CHARACTERISTICS OF LIVING ORGANISMS

All living organism -- from small to big -- share characteristics that seperate them from the divisions in nature that do not exhibit life like rocks or soils. Living creatures have cells, DNA, the ability to convert food into energy, grow, reproduce respire and move. These characteristics become the criteria for scientists to seperate the living elements in nature from non-living ones.

CELLS AND DNA

All living creatures consist of cells. Organized into groups such as organelles, molecules and other multi cellular classifications, cells can also reproduce themselves, showcase movement and display a response to certain stimuli for a scientist to consider the organism as living. Each cell carries DNA, the material made up of chromosomes that passes down genetic information which includes inherited traits of its lineages.

METABOLIC ACTIONS

For something to live, it must consume food and convert that food into energy for body. All living entities employ interior chemical reactions to convert

eaten food into energy through a form of digestion and then transmit the energy extracted to the cells of the body. Plants and trees convert energy from the sun into food and absorb nutrients in the soil through their roots.

INTERNAL ENVIRONMENT CHANGES

Organisms that are living make changes to their internal environment. Called homeostasis, this represents the action a body takes to protect itself. For instance, when body gets cold, it shivers to generate heat. All living organisms share this feature

LIVING ORGANISMS GROW

To grow, a living organism must have cells that divide in an orderly way to create new cells. As cells grow, expand and divide, the creature becomes larger over time. Scientists use growth and development as measure of life.

ART OF REPRODUCTION

living organism grow and reproduce to make more living organisms like themselves. This can occur through asexual reproduction or by producing other living organisms through sexual reproduction.

The new organisms DNA is like that of cell it came from.

ABILITY TO ADAPT

Plants, Animals, people and even micro organism that live can adapt to the world around them. Adaptability involves the traits that help a living organism survive in its environment. One such traits include the way different animals coats change through the seasons to make it hard for prey or predator to be seen.

ABILITY TO INTERACT

A living organism will interact with another Living organism -- wheather it is same type of organism. a threat or a neutral organism, there is some form of interaction between the two. for example, flowers interact with bees by releasing pollen for it to be picked up and dispersed among female plants during reproduction. Plants like the Venus flytrap interact with nature by enclosing itself over flies, lizards and other edible insects that land within its grasp.

THE PROCESS OF RESPIRATION

Respiration is more than just breathing. It represent the ability of a living organism to convert energy to feed the cells, using oxygen to break down sugars and produce carbon dioxide as a by-product expelled during exhallation. All living organism have some form of respiration, though the process may differ between them.

LIVING CREATURES MOVE

To classify an organism as living, it must exhibit some form of movement. Though humans and animals obviously move, other items such as plants also move though it is hard to see without a time-lapse camera. Plants move their buds or leaves towards sunlight or away from shaded areas to promote growth.

Basic Classification:-

The five-kingdom classification is the most acceptable among these classifications.

Five-Kingdom Classification:-

American taxonomist Robert H. Whittaker proposed this Classification based on these factors.

a) Nature of cell structure - prokaryotic, eukaryotic.

b) Complexity of body organization - unicellular, multicellular.

c) Mode of nutrition - auto trophic, heterotrophic [Saprozoic & Halozoic]

The five kingdoms of Whittaker are

1) Monera 2) protista 3) Fungi 4) plantae 5) Animalia.

1) Kingdom Monera: (Monera ⇒ Mono = Single)

They are unicellular prokaryotic organisms.

1) Cell is covered by cell wall which is made up of peptidoglycan (Mureins).

2) Cell organelles like Mitochondria, golgi complex & plastids are absent.

3) Nutrition is Saprophytic, Chaemo (or) phototrophic

4) Monerans are the chief decomposers and mineralisers of Biosphere.

Types of Monerans:-

1) Eubacteria:-

i) They are called as true bacteria

ii) They may be photo autotrophic, Chemo autotrophic.

iii) They exist in different Shapes like Cocci, bacilli, Spirilli, Vibrio... etc.

2) Actinomycetes:-

They are formerly called, "ray fungi". They show bacterial and fungal characters.

Eg:- Actinomyces, Mycobacterium.

3) Archae bacteria:-

i) Most primitive bacteria.

ii) They are considered as "Living fossils".

4) Cyano bacteria:-

i) Ancient autotrophic bacteria.

ii) They are also called "Blue green algae".

Eg:- Nostoc.

5) Mycoplasma (or) (pleuro pneumonia like organisms) PPLOs:

These are the Simplest and the Smallest of the living Cellular organisms.

Eg:- Mycoplasma.

ii) Cytoplasm possess

2) Kingdom protista:

1) They are unicellular eukaryotes may be solitary or colonial.

2) Membrane bound cell organells like mitochondria, golgi complex, Endoplasmic reticulum and lysosomes are present.

3) Ribosomes are of 80s type.

4) Nutrition may be saprobic, holophytic or holozoic or mixotrophic (Euglena). Some are symbiotic (Trichonympha).

Type of protistants:

1) Autotrophic protists (protophytons):

i) They are mostly marine.

ii) only asexual reproduction takes place by binary fission.

Eg:= Noctiluca.

Diatoms:

i) These are found in fresh water, marine water and also in damp soils.

ii) Reproduction is both asexual and sexual.

Eg:= Triceratium.

Euglenoids:

i) These are found only in fresh water

ii) Cytoplasm possess Chloroplasts

iii) Cell wall is absent. Body is covered by pellicle.
Eg:- Euglena.

Cellular Slime moulds:

i) In Vegatative phase cell body is amoeba like and possess single diploid nucleus. Such cells aggregate and form a large mass of protoplasm called Pseudoplasmodium.

ii) In reproductive phase they produce diploid Spores.
Eg:- Dictyostelium.

3. Kingdom Fungi: (Multicellular decomposers)

i) These are multicellular decomposers and mineralisers of the Biosphere.

ii) Cell wall Contains Chitin.

iii) Nutrition is Saprophytic. Some are Symbiotic (Lichen)
Eg:- Yeast, penicillium.

4. Kingdom plantae: (metaphyta)

i) These are multicellular producers.

ii) Cell walls are made up of cellulose.

iii) Cytoplasm generally possess Chloroplasts.

iv) Nutrition is autotrophic, few are parasitic or Saprobic

v) Reserve food is Starch.

This kingdom includes the following groups.

Eg:- Red algae, Brown algae, Green algae, Gymnosperms and Angiosperms.

5. Kingdom Animalia: (Metazoa)

i) These are multicellular Consumers which are highly diversified.

ii) They are mostly motile.

iii) Nutrition is holozoic and few are parasitic.

iv) Reserve food is glycogen.

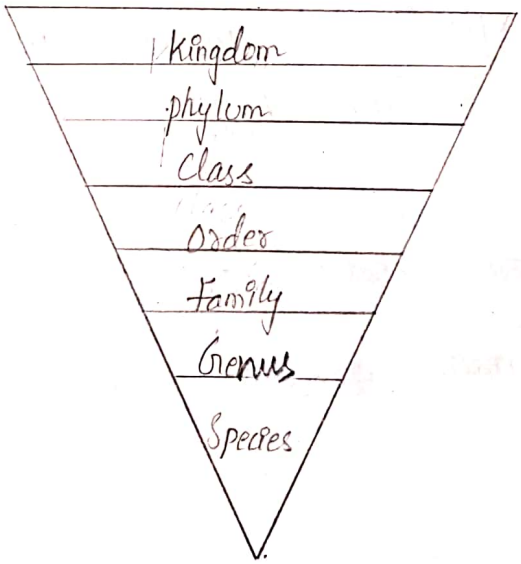
This kingdom includes the following phylums.

i) porifera : Sycon

ii) Coelenterata : Hydra

iii) Chordata : Homosapien.

Basic Classification:-



1) Species:=

Species is the basic unit which includes potentially interbreeding reproductive group.

2) Genus:=

Group of different species having certain common basic characters form genus.

Eg:= Tiger and lion are a part of the genus panthera.

3) Family:=

It contains one or more related Genera which is separated from other families.

Eg:= The genus panthera (lions, tigers) and the genus felis (cats) are grouped under the same family felidae.

4) Order:

It includes one or more related families.

Eg:= Families panthera & felidae are included in the order Carnivora based on their eating habits.

5) Class:

It includes one or more related orders.

Eg:= Class mammals contains orders Carnivora and primates.

6. phylum:

It includes one or more classes.

Eg:= It is the International Code of nomenclature for algae, fungi, and plants accept the terms as equivalent.

7. Kingdom:

It is the highest taxonomic category. All multicellular animals are included in kingdom Animalia.

Eg:- All living and fossil animals are put under the kingdom Animalia.

CELL THEORY

- Matthias Schleiden found all plants have similar types of cells having cell walls.
- Theodore Schwann found all animal cells do not have cell walls
- Theodore Schwann proposed cell hypothesis which states both animals and plants are formed of cells.

POSTULATES OF CELL THEORY.

⇒ All organisms are made of cells. The cells contain hereditary materials and are responsible for transfer of character.

⇒ Cells come only from the reproduction of existing cells. Cells are structural and functional unit in all living organism. Cells are responsible for all the metabolic activities.

⇒ A Cell is a small mass of protoplasm, usually containing a nucleus along with some other cell organelles.

OBJECTIVES OF CELL THEORY

⇒ Cell theory fails to explain the process of formation of new cells.

