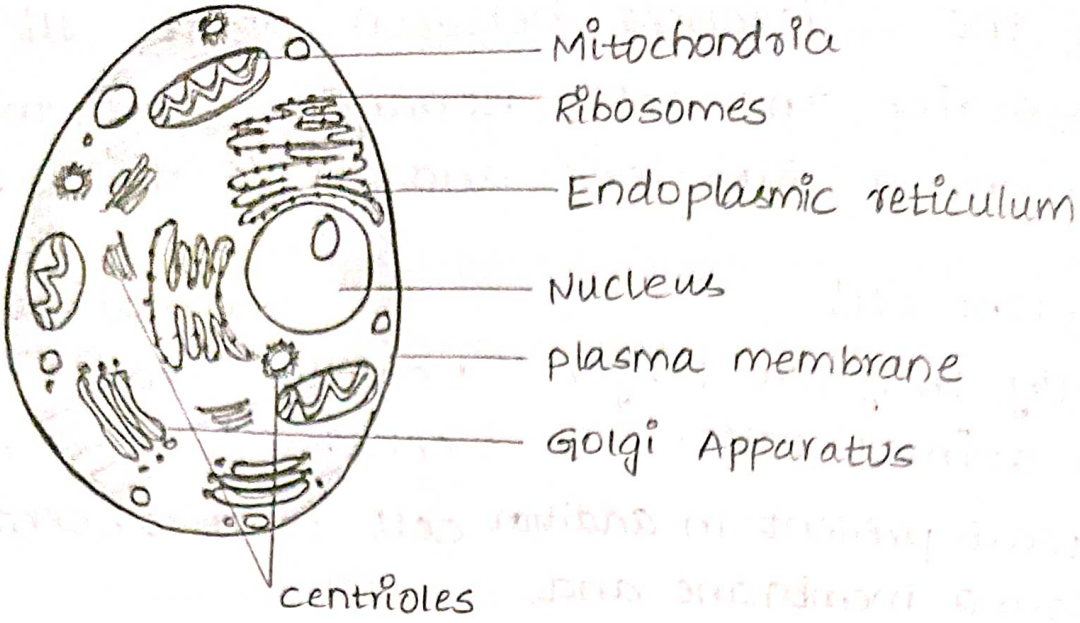
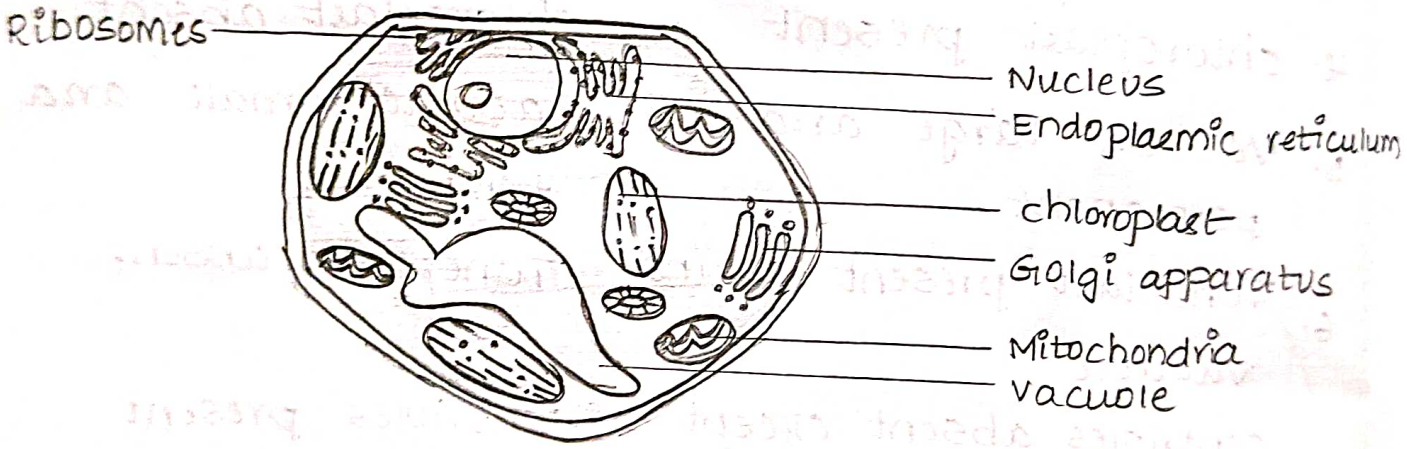
Assignment

2) Explain the differences between plant cell and Animal cell? Describe the mitochondrian? write their structure and important functions and draw the labelled diagram?

