

HISTORY OF BIOCHEMISTRY

The history of biochemistry spans through the works of numerous scientists ranging from the 18th century where microbiology began.

1) LOUIS PASTEUR (1822-1895)

He is an important scientist in the history of microbiology and biochemistry. He discovered vaccination, pasteurization and fermentation process.

Which is an most important process in industrial biochemistry.

Pasteurization is the heating of dairy products, e.g. (milk, cheese, yogurt) to a temperature of 60°C in order to reduce the microbial population.

2) EMIL FISCHER (1852-1919)

He is an important scientist in the history of biochemistry as he was the first scientist to describe the structure of Carbohydrates & protein which is an immense contribution to the history of biochemistry till date.

3) FRITZ KELPMANN (1899-1986)

He discovered Coenzyme A and he described elucidated the function of this enzymes in the bio-synthesis of fatty & amino acid.

4) LINUS PAULING (1901-1994)

He was an important scientist in the history of biochemistry and chemistry as he was the first scientist to discover chemical bonding and describes abstactic catalysis.

the bond that stabilize carbon, hydrate and protein which won him two nobel prizes. He won the nobel prize in chemistry in 1954 and also won a Nobel peace prize in biochemistry in 1962.

5) EDWARD BUCHNER (1860 - 1917)
He discovered cell free fermentation process in 1897. This discovery brought up the idea of ENZYME (biological catalysts).

Michelis Mentez named biological catalysts enzymes

(1928 - present)

6) JAMES WATSON & FRANCIS CRICK (1916 - 2004)

They proposed the double helix structure of DNA using data of X-ray diffraction data from

(ROSALIND FRANKLIN & MAURICE WILKINS created

this discovery revolutionized molecular biology. It was proposed in 1953.

7) FRIEDRICH WOHLER (1800 - 1882)

He discovered urea in 1828. He disapproved the theory of VITALISM.

According to vitalism, organic must produce organic

8) HANS ADOOLF KREBS

He is an important scientist who discovered an important cycle known as KREBS CYCLE or

TETRCARBOXYLIC ACID CYCLE or CITRIC ACID CYCLE in 1937

and he described the role of Krebs cycle in the biosynthesis of fatty acid and amino acid.

All reaction that occur in a cell is METABOLISM
sum total of all
(add up) Anabolism - Biosynthesis
Catabolism - Breakdown

Krebs cycle is a metabolic cycle

pathway that oxidizes acetyl

co-enzyme A (Acetyl CoA) into:

NADH, FADH₂, & ATP

NADH \Rightarrow Nicotinamide Adenosine Dinucleotide Hydrogen

FADH₂ \Rightarrow Flavin Adenosine dinucleotide dihydrogen

ATP \Rightarrow Adenosine Triphosphate

NADH & FADH₂ \Rightarrow Reducing power / Proton carrier

Glycosis = 2

Krebs cycle = 4

Electron transport chain = 30⁺

{ Significance of Krebs cycle

- It is an important steps

Pathway in metabolism that produces reducing power in

form of NADH & FADH₂

We are called Aerobes because our final electron acceptor is OXYGEN which serves as, important electron carriers / proton carriers which are valuable in the production

Aerobes final electron acceptor is Large amount of ATP in the CRISTA (foldings) of the

mitochondria through a chain known as ELECTRON TRANSPORT CHAIN

PROTEIN

Protein are polymers of amino acids.

Functions

- Proteins are biomolecules that are mostly involved in metabolic reactions.
- They are the labels by which genetic formations are expressed.
- They help in production of new tissues and repair of damaged tissues.
- They serve as carbohydrate sepearals.

Some proteins plays role in a cell such protein is collagen, elastin, fibronectin.

Monomers of Protein

AMINO ACIDS

All proteins are formed from the same 20 naturally occurring amino acids.

Proteins are polymers of amino acids re amino acids are joined together by Peptide bonds to form proteins. The first amino acid to be discovered is ASPARAGINE. It was discovered 1806 from "asparagus". Tyrosine was discovered from thyros (greek word cheese) - Glutamine is discovered from "wheat Gluten" - Gluten is a false carbohydrate that can be found in fibres.

Egg has 8 amino acids, meat has 7 amino acids.

CLASSIFICATION OF AMINO ACIDS

Amino acids are classified into different groups based on different criteria.

-based on diet : Essential Amino acid

Non-essential Amino acid.

ESSENTIAL AMINO ACID : They can not be synthesized by the body and as a result they must be taken in through the diet.

NON-ESSENTIAL AMINO ACID : Non-essential

Histidine

Glutamine

Arginine { HALLT, PINM }
Leucine

Proline { GAGGA PTSACY }

Lysine

Asparagine
Glutamine

Tryptophan

Aspartate

Tyrosine

Glutamate

Phenylalanine

Cysteine

Isoleucine

Theanine

Alanine

Alanine

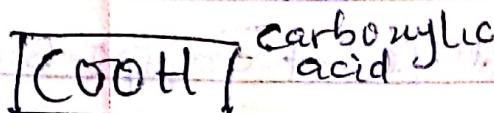
Methionine

Serine

NON-ESSENTIAL AMINO ACID : They are amino acid synthesized by the body and not needed to be taken in through the diet.

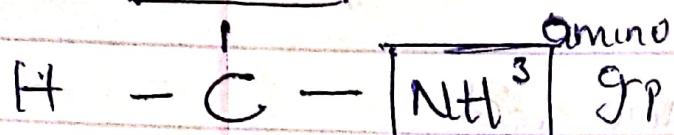
Based on nature

- Based on nature Non polar aromatic R group



Phenylalanine

(PAA)



Tryptophan
Tyrosine

Polar uncharged R group

Any carbon that is connected to carboxylic acid $\{ \text{COOH} \}$ is

an alpha-carbon.

Serine
Threonine

(GASCT)

Cysteine

- All amino acids are α -carbo-
xylic α -amines.

Asparagine
Glutamine

The functional group of amino acids is $\{ \text{COOH} \}$

Polar positive charge R group

Based on nature of R group

Lysine

Non-polar aliphatic R group

Histidine

(HAL)

Arginine

a) Methionine

b) Valine (PHAGMW)

c) Proline

d) Glycine

e) Leucine

f) Isoleucine

g) Alanine

Polar negative charge R group

Aspartate

Glutamate

Non polar aliphatic (R) group

These are the amino acids that do not contain any aromatic ring and are insoluble in polar solvent such as water and ethanol.

Non polar aromatic (R) group

These are the amino acids that contain aromatic ring in their structure and also insoluble in polar solvent such as water and ethanol.

Polar Uncharged (R) group

These amino acids contain a group that is capable of forming hydrogen bond with water and ethanol and as a result becomes soluble in them. These groups have no net charge.

The most hydrophilic (most soluble in water) groups of amino acids are the groups with net positive and negative charge and are classified into polar positively charged group and polar negatively charged group.