⇒ Cell theory suggest that new cells were formed inside old one's from the nucleus which was reffered to us cyto blast.

EXCEPTIONS TO CELL THEORY

⇒ Viruses lack protoplasm like that of cells & are made up of nucleic acid and proteins.

⇒ Bacteria and Blue greens algae lack nucleus.

⇒ Coenocytic hyphae of fungus are multi nucleated and aseptate such conditions are not explained in cell theory.

Structure of Prokaryotic Cell

Prokaryotic cells are single-celled microorganisms known to be the earliest on earth. prokaryotes include Bacteria & Archaea. The photosynthetic prokaryotes include Cyanobacteria that perform photosynthesis.

Characteristics of prokaryotic cells.

Prokaryotic cells have different characteristic features. The characteristics of the prokaryotic cells are mentioned below.

1) They lack a nuclear membrane.

2) Mitochondria, Golgi bodies, Chloroplast, and lysosomes are absent.

3) The genetic material is present on a single chromosome.

4) The histone proteins, the important constitutes of eukaryotic chromosomes, are lacking. In them.

5) The cell wall is made up of carbohydrates & amino acids.

6) The plasma membrane acts as mitochondrial membrane carrying respiratory enzymes.

7) They divide asexually by binary fission. The sexual mode of reproduction involves recombination.

Prokaryotic cell Structure.

A prokaryotic cell does not have a nuclear membrane. However, the genetic material is present in a region in the Cytoplasm known as the nucleoid. They may be Spherical, rod-Shaped, or Spiral.

A prokaryotic cell Structure is as follows:

1. Capsule:= It is an outer protective covering found in the bacterial cells, in addition to the cell wall. It helps in moisture retention, protects the cell when engulfed, and helps in the attachment of cells to nutrients and Surfaces.
2. Cell Wall:= It is the outermost layer of the cell which gives Shape to the cell.
3. Cytoplasm:= The Cytoplasm is mainly composed of enzymes, Salts, cell organelles and is a gel-like component.
4. Cell Membrane:= This layer Surrounds the Cytoplasm and regulates the entry and exit of Substances in the cells.
5. pili:= These are hair-like outgrowths that attach to the Surface of other bacterial cells.
6. Flagella:= These are long Structure in the form of a whip, that help in the locomotion of a cell.

7. Ribosomes :- These are involved in protein Synthesis.

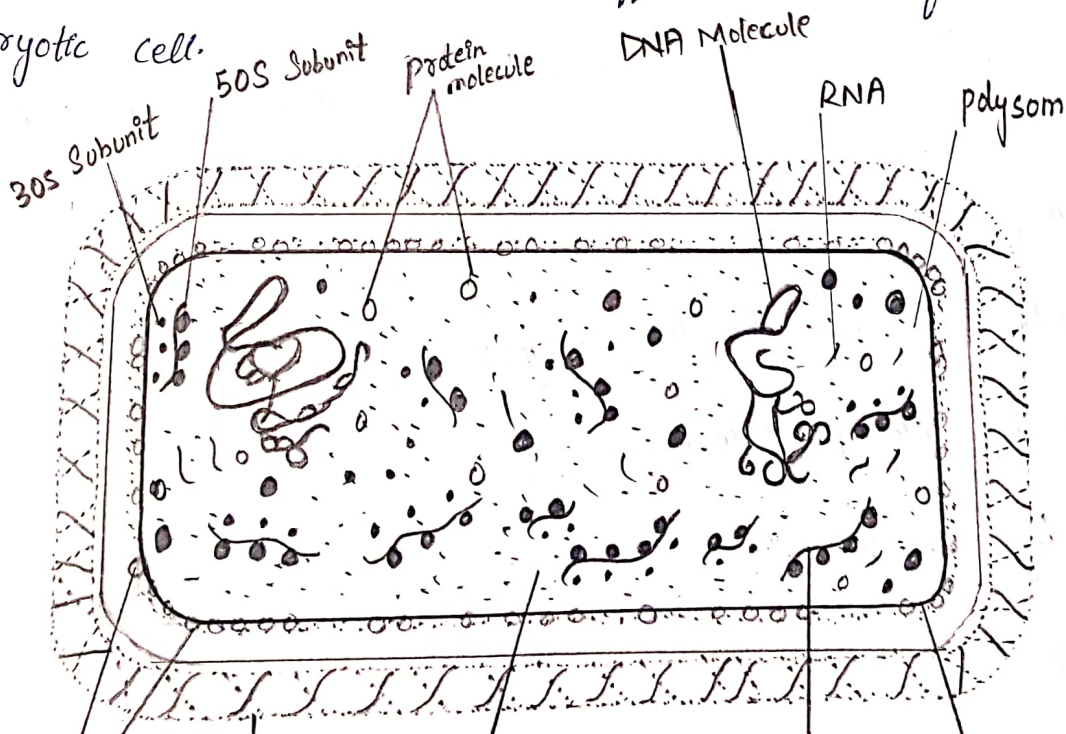
8. plasmids :- plasmids are non-Chromosomal DNA structures. These are not involved in reproduction.

9. Nucleoid Region :- It is the region in the Cytoplasm where the genetic material is present.

A prokaryotic cell lacks certain organelles like mitochondria, endoplasmic reticulum, and Golgi bodies.

Prokaryotic Cell Diagram

The prokaryotic cell diagram given below represents a bacterial cell. It depicts the absence of a true nucleus and the presence of a flagellum that differentiates it from a eukaryotic cell.



Prokaryotic Cell of E. coli

Components of prokaryotic cells.

The prokaryotic cells have four main components:

Plasma Membrane:= It is an outer protective covering of phospholipid molecules which separates the cell from the surrounding environment

Cytoplasm:= It is a jelly-like substance present inside the cell. All the cell organelles are suspended in it.

DNA:= It is the genetic material of the cell. All the prokaryotes possess a circular DNA. It directs what proteins the cell creates. It also regulates the actions of the cell.

Ribosomes:= protein synthesis occurs here.

Some prokaryotic cells possess cilia and flagela which helps in locomotion.

Reproduction in prokaryotes

A prokaryote reproduces in two ways:

- Asexually by binary fission
- Sexually by recombination

Binary Fission

1) The DNA of an organism replicates and the new copies attach to the cell membrane.

2) The cell wall starts increasing in size and starts moving inwards.

3) A cell wall is then formed between each DNA, dividing the cell into two daughter cells.

Examples of prokaryotic cells.

* Bacterial cells

1) These are unicellular organisms found everywhere on earth from soil to the human body.

2) They have different shapes and structures.

3) The cell wall is composed of peptidoglycan that provides structure to the cell wall.

* Archaeal cells

1) Archaebacteria are unicellular organisms similar to bacteria in shape and size.

2) They are found in extreme environments such as hot springs and other places such as soil, marshes, and even inside humans.

Structure of Eukaryotic Cell

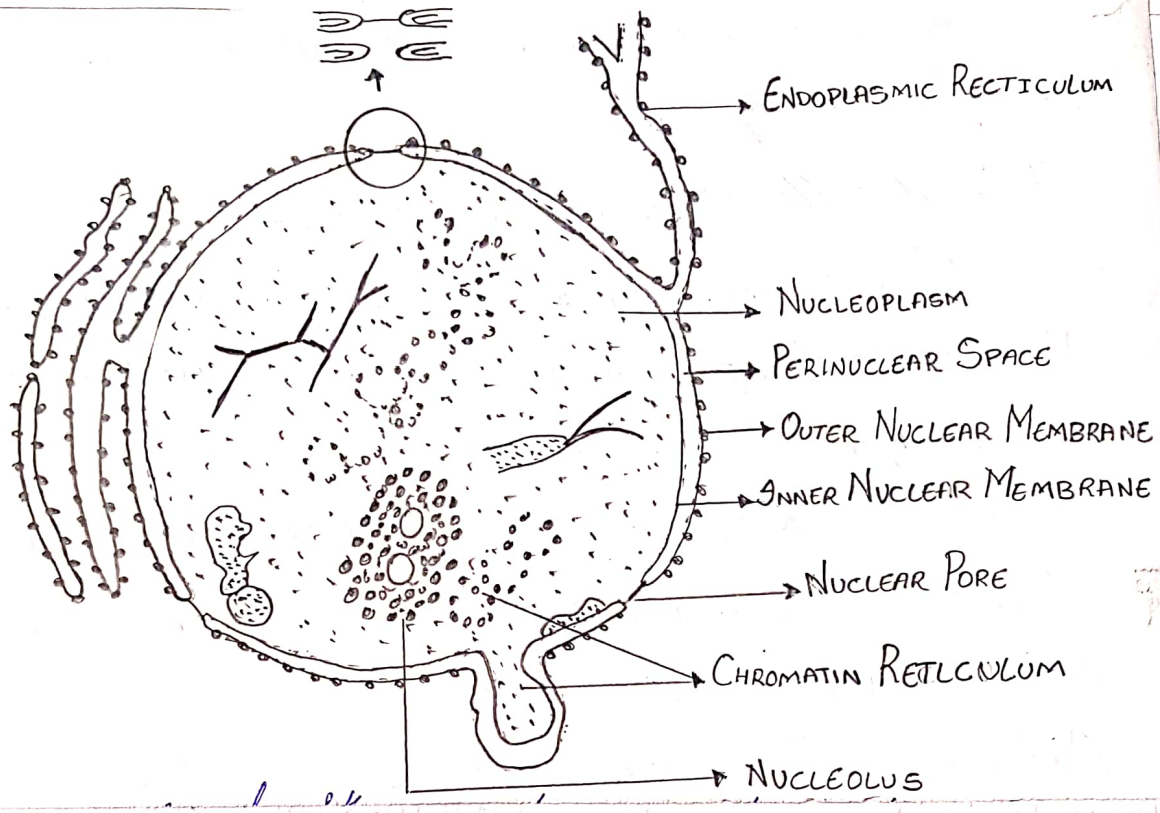
Eukaryotic cells are characteristic of plants and animals. They have a definite nucleus with nuclear membrane, chromatin and nuclear sap. The cytoplasm contains many membrane-bound organelles such as mitochondria, lysosomes, chloroplasts etc. plants cells are surrounded by a rigid cell wall which is lacking in animal cells.