S.no	plant cell	Animal cell
1.	Usually they are larger than animal cells.	Usually smaller than plant cells.
2.	cell wall present in addition to plasma membrane and consists of middle lamellae, primary and secondary walls.	cell wall absent.
3.	plasmodesmata present	plasmodesmata absent
4.	chloroplast present	chloroplast absent
5.	vacuole large and permanent	vacuole small and temporary
6.	Tonoplast present around vacuole	Tonoplast absent
7.	centrioles absent except motile cells of lower plants.	centrioles present
8.	Nuclues present along the periphery of the cell.	Nucleus at the centre of the cell.
9.	Lysosomes are rare	Lysosomes present
10.	Storage material is starch grains	storage material is a glycogen granules.

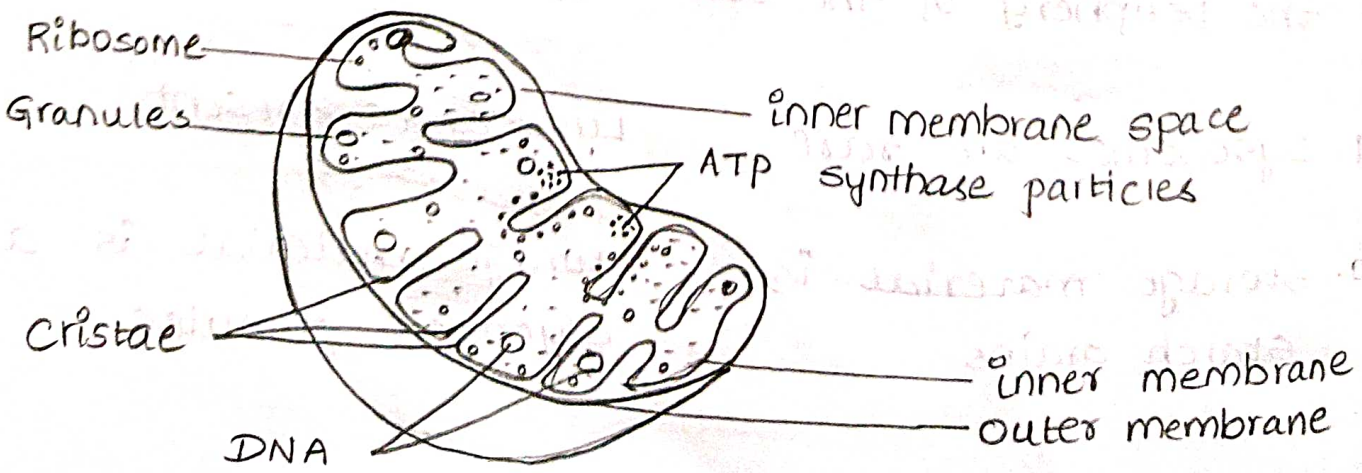


ANIMAL CELL



PLANT CELL

Mitochondria :



A mitochondrion is a membrane bound organelle found in eukaryotic cells. This organelle generates the cells supply of chemical energy by releasing energy stored in molecules from food and using it to produce ATP (adenosine Triphosphate). ATP is a special type of "energy carrying" molecule.

Structure and function of the Mitochondrion:

Mitochondria contains two phospholipid bilayers: there is an outer membrane, and an inner membrane. The inner membrane contains many folds called cristae which contain specialised membrane proteins that enable the mitochondria to synthesize ATP. Inside the inner membrane is a jelly-like matrix. Listed from the outermost layer to the innermost compartment, the compartments of mitochondrian are:

1. Outer mitochondrial membrane
2. Inner-membrane space
3. Inner mitochondrial membrane
4. cristae (folds of the inner membrane)
5. matrix (jelly like substance within the inner membrane)

Functions:

1. They are power house / storage batteries (or) ATP mills of the cells.
2. They are the site of cellular respiration.

3. The outer chamber of mitochondria helps in elongation of fatty acid chain.

4. Yolk formation during ovum development is done by mitochondria.

5. They can store and release ca^{+2} whenever is required.

6. It is site of thermogenesis.

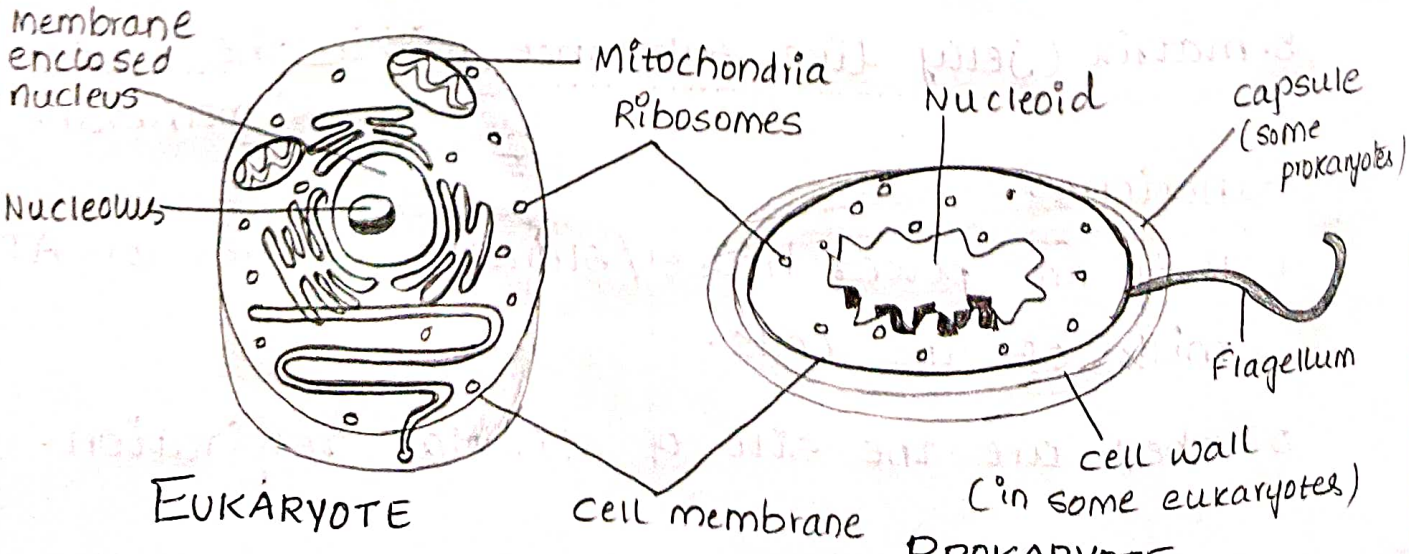
---

3) Describe the types of cells and write the differences between prokaryotes and eukaryotes cells with labelled diagrams?

Types of cells:

Cells are similar to factories with different labourers and departments that work towards a common objective. Various types of cells perform different functions. Based on cellular structure, there are two types of cells:

1. prokaryotes 2. Eukaryotes



Difference between prokaryotes and Eukaryotes:

PROKARYOTES	EUKARYOTES
* circular DNA (in cytosol)	* linear DNA (in nucleus)
* NO organelles	* several membrane bound organelles.
* Nucleoid (not membrane bound)	* Nucleus (membrane bound)
* single chromosome	* several chromosomes
* plasma membrane typically lacks receptors	* plasma membrane with receptors (sterols & carbohydrates)
* chemically complex cell wall (may contain peptidoglycan)	* chemically simple cell wall (cellulose (plants) & chitin (fungi))
* DNA transcription & mRNA translation occurs simultaneously (in cytosol)	* DNA transcription in nucleus and mRNA translation in cytosol.
* Flagellum (if present) simple, built from two proteins.	* Flagellum (if present) complex, built from microtubules.
* May have pili & fimbriae	* May have cilia.
* Haploid genome (only one copy of each gene).	* Diploid genome (more than one copy of each gene).
* May have plasmids (DNA outside chromosome)	* plasmid DNA not common
* compact genome (little repetitive DNA)	* usually large amounts of non-coding & repetitive DNA.
* small ribosomes	* Large ribosomes in cytosol/ nucleus small ribosomes in organelles.

