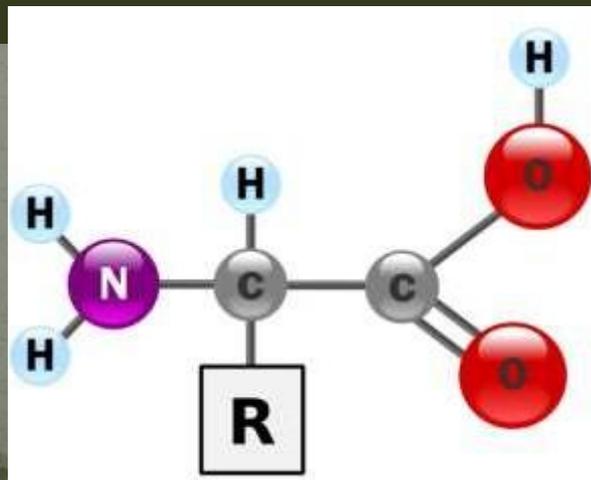
Amino acid classification

Classification of amino acids

- Amino acids can be classified in 4 ways:
 1. Based on structure
 2. Based on the side chain characters
 3. Based on nutritional requirements
 4. Based on metabolic fate

1) Based on Chemical structure

- ❑ Mono amino mono carboxylic acids
Ex-Glycine, valine, threonine, leucine, isoleucine
- ❑ Mono amino dicarboxylic acids
Ex- Aspartic acid, glutamic acid
- ❑ Diamino mono carboxylic amino acid
Ex- arginine, lysine
- ❑ Sulphur containing acid
Ex- cystine, methionine
- ❑ Aromatic and heterocyclic Amino acid
Ex- phenylalanine, tyrosine, tryptophan, histidine, proline



2) Classification based on side chain characters

A) Amino acids with a non-polar side-chain:

e.g.: Alanine, Valine, Leucine, Isoleucine,

B) Amino acids with a polar but uncharged side-chain:

e.g. Serine, Threonine, Tyrosine, Cysteine, Asparagine and Glutamine.

C) Amino acids with a charged side-chain

a) Amino acids with a positively charged side-chain:

The basic amino acids- Lysine, Arginine and Histidine

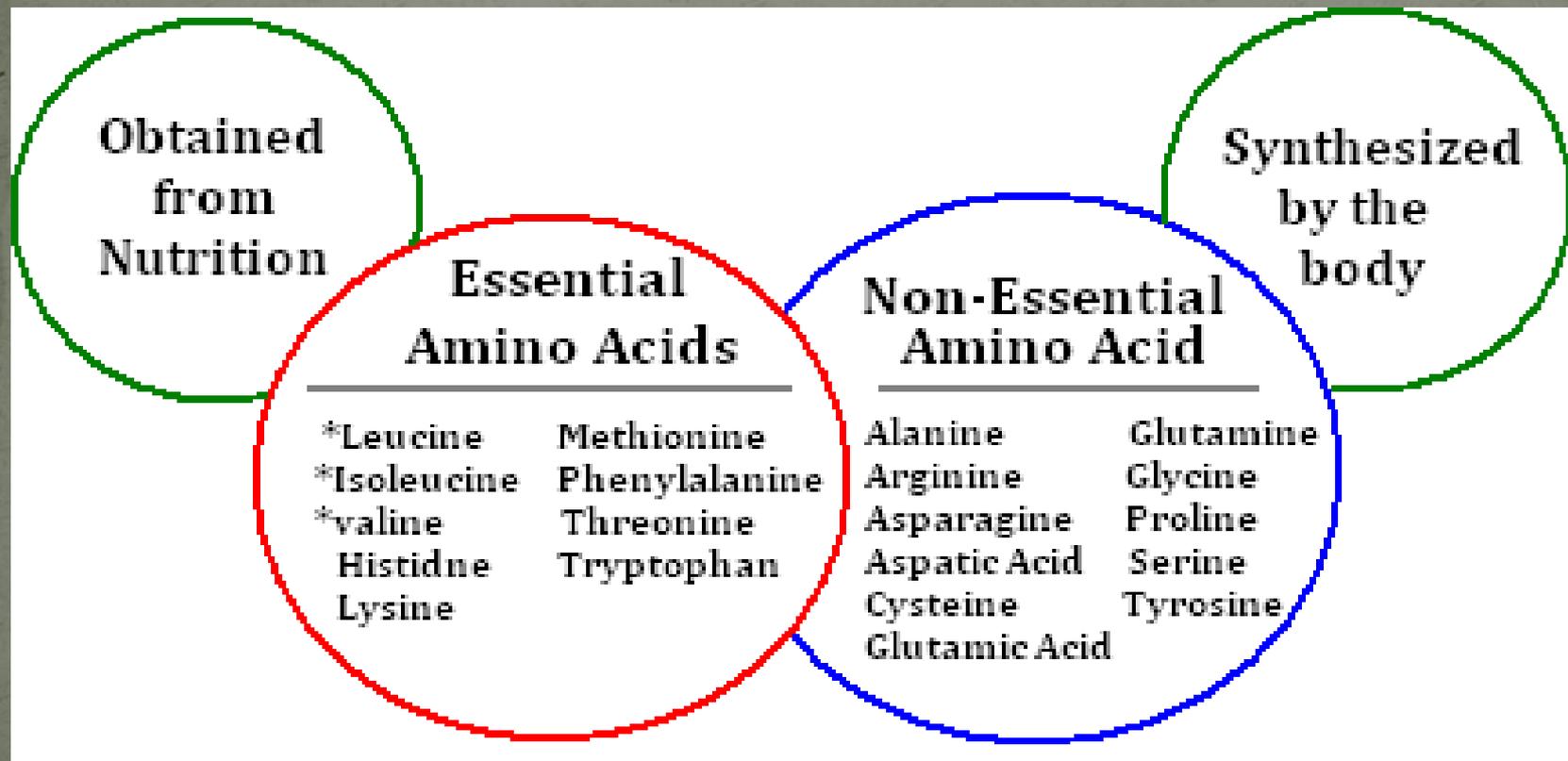
b) Amino acids with a negatively charged side-chain:

The acidic amino acids- Glutamic acid and Aspartic acid

They are hydrophilic in nature.

3) Based on nutritional requirements

- ❑ Essential amino acids
- ❑ Non essential amino acids
- ❑ Semi essential amino acids



4) Classification based on metabolic fate

The carbon skeleton of amino acids can be used either for glucose production or for the production of ketone bodies, Based on that

1) Both glucogenic and ketogenic amino acids:
Isoleucine, Tyrosine, Phenylalanine and Tryptophan

2). Purely Ketogenic amino acids:
Leucine and Lysine

3) Purely Glucogenic amino acids:

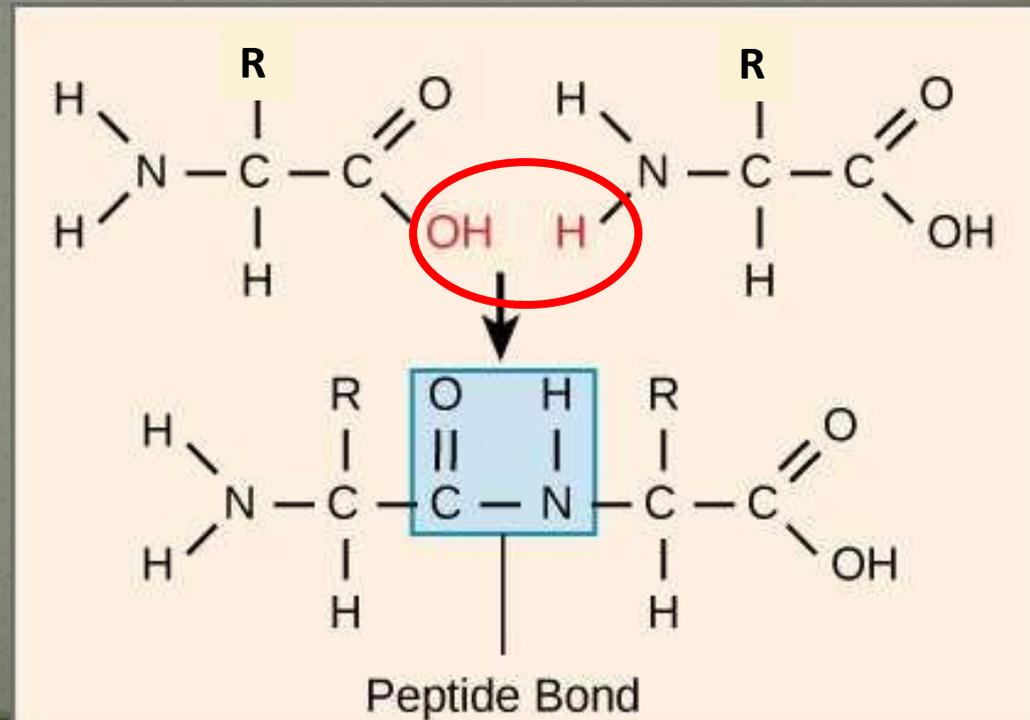
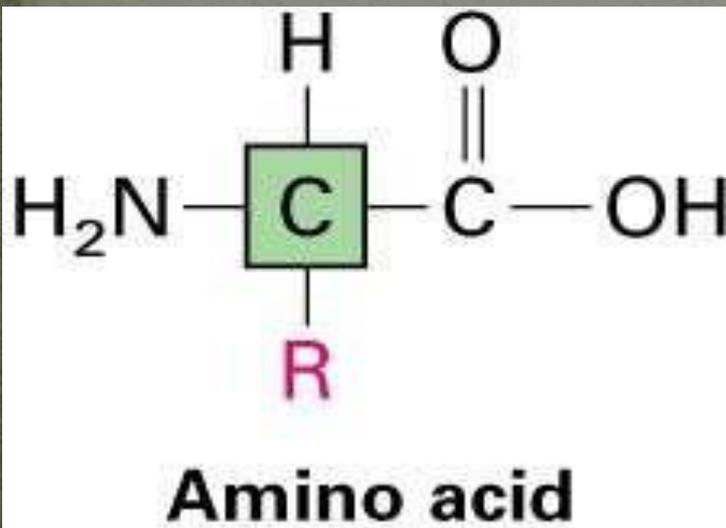
The remaining 14 amino acids are glucogenic.
Alanine, valine, serine, threonine, glycine, methionine, asparagine, glutamine, cysteine, cystine, aspartic acid, glutamic acid, histidine and arginine.

STRUCTURE OF AMINO ACIDS

- In protein molecules the amino acid residues are covalently linked to form very long chains. They are united in a head-to-tail arrangement through substituted amide linkages called **Peptide bond** that arise by elimination of the elements of water from the carboxyl group of one amino acid and α -amino group of the next.
- Three amino acids can be joined by two peptide bonds to form a tripeptide; similarly, amino acids can be linked to form tetrapeptides, pentapeptides, and so forth.