Animal Cell versus Plant Cell :-

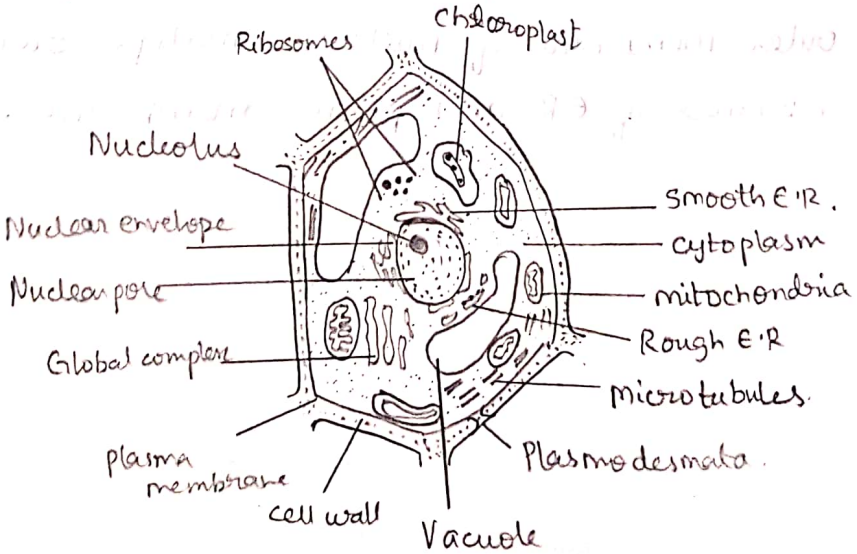
- Plant cell have a cell wall, a large central vaccuole, chloroplasts, and other specialized plastids, whereas animals cell do not.
- While all eukaryotic cells contain cell organells and structure there are some striking difference between animals and plant cells.
- Animals cell have centrioods, centrosomes, and lysosomes, whereas plants cells do not.

The Nucleus and its structures :-

- The nucleus is the controlling centre of cell; which governs the growth and development. The nucleus consists of three structures (i) Nuclear membrane (ii) Nucleoplasm and chromosomes and (iii) the Nucleus.
- The nucleus is bounded by two membranes of lipoproteins which are known as nuclear membranes. They form a kind of envelope around the nucleus and this envelope is known as nuclear envelope. The nuclear envelope is interrupted by a number of pores. The outer membrane of nuclear envelope remains continuous with the membranes of ER and plasma membrane.

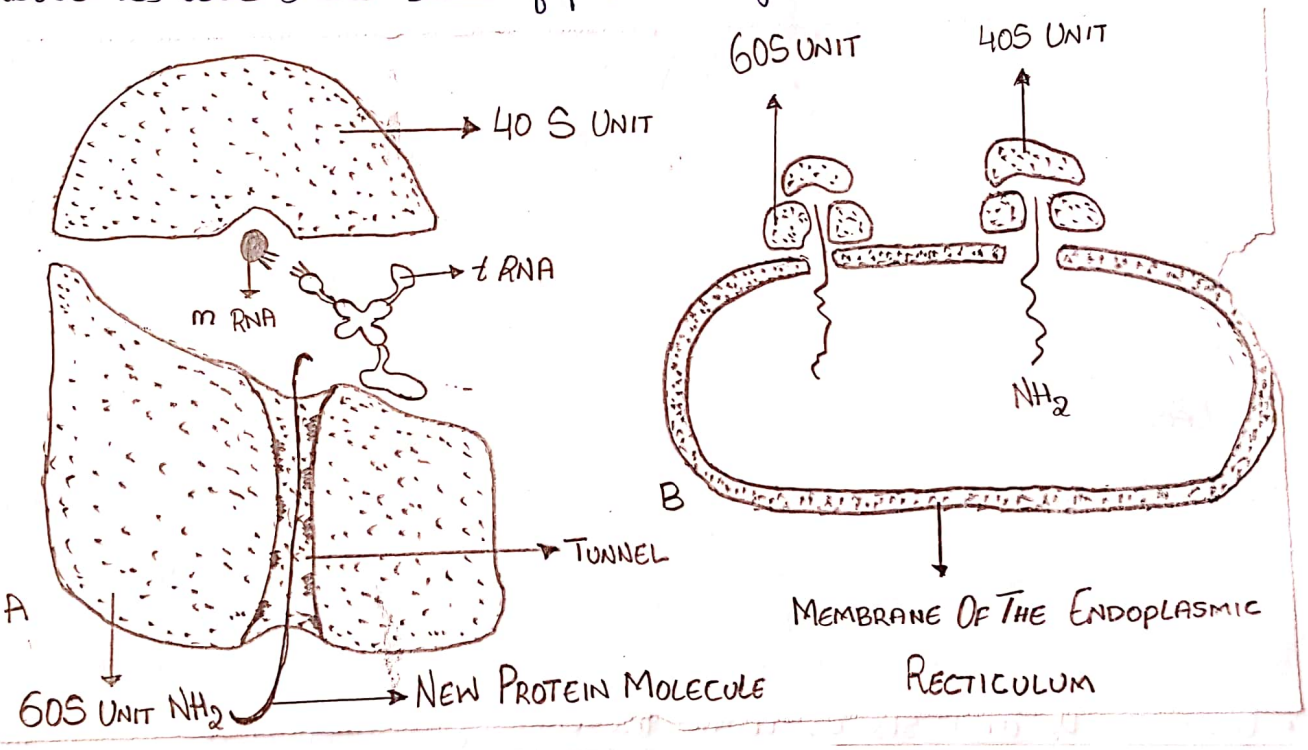


- The nucleus is filled with a watery substance known as nucleoplasm or karyolymph. The nucleoplasm contains certain thread-like structures known as chromosomes. The chromosomes appear only during cell division, otherwise they occur in the form of chromatin fibres during resting phase. The chromosome fundamentally consists of large molecules of DNA and many nucleoproteins.
- The nucleoplasm contains a conspicuous, darkly stained spherical body known as the nucleolus.



Ribosomes :-

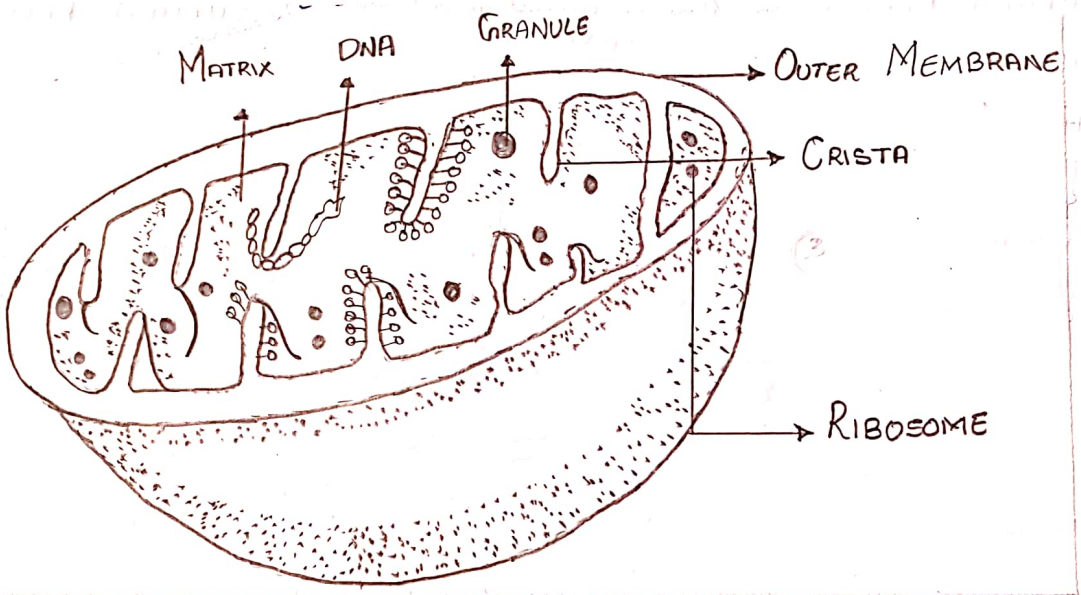
- These are small organelles of about 140-230 A° in size.
- They are composed of RNA and protiens.
- They may be present free in the cytoplasma or be attached to the membranes of rough type of ER.
- Each ribosomes is composed of two structural units, a smaller subunit known as 40S subunit and carger subunit known as 60S subunit.
- The 40S subunits occurs on the larger unit and form a cap like structure.
- Ribosomes are the sites of protiens synthesis.