* no histones in chromosomes	* DNA wound around histones
* Lacks cytoskeleton	* cytoskeleton (actin, microtubules)
* Mycolaginous capsule	* No mycolaginous capsule
* cell size range 0.5 – 100 μm	* cell size range 10 – 150 μm
* Asexual reproduction (binary fission)	* sexual reproduction (binary fusion)

PROKARYOTE :

Prokaryotes are unicellular organisms that lack membrane bound structures, the most noteworthy of which is the nucleus. prokaryotic cells tend to be small, simple cells, measuring around 0.1 – 5 μm in diameter. while prokaryotic cells do not have membrane bound structures, they do have distinct cellular regions. In prokaryotic cells, DNA bundles together in a region called the nucleoid.

EUKARYOTE :

Eukaryotes are organisms whose cells have a nucleus and other organelles enclosed by a plasma membrane. organelles are internal structures responsible for a variety of functions, such as energy production and protein synthesis Eukaryotic cells are large (around 10 – 100 μm) and complex. while most eukaryotes are multicellular organisms, there are some single-cell eukaryotes.

5) What is cell division? Describe the mitosis cell division process with labelled diagrams.

Cell division:

Cell division is the process by which a parent cell divides into two (or) more daughter cells. Cell division usually occurs as part of a larger cell cycle. During cell division, the cell nucleus splits and the DNA is replicated. DNA synthesis occurs in one specific stage of cell division but distribution of chromosome in cells occurs in complex series of events during cell division.

→ Human cell divide once in approximately 24 hours, which may vary in different organisms. In yeasts it takes about 90 minutes to complete the cell division process.

There are two distinct types of cell division out of which the first one is vegetative division, where in each daughter cell duplicates the parent cell called mitosis. The second one is meiosis, which divides into four haploid daughter cells.

Mitotic cell Division:

* In animals mitotic division is present in only somatic diploid cells but in plants it is seen in both haploid and diploid cells.

* Mitosis cell division is also known as equational division because the numbers of chromosome remain same in parental and progeny cells.

There are four stages in M phase, namely:

1. prophase
2. Metaphase
3. Anaphase
4. Telophase

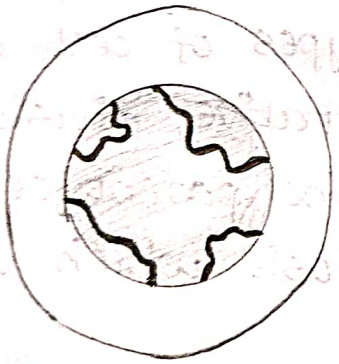
1. prophase:

prophase is the first phase of mitosis followed by G2 phase. It involves following events-

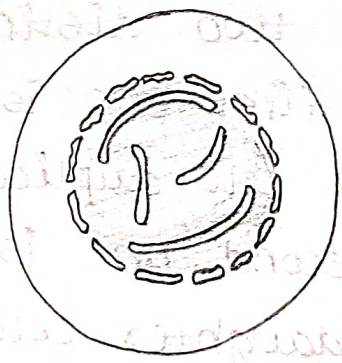
i. Initiation of condensation of chromosomal materials.

ii. Movement of centrioles towards opposite poles of the cell.

iii. At the end of prophase, endoplasmic reticulum, nuclear membrane, Golgi complex disappears.



Early prophase



Late prophase

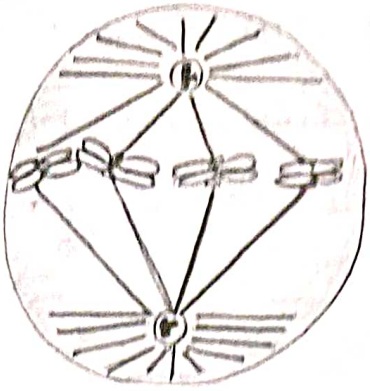
2. Metaphase:

Metaphase starts with complete disappearance of nuclear membrane. The most suitable stage for study of morphology of chromosomes. It involves

1. condensation of chromosomal materials in to compact and distinct chromosomes made up of two sister chromatids attatched with splindle fibres with

kinetochores.