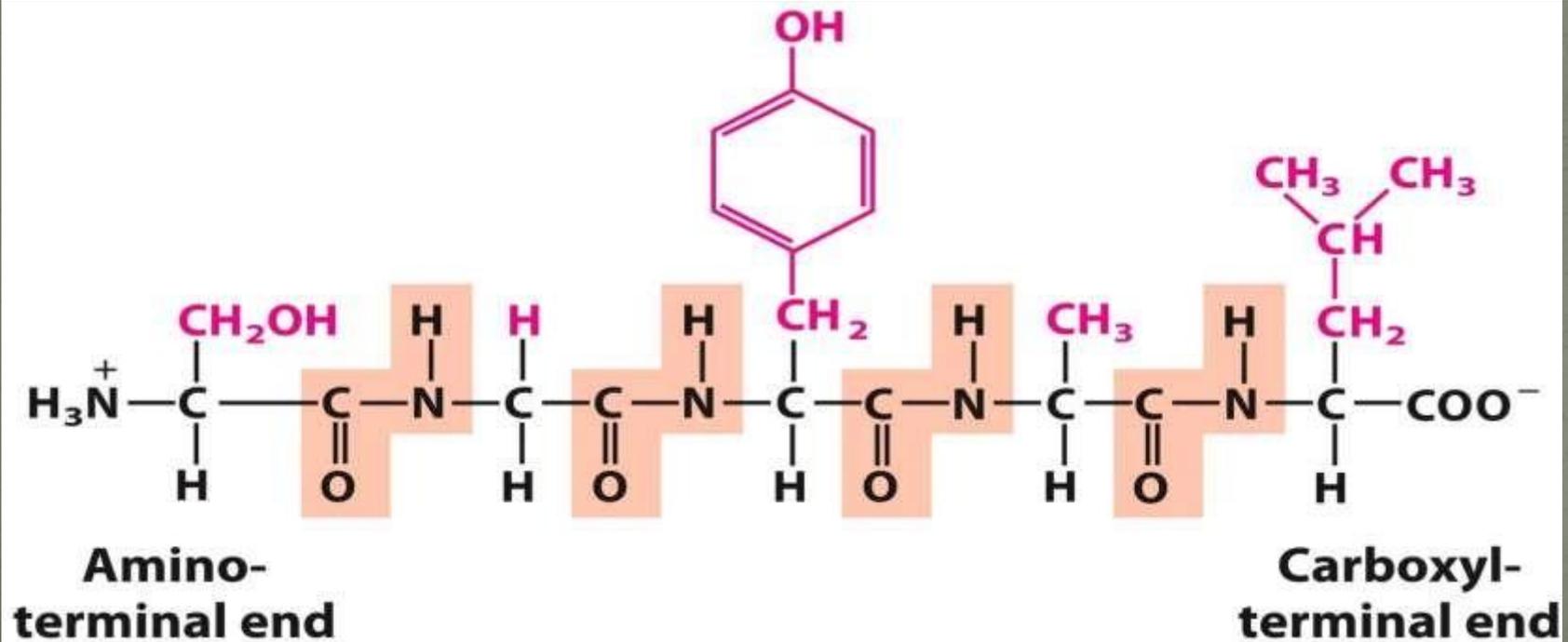
STRUCTURE OF AMINO ACIDS

- When a few amino acids are joined in this fashion, the structure is called an oligopeptide.
- When many amino acids are joined, the product is called a polypeptide.



STRUCTURE OF AMINO ACIDS

➤ In a peptide, the amino acid residue at the end with a free -amino group is the amino-terminal (or N-terminal) residue; the residue *at* the other end, which has a free carboxyl group, is the carboxyl-terminal (C-terminal) residue.



PROTEIN COMPOSITION OF FISH

➤ The protein of fish muscle tissue can be divided into the following three group based on solubility.

1) Myofibrillar protein

2) Sarcoplasmic protein

3) Stroma protein

➤ A similar composition is found in fish and livestock meat.

➤ The live stock meat contains more stroma than fish meat.