Mitochondria :-

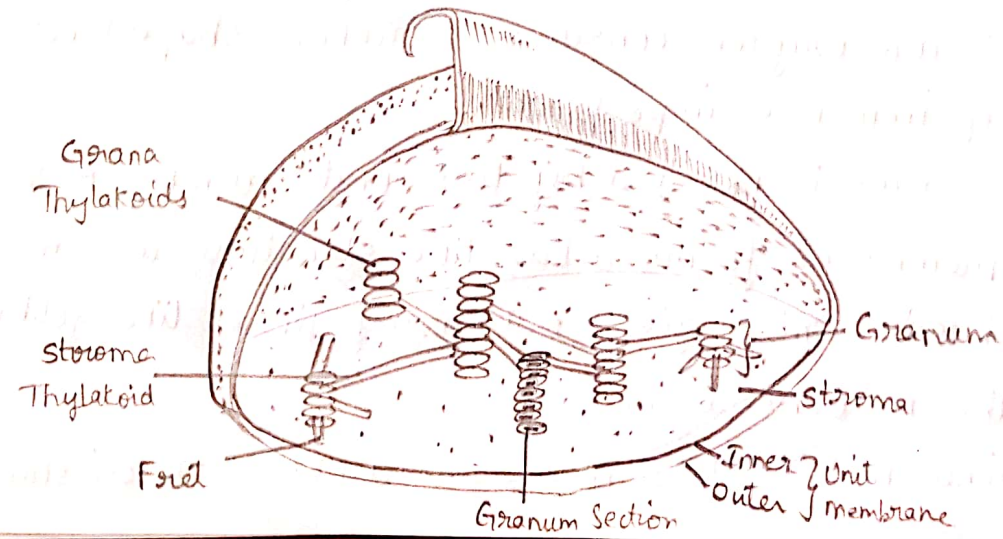
- Mitochondria are oxygen consuming ribbon-shaped cellular organelles of immense importance.
- Each mitochondria is bounded by two units membranes
- The outer membrane forms a bag like structure around the inner membrane which gives out many finger like folds in the lumen of the mitochondria.
- The folds of inner mitochondrial membrane are known as cristae.

- The space between outer and innear mitochondrial membrane as well as the central space is filled by a viscous mitochondrial matrix.
- The matrix contain many oxidative enzymes and coenzymes.
- The functions of mitochondria are respiration, oxidation of food, and metabolism of energy.
- The mitochondria also contain a circular DNA molecules and ribosomes.



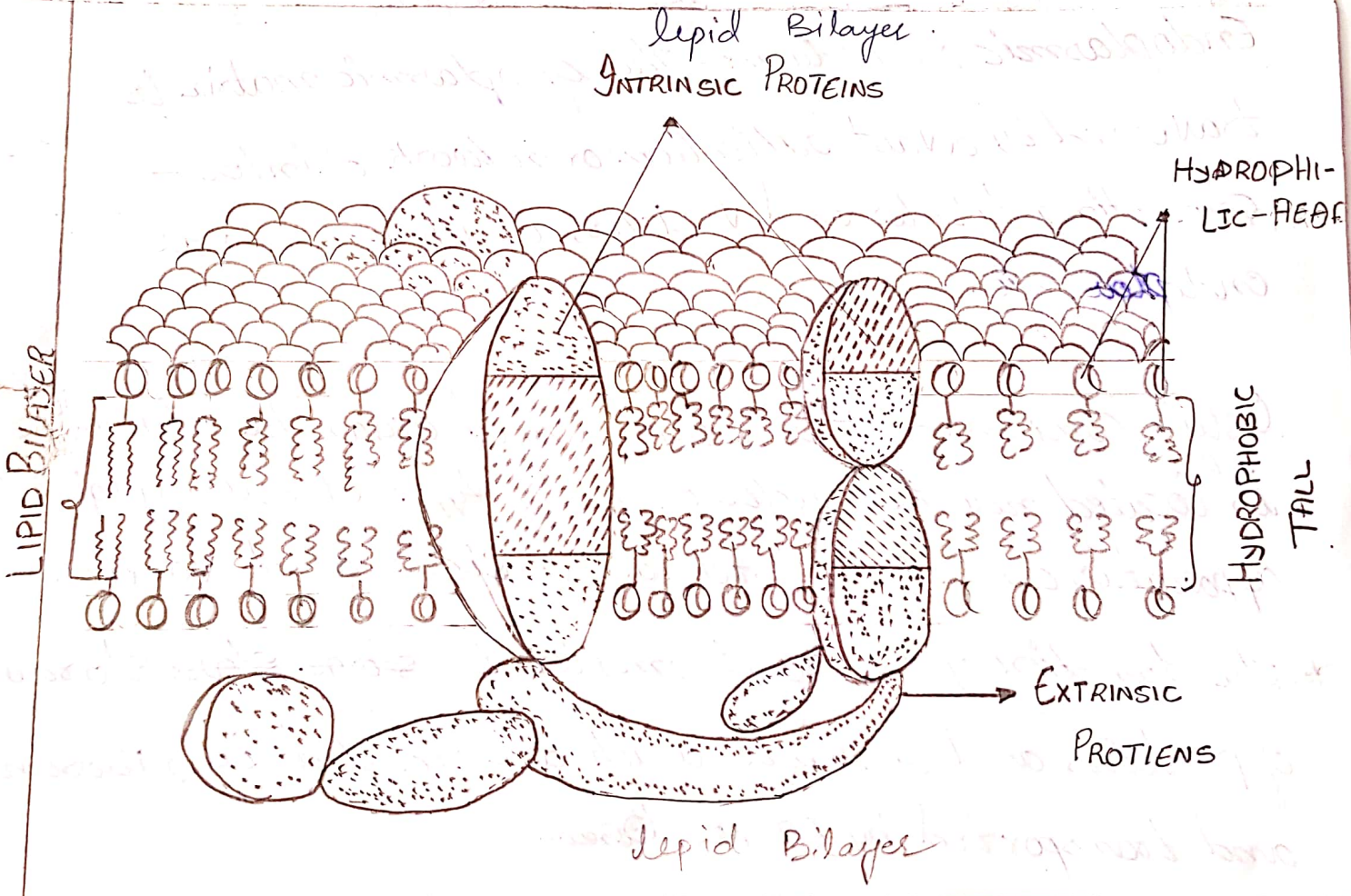
Chloroplast :-

- Several kinds, most common are chloroplasts containing the green pigment chorophyll.
- Chloroplast (green) trap solar energy for photosynthesis, contains the pigment chlorophyll.
- Converts it and stores it in the energy storage molecules ATP and NADPH while freeing oxygen from water in plant and algal cells.



Plasma Membrane :-

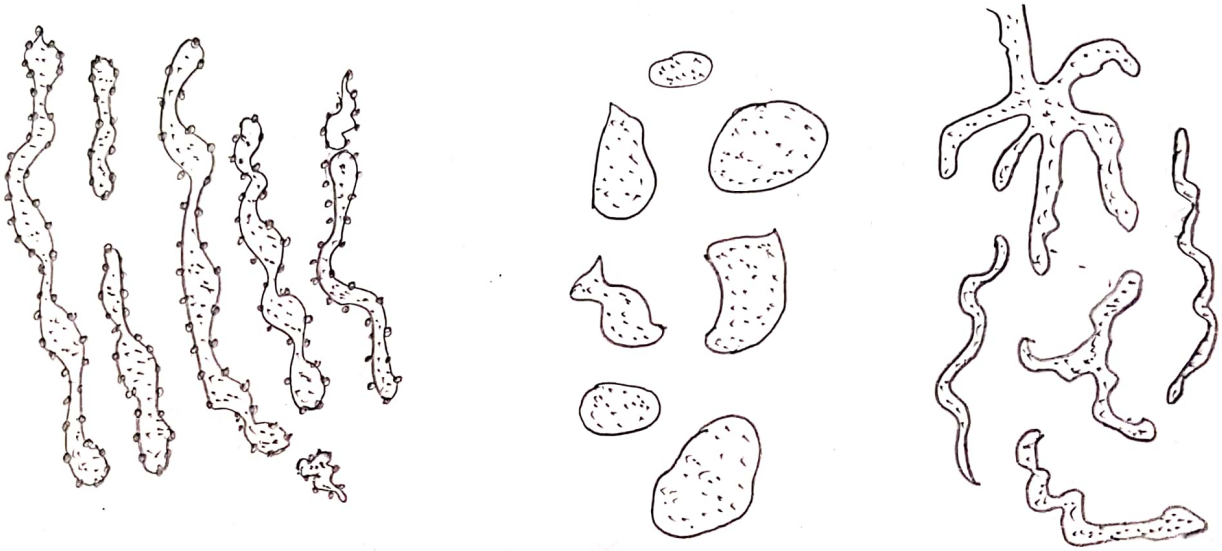
- The protoplast of a cell is delimite by a living, thin and delicate membrane called plasma membrane.
- In plant cells, plasma membrane occurs just inner to cell wall, bonding the cytoplasm. The plasmamembrane exhibits a trilaminar structure with a translucent layer sandwiched between two dark layers.
- At molecular level, it consists of a continuous bilayer of lipid molecules with protiens.



Endoplasmic Reticulum :-

- The cytoplasmic matrix is traversed by a vast reticulum or network of inter-connecting tubules and vesicles, which is known as endoplasmic reticulum.