2. Chromosomes arrange at centre of cell called metaphase plate.



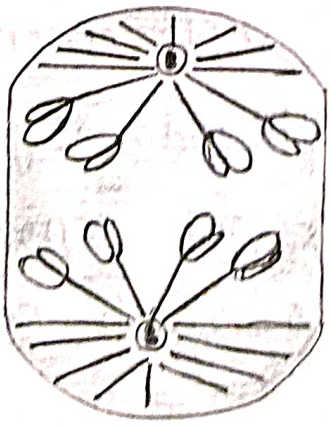
Metaphase

3. Anaphase:

1. The splitting of the sister chromatids marks the onset of anaphase.

2. These sister chromatids become the chromosome of the daughter nuclei. The chromosomes are then pulled towards the pole by the fibres attatched to the kinetochores of each chromosome.

3. The centromere of each chromosome leads at the edge while the arms trail behind it.

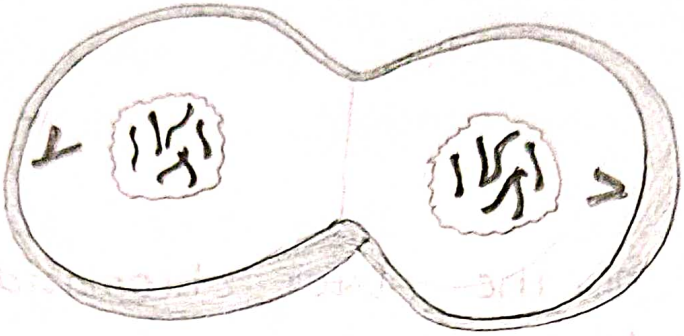


Anaphase

Telophase:

* The chromosomes that cluster at the two poles start coalescing into an undifferentiated mass, as the nuclear envelope starts forming arand it.

* the nucleolus, Golgi bodies and ER complex, which had disappeared after prophase start to reappear.



Telophase is followed by cytokinesis, which denotes the division of the cytoplasm to form two daughter cells. Thus, it marks the completion of cell division.

Functions of Mitosis:

Following are the two important functions of mitosis:

1. Mitosis helps in the development of an organism. In single-celled organisms, mitosis is the process of asexual reproduction.

2. Mitosis helps in the replacement of damaged tissues. The cells near the damaged cells begin mitosis when they do not sense the neighbouring cells. The dividing cells reach eachother and cover the damaged cells.

Significance of Mitosis:

1. Mitosis is responsible for the development of the zygote into an adult.
2. Equal distribution of chromosomes to each daughter cell.
3. It is responsible for the growth and development of an individual.
4. It maintains the constant number of chromosomes in all body cells of an organism.
5. Mitosis is required for asexual reproduction, vegetative propagation in plants and also responsible for repair and regeneration of damaged tissues.
6. Mitosis helps in maintaining purity of genome as no recombination (or) crossing over takes place.
7. It is responsible for repair and regeneration of old and damaged cells in animals.

eg: gut epithelium, blood cells etc.

8) Explain the reaction of Krebs / TCA cycle?

* The Krebs cycle, also known as the citric acid cycle (or) TCA cycle is a series of reactions that take place in the mitochondria resulting in Oxidation of acetyl CoA to release carbon dioxide and hydrogen atoms that later lead to the formation of water.

* This cycle is termed the citric acid cycle as the first metabolic intermediate formed in the cycle is citric acid.

* This cycle is also termed tricarboxylic acid (TCA) because it was when not certain whether citric acid or some other tricarboxylic acid (e.g., isocitric acid) was the first product of the cycle. However, now it has been known that the first product is indeed citric acid and thus the use of this name has since been discouraged.