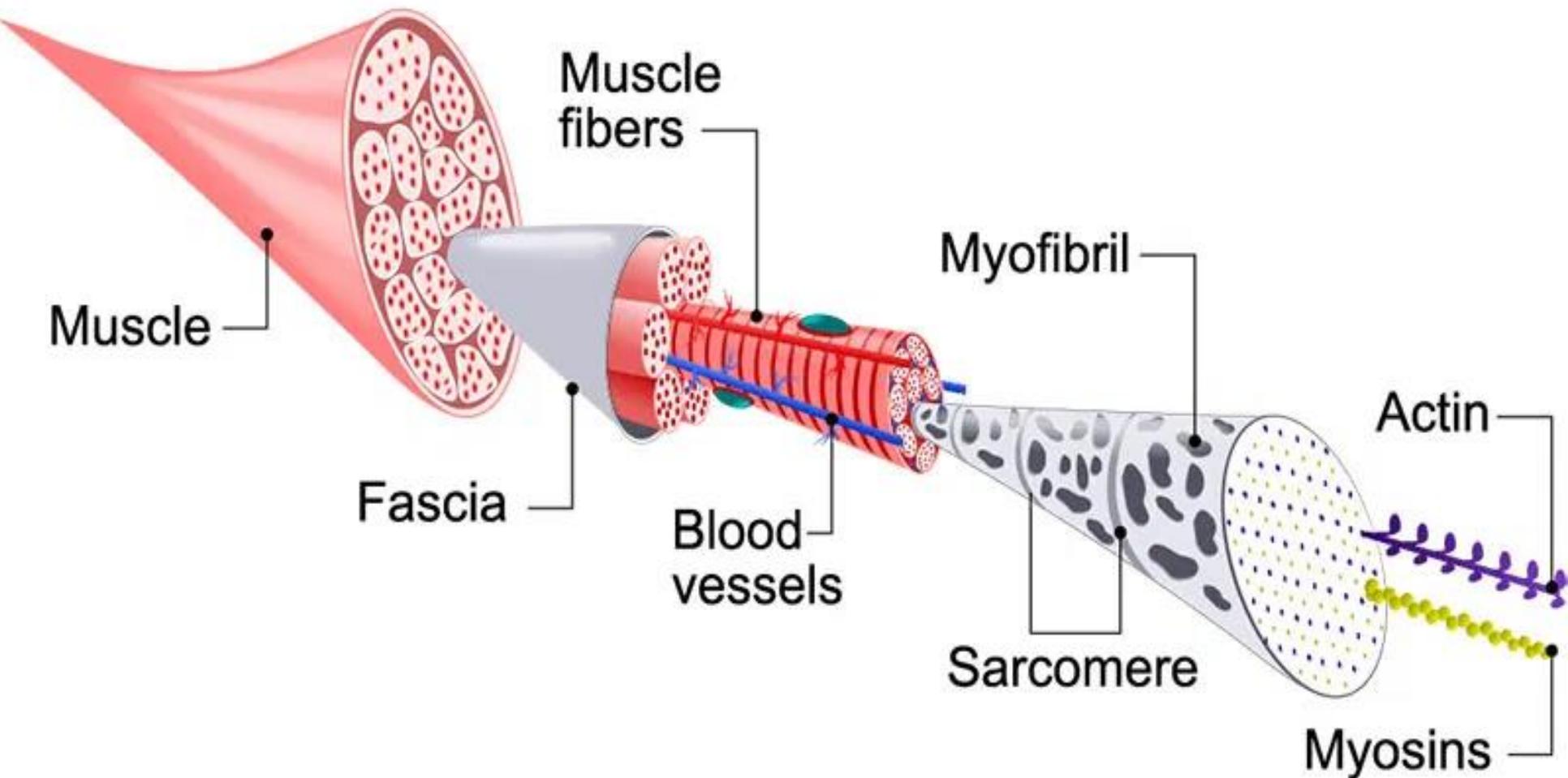
Fish Meat Composition

The edible portion of fish is roughly 45-50% of the whole fish body weight but varies according to shape, age and whether caught before or after spawning. With elliptically shaped fish such as skipjack and salmon, it is over 60% and with large headed or bellied fish like cod and Pollack and of flat shaped fish like sole it is 35-40%.

Proximate composition of fish meat and livestock meat

Type of meat	Moisture %	Protein %	Lipid %	Carbohydrate %	Ash %
Fish meat	66-84	15-24	0.1-22	1-3	0.8-2
Livestock meat	65-80	16-22	1.5-13	0.5-13	1%

SKELETAL MUSCLE



The protein of fish muscle tissue can be divided into the following three groups based on solubility :

1)sarcoplasmic, 2)myofibrillar, 3)stroma protein.

The sarcoplasmic protein is located in the muscle plasma. The myofibrillar protein is present in the myofibrils and the stroma protein is present in the connective tissue. A similar composition is found in fish and livestock meat. The livestock meat contains more stroma than fish meat.

Protein Composition of Fish, Shellfish and Meat

Type of Meat	Sarcoplasmic proteins	Myofibrillar proteins	Stroma protein
	% of total proteins		
Cod	21	76	3
Carp	23-25	70-72	5
Flatfish	18-24	72-79	3
Mackerel	32	58	7
Prawn	29.85	65-70	70
Meat	16-28	39-68	16-28