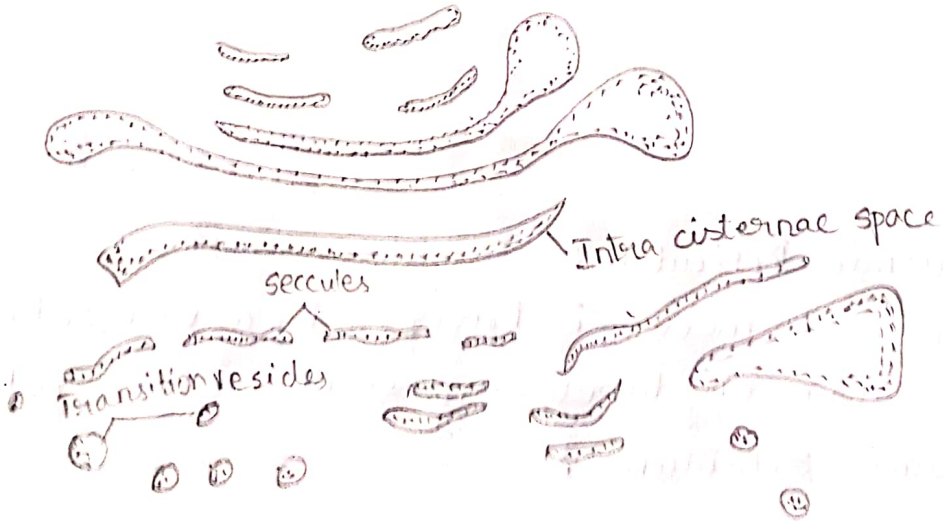
STRUCTURE OF ENDOPLASMIC RETICULUM:-



Golgi Complex :-

- It is a cup shaped organelle which is located near the nucleus in many types of cells. Golgi apparatus consists of cisternae, vesicles and vacuoles.
- The function of the golgi complex is storage of protiens and enzymes which are secreted by ribosomes and transported by ER.

: —Secretory Veside



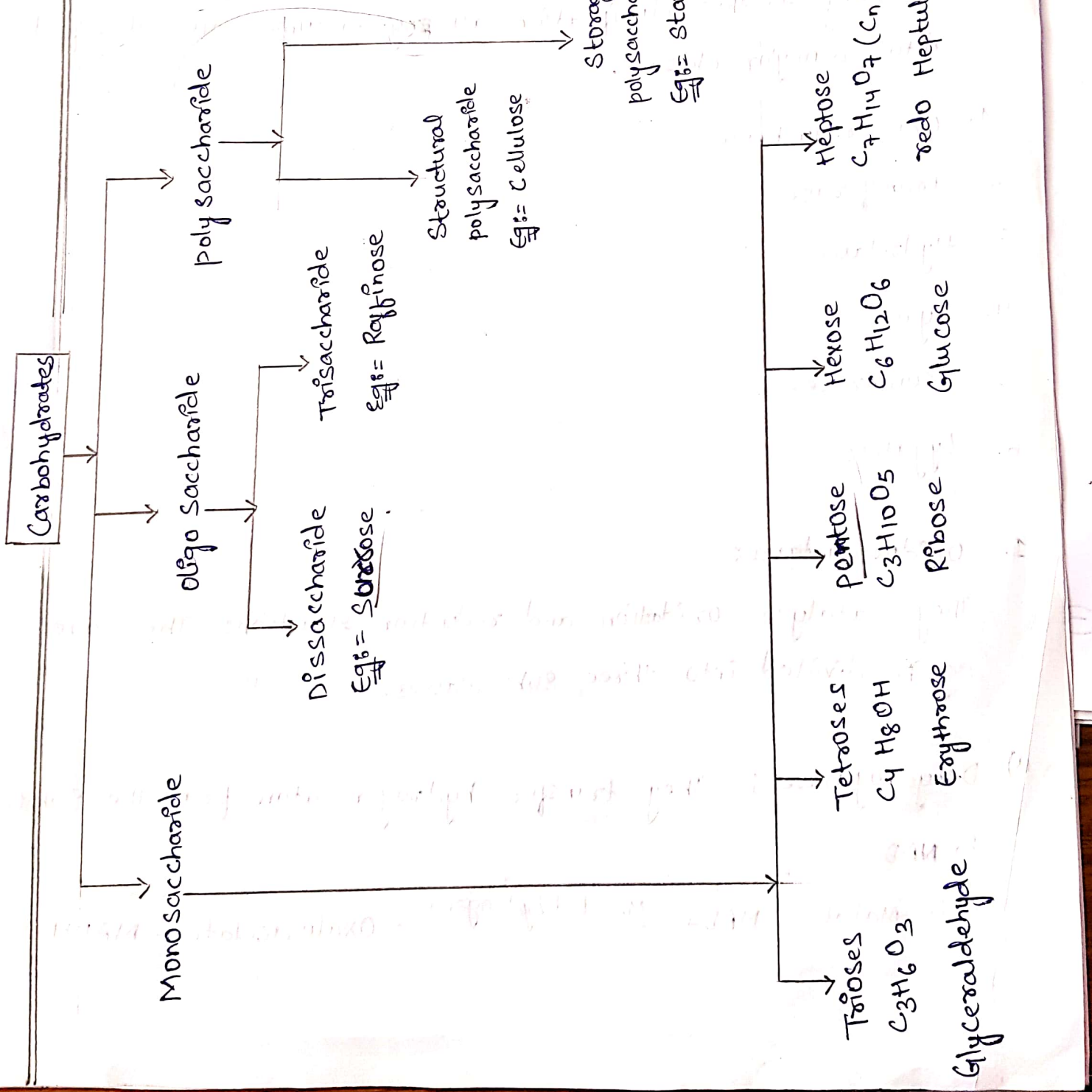
Deffnation, Gerenal classification and functions of carbohydrates:

Carbohydrates :=

Carbohydrates also called saccharides are molecular compounds made from just three elements: Carbon, hydrogen and oxygen. Monosaccharides.

Example := Glucose and sucrose are relatively small molecules. They are often called sugars.

Classification :=



* Classification of carbohydrates :-

1. Carbohydrates can be classified on the basis of their behaviour on hydrolysis.

2. They are mainly classified into three groups.

1. Monoscaccharides.
2. Oligo scacchorides
3. poly scacchorides.

1. Monosaccherides :-

It contains one sugar molecule. Mi sweet in taste. It is soluble in water and it can't be hydrolysed into simple sugars

Example :- Glucose (grapes), fructose (Honey).

2. Oligosaccherides :-

It contains 2-10 sugar molecules. which breakdown in monosaccherides.

They are classified as Disaccherides.

→ Disaccherides :-

Any of a class of sugars whose molecules contain two monosaccherides residues is called as Disaccherides.

Example :- Sucrose, maltose, lactose.

* Lipids :-

3. Polysaccharides:-

1. It contain many sugar molecules.
2. It is sweet in taste.
   Eg:- Starch.
3. Starch formed in roots potato seeds, leaves.

* Glycogen:-
Reserve food in animal, stored in liver, muscle.

* Cellulose:-
present in the plant, in the cell wall.

Functions of carbohydrates:

① Main function of carbohydrates:

For providing energy but they also play an important role in structure and functional of cells tissues, organs as well as in the formation of structures on the surface of cells.

② Fibre is a type of carbohydrate that promote good digestive health by reducing constipation and lowering risk of digestive track diseases

③ Body can transform extra carbohydrate into stored energy in the form of glycogen several hundred grams can be stored in livers and muscles

④ Cell converts carbohydrates into fuel molecular called ATP (Adenosine triphosphate) through a process called cellular respiration.

⑤ Carbohydrates are converted into sugar and this sugar will be used by the cell for its energy

⑥ The fibre in carbohydrates helps in lowing blood cholestrol. It is a part of connecting tissue

(7) They are also component of several important bio-chemical compounds such as nucleic acids and blood group substances

(8) They maintain glucose level of plasma.