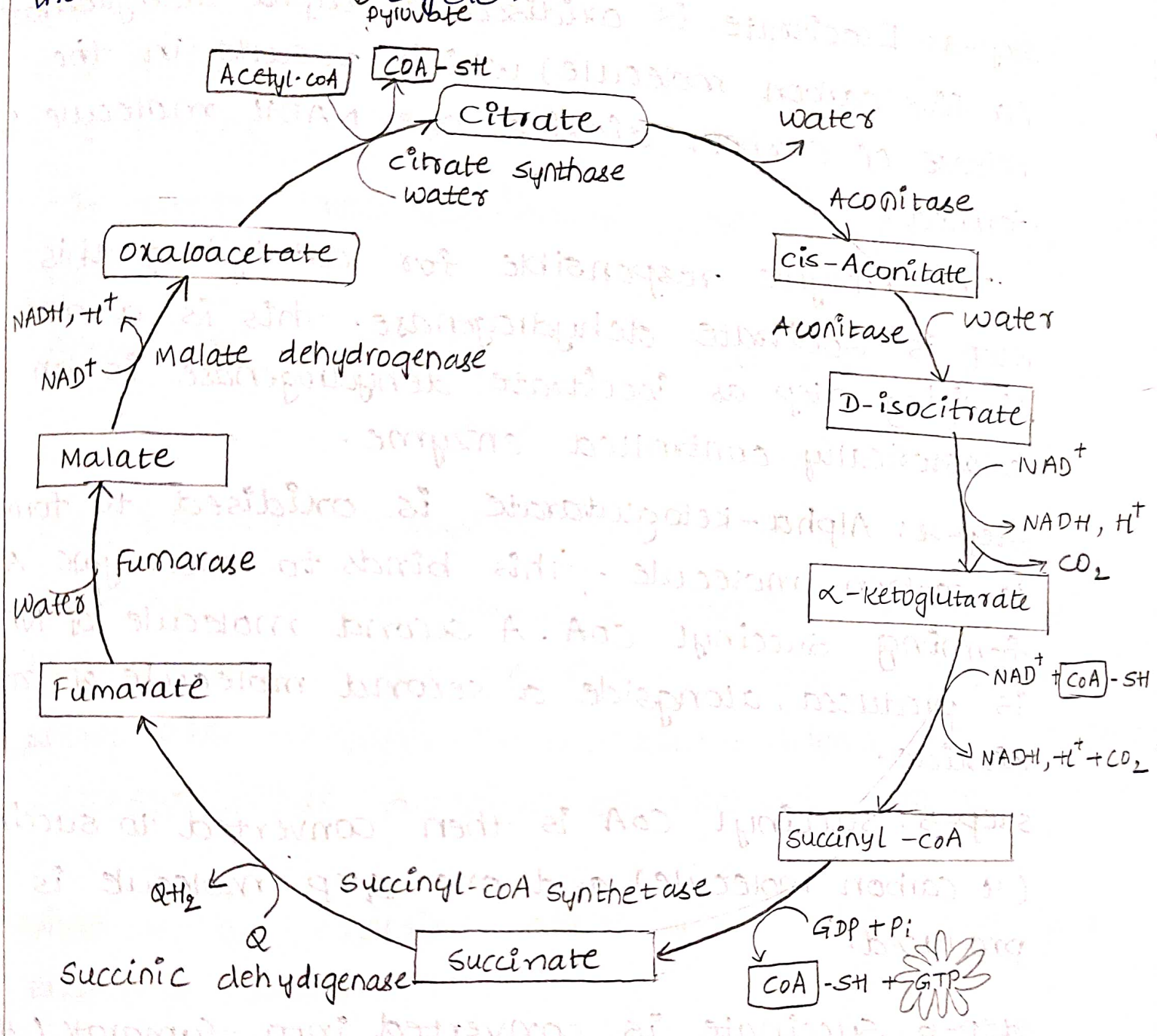
* this cycle only occurs under aerobic conditions as energy-rich molecules like NAD^+ and FAD can only be retrieved from their reduced form once they transfer electrons to molecular oxygen.

* The citric acid cycle is the final common pathway for the oxidation of all biomolecules; proteins, fatty acids, carbohydrates. Molecules from other cycles and pathways enter this cycle through Acetyl CoA.

* the citric acid cycle is a cyclic sequence of reactions formed of 8 enzyme-mediated reactions.

* This cycle is also particularly important as it provides electrons / high-energy molecules to the electron transport chain for the production of ATPs and water.

* pyruvate formed at the end of glycolysis is first oxidized into Acetyl coA which then enters the citric acid cycle.



Steps of TCA cycle:

Following are the important steps of the TCA cycle:

Step 1: Acetyl coA (two carbon molecule) joins with Oxaloacetate (4 carbon molecule) to form citrate (6 carbon molecule).

Step-2: Citrate is converted to isocitrate (an isomer of citrate).

Step-3: Isocitrate is oxidised to alpha-Ketoglutarate (a five carbon molecule) which results in the release of carbon dioxide. One NADH molecule is formed.

The enzyme responsible for catalysing this step is isocitrate dehydrogenase. This is a rate limiting step as isocitrate dehydrogenase is an allosterically controlled enzyme.