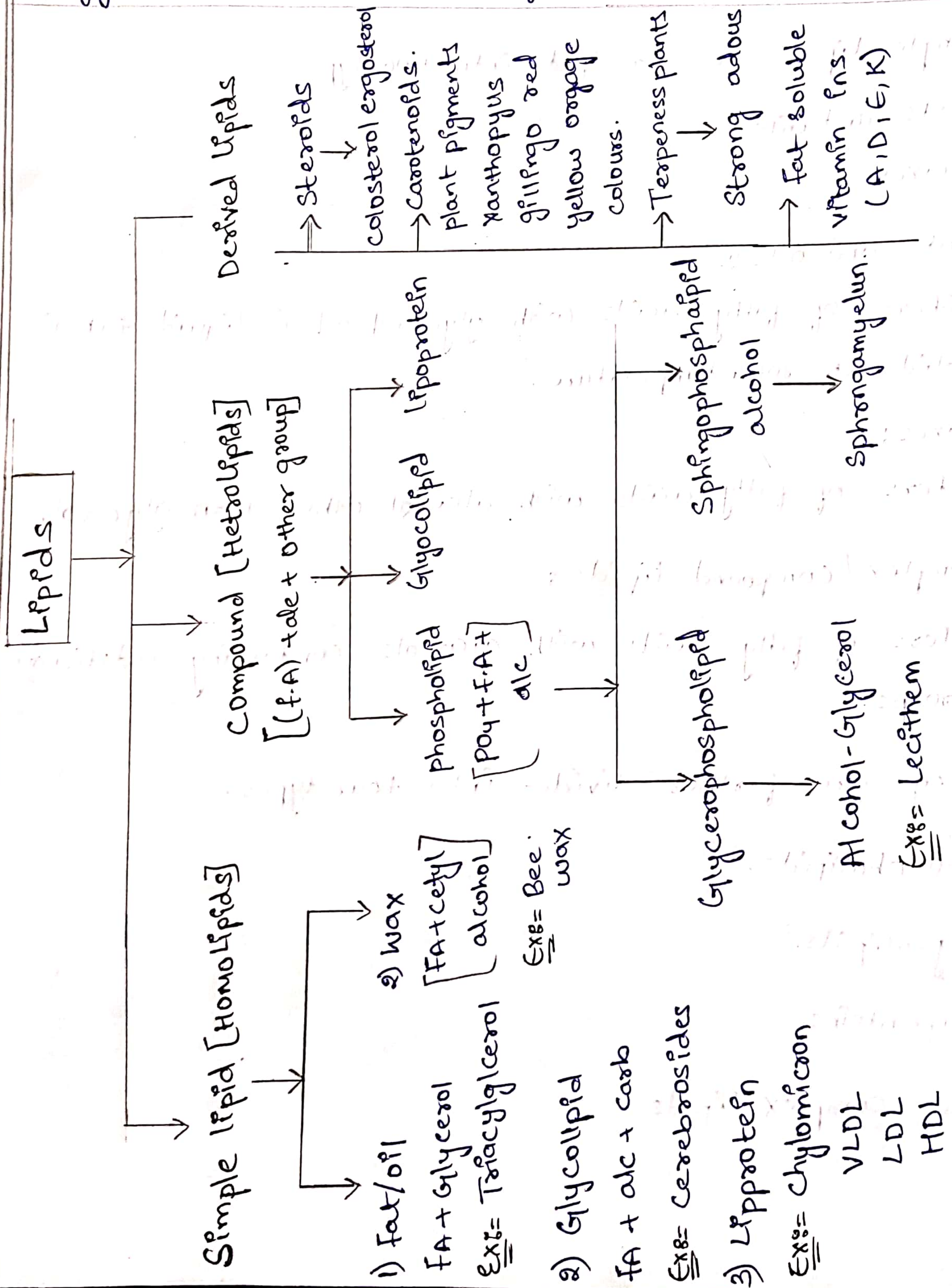
(9) They help in peristaltic movement of food.

(10) They are essential components of milk of lactose

(11) They are essential components of the temperature control and proper functioning of the different parts of the animal body.

* Lipids:-

Any of a large group of organic compounds that are oily to the touch and insoluble in water. Lipids include fatty acids, oils, waxes, sterols, and triglycerides. They are a source of stored energy and are a component of cell membrances.



* Classification of Lipids :-

Lipids are classified as simple lipids and complex lipids

1. Simple Lipids :-

1. Esters of fatty acids with various alcohols.
2. Simple lipid are classified into two types.

1 Fats and oils.

2. Waxes.

1. Fats and oils :-

Esters of fatty acids with glycerol oil is liquid, fat is solid at room temperature.

2. Waxes :-

Esters of fatty acids with alcohol other than glycerol.

2. Complex / Compound lipids :-

1 Esters of fatty acids with alcohols containing additional groups.

2. They are further divided into Four types.

1. phospholipids.
2. Glycolipids.
3. Lipoproteins.
4. Other complex lipids.

1. Phospholipids :=
Lipids containing phosphoric acid and frequntry a nitrogenous base.

2. Glyco Lipids :=
These lipids contain a fatty acid, carbohydrate and nitrogenous base.

3. Lipo proteins :=
Macromolecular complexes of lipids with proteins.

4. Other complex lipids :=
Sulfolipids, amino lipids and lipopolysaccharides are among the other complex lipids.

3. Derived lipids :=
These substraces are derived by hydrolysis of simple lipids and compound lipids.

4. Miscellaneous lipids :=
A large number of compounds processes characteristics of lipids
Eg := Hydrocarbons like pentacosone and terpenes etc.

5. Neutral lipids :=
The lipids which are unchanged are called as neutral lipids.
Eg := Mono, di, acylglycerols, cholestrol.

⇒ Functions of Lipids:=

1. Lipids serve as food reserve in both plants and animals.
2. In seeds and spores lipids help in thermal insulation, protection from UV radiations and loss of water
3. They function as concentrated food because as compared to carbohydrates they yield more than twice as much energy per unit weight.
4. Vitamins A, D, E & K are soluble in lipids. The latter not only act as their carriers but also protect them from oxidation.
5. Drying oils having unsaturated lipids are used in paint industry.
6. phospholipids, glycolipids and sterols are components of cell membranes.
7. Fragrance of many plant products is due to lipid substances called terpenes.
8. Desert animals employ lipids as a source of metabolic water.
9. Lipid tissues forms an insulating layer below the skin of animals for protection against low temperature.

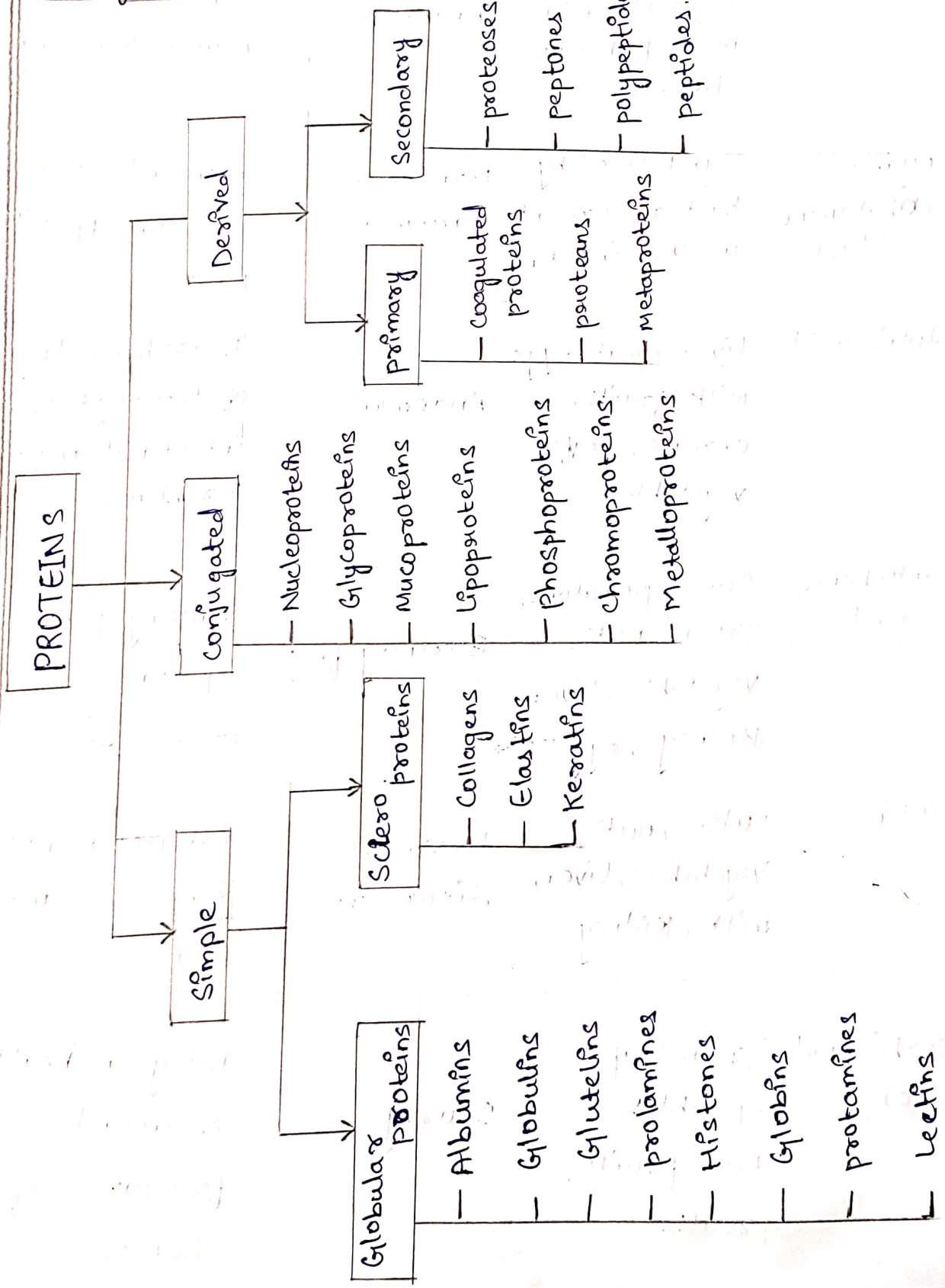
Lipids also produce a shock absorbing cushion around eyeballs, kidney and other vital organs.

Defination, General classification and functions of proteins

proteins :=

proteins are most abundant organic molecules of life which are essential for catalysing most of the biological processes.

Classification :=



Niacin (B_3)	Kidney, liver, meat, egg, oil seeds	pellagra	Dermatitis, Diarrhoea loss of memory Scaly skin.
phridoxine (B_6)	cereals, oil seeds vegetables, milk, meat, fish, eggs, liver.	Anaemia	Hyper Irritability, nausea, vomiting.
Cyano-cobalamine (B_{12})	Synthesised by bacteria present in the intestine	pernicious Anaemia	Lean and Weak, loss of appetite
Folic acid	Liver, meat, eggs milk, fruits, Cereals, Leafy vegetables	Anaemia	Diarrhoea, loss of leucocytes, intestinal mucus problems
pantothenic acid	Sweet potatoes, ground nuts, vegetables, liver Kidney, egg	Burining feet	Walking problems, Sprain.
Biotin	pulses, nuts, Vegetables, Liver, milk, Kidney	Nervous disorders	Fatigue, mental depression, muscle pains.
Ascorbic acid (c)	Green leafy vegetables, Citrus fruits, Sprouts.	Scurvy	Delay in healing of wounds, fractures of bones.

Vitamin	Resources	Deficiency	Symptoms
Reticol (A)	Leafy vegetables, corrots, tomato, pumpkin, papaya, mango, meat, fish, egg, liver, milk	Eye, skin, diseases	Night blindness, xerepth almia, cornea failure, scaly skin.
Calciferol (D)	Liver, egg, butter cod liver oil	Rickets	Improper formation of bons, knockness swollen wrists, delayed dentition weak bones.
Tocoferol (E)	Fruits, vegetables, Sprouts, meat, egg, sunflower oil	Fertitily disorders	Sterility in males, abortion in females.
Phylloquinone (K)	Green leafy vegetables, milk	Blood clotting	Delay in blood clotting, over bleeding.
Thiamine (B_1)	Cereals, oil seeds, vegetables, milk, meat, fish, eggs	Beri Beri	Vomiting, fits, loss of appetite, difficulty in breath -ing paralysis.
Riboflavin (B_2)	milk, eggs, liver, kidney, green leafy, vegetables.	Glossitis	Mouth cracks at corners, red and sore tongue, photophobia, Scaty skin.

Classification of proteins: Three major classification of proteins based on their

1) Function 2) chemical nature 3) solubility

4) Nutritional importance.

1) Functional classification of protein: They are further classified into the following groups.

* Structural proteins: Keratin of hair & nails, collegen of bone.
* Enzymes or catalytic proteins: Hexokinase, pepsin.
* Transport proteins: Haemoglobin, serum, albumin.
* Hormonal proteins: Insulin, growth hormone.
* Contractile proteins: Actin, myosin.
* storage proteins: ovalbumin, glutelin.

2) Protein classification based on chemical nature & solubility: These are classified into 3 major groups:-

1. Simple proteins, 2. Conjugated 3. Derived protein

1. Simple proteins: They are composed of only amino acid residues.
2. Conjugated proteins: Besides the amino acids, these proteins contain a non protein part known as prosthetic group or conjugating group.
3. Derived proteins: These are denatured or degraded products of simple & conjugated proteins.

ii) Keratins :- These are present in exoskeletal stutures
eg:- hairs ; nails.

2) Defination :→ Conjugated proteins :- A conjugated protein is a protein that functions in interaction with other chemical groups attached by covalent bonding or weak interactions.

a) Nucleo proteins :- A complex consisting of a nucleic acid (DNA or RNA) bonded to a protein.
eg:- Nucleohistones , nucleo protamines

b) Glyco proteins :- The prosthetic group is carbohydrate, which is less than 4% of protein.
eg:- mucin (saliva) ; ovomucoid (egg white)

c) Lipo proteins :- Protein found in combination with lipids as the prosthetic group.
eg:- serum lipo proteins.

d) Phospho proteins :- phosphoric acid is the prosthetic group. eg:- Casein (milk) , vitelline (egg yolk).

e) Chromoproteins :- The prosthetic group coloured in nature.
eg:- hemoglobins , cyto chromes.

f) Metalloproteins :- These proteins contain metal ions such as Fe, Co, Zn etc.
eg:- Ceruloplasim (Cu) , Carbonicanhydrase (Zn).

1. Simple proteins :-

a) Globular proteins :- These are spherical or oval in shape

i) Albumins; soluble in water, dilute salt solution & coagulation by heat. eg: serum albumin.

ii) Globulins: Soluble in neutral & dilute salt solns.
eg: serum globulins

iii) Glutelins: Soluble in dilute acids & alkalines & mostly found in plants.
eg: glutelin (wheat).

iv) Prolamines :- soluble in 70% alcohol.
eg: gliadin (wheat), zein (maize)

v) Histones :- Strongly basic proteins, soluble in H_2O & dilute acids but insoluble insoluble in NH_3.
eg:- thymus histones.

vi) Globins :- Globins are no basic proteins & are not precipated by NH_4OH.

vii) Protamines :- They are strongly basic & resemble histones. They are found in association with nucleic acid
eg:- Sperm proteins.

viii) Lectins - Lectins are useful for the purification of carbohydrates by affinity chromatography.
eg:- Concanavalin A; agglutinin.

b) Fiberous (Sclero proteins) :- These are fibre like in shape insoluble in water & resistant to digestion.

i) Collagens :- are connective tissue & main structural protein found in skin.

ii) Elastins :- These proteins are found in elastic tissue such as tendons & arteries

3) Derived proteins :- The derived proteins are of 2 types
→ Primary derived
→ Secondary derived

a) Primary derived proteins :-

i) Coagulated proteins :- These are denatured proteins produced by agents such as heat, acids, alkalies etc.
eg :- cooked proteins, coagulated, albumin (egg white).

ii) Proteans :- These are the earliest products of protein hydrolysis by enzymes, dilute acids, alkalies etc.
eg :- fibrin formed from fibrinogen.

iii) Meta proteins :- These are the 2nd stage products of proteins hydrolysis formed by treatment with slightly stronger acids & alkalies.
eg :- acid & alkali meta proteins.

b) Secondary derived proteins :- These are the progressive hydrolic products of protein hydrolysis. These include proteoses, peptones, polypeptides & peptides.

⇒ Functions of proteins:-

1. Fibrous protein Keratin forms External protective structures like nails, hair, hoofs, skin etc.
2. Antibodies and proteins meant for neutralizing and recognising toxins, viruses and other pathogens.
3. They are both defensive and offensive.
   Eg:- Snake venom, Ricin of castor etc.
4. proteins constitute more than 50% of the dry weight of protoplast. They form supporting structures.
5. pollen grains possess specific proteins in their walls for compalibility - inconpatibility reaction with stegina during pollination.
6. Actin and Myosin are fibrous proteins which is essential for contraction.
7. Microtubules are un-branched, shallows which form cilia, flagella. they are formed of two related proteins α and β tubulins.
8. P-protein is a special protein which is belived to acturely participate in the transport of nutrients.
9. There are over 2000 enzymes. Except few others are build up of proteins alone or in conjugations.
   Eg:- pepsin, trypsin etc.

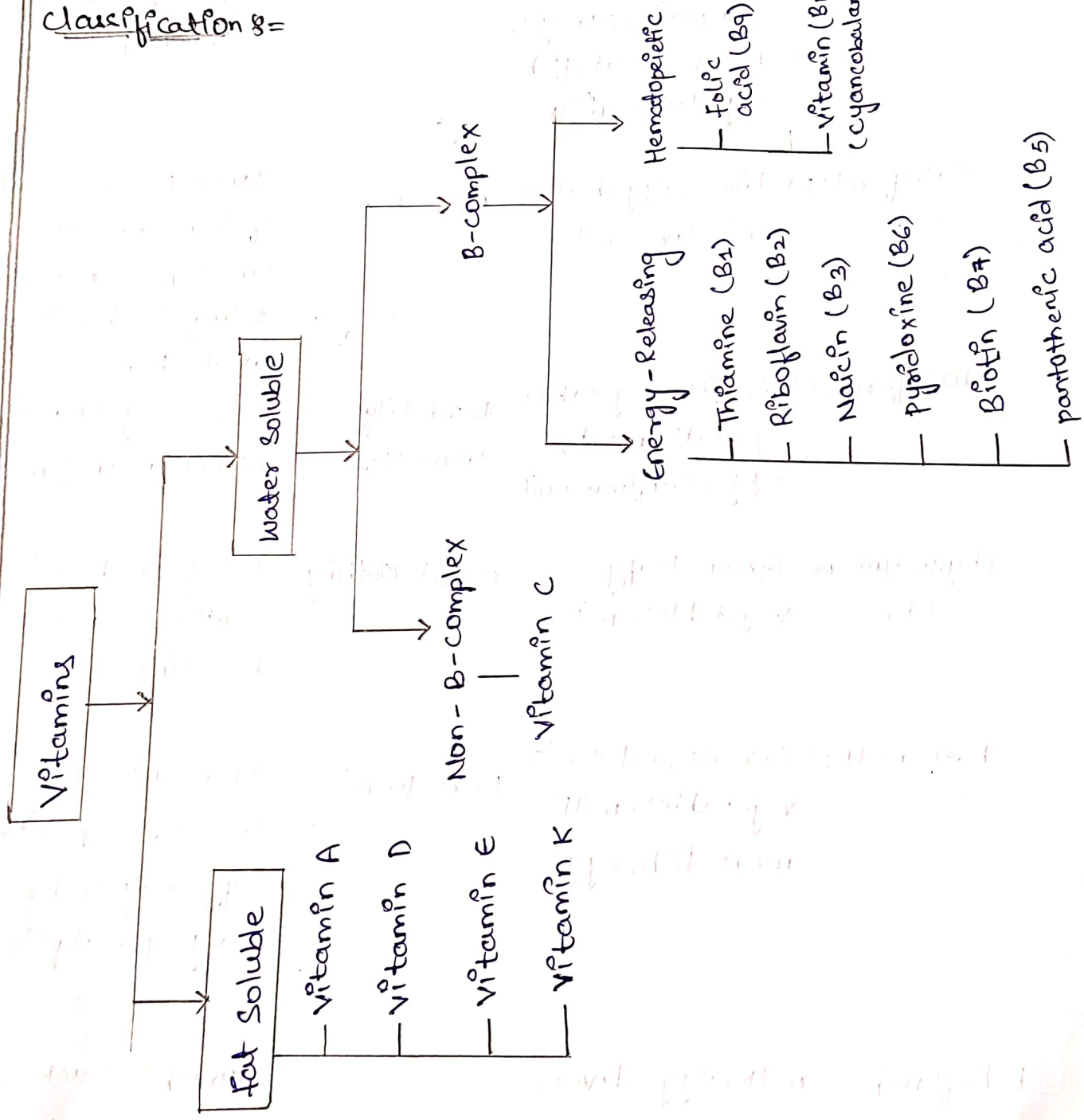
10. proteins occur in milk eggs and seeds to nourish young ones. proteins having all the essential amino acids are called as first class proteins.

Defination, General classification and functions of Vitamin

Vitamin :=

A Vitamin is an organic compound that is essential for the normal growth and metabolic processes of an organism.

Classification :=



1. Energy Releasing
2. Hematopoletic.

1. Energy Releasing :-

1. Energy Releasing is occurring with evolution or releasing of energy.
2. They are 6 types of

1. Vitamin B_1
2. Vitamin B_2
3. Vitamin B_3
4. Vitamin B_6
5. Vitamin B_7
6. Vitamin B_5

1. Vitamin B_1 (Thiamin) :-

It is a vitamin found in food and manufactured as dietary supplement. It is not synthesized in human body.

2. Vitamin B_2 (Riboflavin) :-

It is a vitamin found in fooded needed for growth and overall good health. It helps the body break down caubolydrates proteins & facts to produce energy and it allows oxygen to be used by the body.

3. Vitamin B_3 (Niacin) :-

Niacin known as nicotinic acid is an organic compound. It is an essential human nutrient. It lowers the cholestrol and boost brain.

4. Vitamin B5 (pantothenic acid) :-

One of the most important vitamins for human life. It's neccessary for making blood cells. and help you convert protein, carboky and fats into energy.

5. Vitamin B6 (pyridoxine) :-

It is a group of related compounds. It keeps blood sugar levels normal, fight infections etc.

6. Vitamin B7 (Biotin) :-

It is a vital part of a healthy metabolism and creating important enzymes. Biotin in needed for the formation of fatty acids and glucose in our body.

2. Water Soluble (B complex) :-

2. Hematopoietic :- An immature cell that develops WBC & RBC & phatelets. Are of two B9, B_{12}

1. Vitamin B9 (folic acid) :- A folic acid also called as folate is the synthetic form of B9. found in foods.

2. Vitamin B_{12} (cyanocobalimin) :- It is the laiger and most structurally compliented vitamin. It occus naturally in meat products & can only be industrially produced.

2. Vitamin D acids in bone health and development.

3. Vitamin - E :=

1. Vitamin E is an antioxdient that help the body destroy free radicals.

2. Vitamin E could plays an important role in preventing cancer.

4. Vitamin - K :=

1. It helps the body form blood clots.

2. This necessary function present a peson from bleeding out from small scratches.

2. Water Soluble :=

Water soluble vitamin are carried to the body's tissues but are not stored in the body, vitamin C (non-B-complex) and vitamin B (complex B) are water soluble.

1. Non-B-Complex (OR) Vitamin C :=

1 Ascorbic acid ; also known as vitamin C is water soluble strongly reduig effects.

2. Human cannot synthesize it and receive it from in food.

2. B Complex :=

B complex vitamins are classified into two types.

* Classification of vitamins :=

Vitamins are classified as

1. Fat soluble vitamins.
2. Water soluble vitamins.

1. Fat soluble vitamins :=

They are soluble in fats and oils and also the fat solvents (Eg :- Alcohol, acetone). Fat soluble vitamins can be stored in liver and adipose tissue. They are not readily excreted in urine.

They are of four types of vitamins. A, D, E, K

1. Vitamin-A :=

1. Vitamin A plays an important role in maintaing healthy vision and immune system.
2. Without vitamin A a person would suffer from severe vision issues.

2. Vitamin - D :=

1. It is produced naturally in the human body when the skin is exposed to sun.

⇒ **Functions of vitamins :=**

Their are 13 essential vitamins required for the body to work properly.

They are vitamin A, C, D, E, K, B_1, B_2, B_3, B_5, B_7, B_6, B_{12} and B_9

1. Vitamin A helps form and maintain healthy, teeth, bones, soft tissues and skin.
2. Vitamin C is an antioxidant. It is essential for wound healing, promotes healthy teeth.
3. Vitamin D helps maintains proper blood levels of Calcium and phosphorous. Also called as Sunshine vitamin.
4. Vitamin E is an antioxidant, helps form RBC and use vitamin K.
5. Vitamin K is needed because without it blood would not strick together (coagulate)
6. Biotin is essential for the metabolism of proteins, and carbohydrates and also production of hormones and cholesterol
7. Niacin is a vitamin B that helps maintain healthy skin and nerves.
8. Chlorine helps in normal functioning of the brain and nervous system.

9. Carnitine helps the body to change fatty acids into energy.

Deffination, General classification and functions of enzymes

* **Enzymes :=**
Enzymes are biological catalysts. They catalyse the biochemical reactions of the cell.

* **Classification :=**
International union of Biochemistry appointed a commission on enzymes to propose a systematic classification of enzymes. According to this classification all enzymes are classified into 6 major classes.

1. Oxidoreductases.
2. Transferases
3. Hydrolases
4. Lyases
5. Isomerases
6. Lygases.

1. **Oxidoreductases :=**
They catalyse oxidation and reduction reactions. These are again divided into three sub classes.

a) **Dehydrogenases :=** They transfer hydrogen atom from the substrate to NAD.

Eg := Malate + NAD+ $\xrightarrow{\text{Malatedehydrogenases}}$ Oxalo acelate + NADH

b) Reductases:= They add hydrogen to the substrate or remove oxygen.

Eg:= NO_3^- $\xrightarrow{\text{Nitrate Reductase}}$ NO_2^-

c) Oxidases:= They transfer hydrogen from the substrate to oxygen

Eg:- Glycolic acid + O_2 $\xrightarrow{\text{Glycolic acid oxidase}}$ Glyoxylic acid + H_2O

2). Transferases:=

They catalyse the transfer of active groups from one substrate to another substrate.

a) Transaminases:= They transfer an amino group from amino acid to keto acid.

b) Kinases:= They transfer phosphate group from ATP to substrate.

Eg:= Glucose + ATp $\xrightarrow{\text{Hexokinase}}$ Glucose-6-phosphate.

3). Hydrolases:=

These enzymes break the bonds in the presence of water. This class is divided into two sub groups.

a). phosphatases:= They catalyse the removal of phosphate group from the substrate in the presence of water

b). peptidases:= They catalyse the hydrolysis of peptide bonds.

Eg:= Tripsin, pepsin

Eg:- protein + H_2O $\xrightarrow{\text{Tripsin}}$ polypeptides + Amino acids

4). Lyases:-

These enzymes split the substrates in the absence of H_2O

Eg:- Arginosuccinic acid $\xrightarrow{\text{Arginosuccinase.}}$ Arginin + fumaric acid

5). Isomerases:-

These enzymes catalyse the isomeric changes of substrate molecule.

Eg:- Glucose 6 phosphate ⟶ Fructose 6 phosphate.

6). Ligases:-

These enzymes catalyse the synthesis of new bonds by utilizing energy from ATP.

Eg:- Glutamic acid + NH_3 + ATP $\xrightarrow{\text{Glutamine synthetase}}$ Glutamine.

⇒ Functions of Enzymes :=

1. Enzymes are the key molecules which procen the digestion in the body. Amylase breaks alone carbohydrates, proteases breakdown proteins and lipases breakdown lipids.
2. Metabolism is an important process to remove toxic waste from our body Enzymes play a crucial role in metabolism.
3. Enzyme helps decrease the blood pressure in high B.P pateents.
4. Some enzymes are present on the nephron which prekent Excretion of useful substances.

   Eg :- leucine aminopeptidase etc.
5. Thrombin enzyme activates clotting factors and enables coagulation.
6. Nervous system regulates the whole body and physiology. Their actions are broken down by enzymes. If it is not broken their would be persistent effects like seen in pesticide poisoning.
7. proteolytic enzymes are also involved in wound healing process.
8. lysosomal enzymes are helpful in the destruction of harmful microbes entering into the body. They help in

body defence and are part of Immunity.

9. Enzymes are also responsable for few Secretions Eg:- HCl in Stomach which acids digestion.

10. Enzymes are also helpful for physiology of respiration, helps convert CO_2 to carbonic and bicarbonate ions.