Step-4: Alpha-ketoglutarate is oxidised to form a 4 carbon molecule. This binds to coenzyme A forming succinyl CoA. A second molecule of NADH is produced, alongside a second molecule of carbon dioxide.

Step-5: Succinyl CoA is then converted to succinate (4 carbon molecule) and one GTP molecule is produced.

Step-6: Succinate is converted into fumarate (4 carbon molecule) and a molecule of $FADH_2$ is produced.

Step-7: Fumarate is converted to malate (another 4 carbon molecule).

Step-8: Malate is then converted into Oxaloacetate the third molecule of NADH is produced.

End products of TCA cycle

Following are end products of TCA cycle:

1. 6 NADH
2. 2 ATPs
3. 2 $FADH_2$

The overall reaction / equation of the citric acid cycle is:

$$\text{Acetyl CoA} + 3\,NAD^+ + 1\,FAD + 1\,ADP + 1\,Pi \longrightarrow 2\,CO_2 + 3\,NADH + 3H^+ + 1\,FADH_2 + 1\,ATP$$

In words, the equation is written as:

Acetyl CoA + Nicotinamide adenine dinucleotide + Flavin adenine dinucleotide + Adenosine diphosphate + phosphate ⟶ pyruvate + water + Adenosine triphosphate + Nicotinamide adenine dinucleotide + Hydrogen ions.

9) what is an exocrine gland and explain any four endocrine glands?

Exocrine glands:

Exocrine glands release (secrete) substances through openings (ducts) onto your body surfaces. Exocrine glands secrete sweat, tears, saliva, milk and digestive juices. A gland is a unit of cells that work together to create and secrete these substances.

Endroctine glands:

Endocrine glands:

1. pituitary gland
2. Thyroid gland
3. parathyroid glands
4. Adrenal glands
5. pancreas
6. Gonads
7. pineal gland

1. pituitary gland:

Enclosed deep within the SKULL, the pituitary gland is the size of a pea. It hangs on a stalk at the base of the brain. It consists of an anterior portion that produces hormones and a posterior portion that has many neural links. This gland is regarded as the master gland as it controls the functions of all the other glands (such as adrenal, thyroid glands) in the endocrine system. The pituitary gland stimulates the adrenal gland to secrete cortisol, a steroid hormone controls a range of activities from controlling the body's metabolism to stimulating blood pressure. The pituitary gland also secretes prolactin, which stimulates the production of milk.

2. Thyroid gland:

The thyroid glands can be found at the front of the neck. It sits low in the throat, between the windpipe. Brownish red, it has blood vessels coursing through it. It secretes harmones that are collectively called thyroid harmones. The most prominent are T3 and T4 which influence the body's rate of metabolism.

3. parathyroid glands:

The parathyroid glands consists of four small glands that are located behind the thyroids in the neck. They influence the calcium levels in the body by producing a harmone called parathyroid harmone. sometimes, when the gland produces excess parathyroid harmones, it can have negative effects such as brittle bones and kidney stones.

4. Adrenal glands:

The adrenal glands sit atop the kidneys and are no larger than a walnut. These glands produce over 150 harmones that regulate different functions in the body. The most well known is Adrenaline, which triggers the flight (or) fight response. In other words, this is a stress harmone that helps the organism to either face a dangerous situation or to avoid it altogether. It does this by:

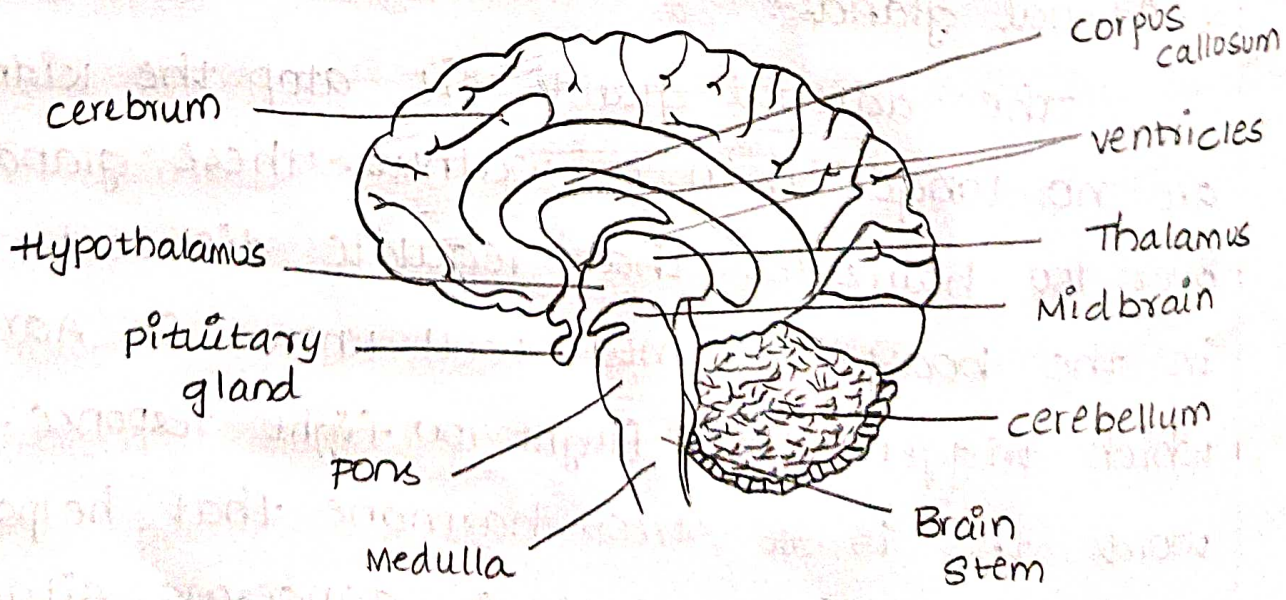
* Increasing blood sugar levels.
* Increasing the blood supply to the muscles, particularly to the limbs.
* Dialating the pupils.
* Increasing the heart rate
* Tightening the jaw muscles.

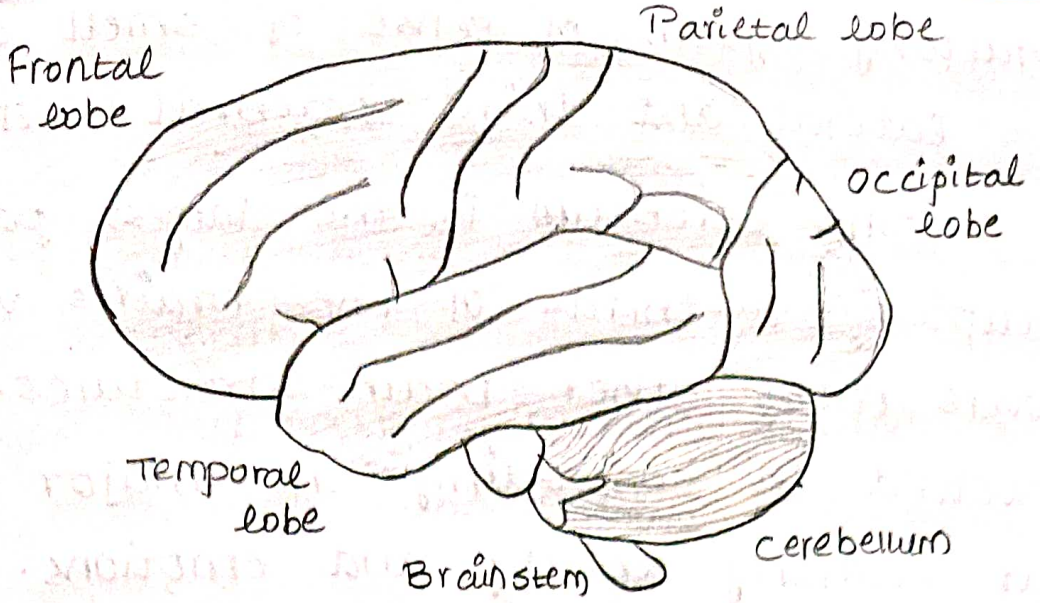
Functions of endocrine glands;

* Harmones are released into the blood stream by endocrine glands. This allows harmones to flow to cells throughout the body.

* Endocrine harmones play a role in mood regulation, growth and development, organ function metabolism and reproduction.

10) Describe the structure and functions of the brain of man?





Central Nervous system (CNS) is often called the central processing unit of the body. It consists of the brain and spinal cord.

The human brain is divided into three main parts:

1. Forebrain
2. Midbrain
3. Hindbrain

These three main parts comprises many small parts.

Forebrain:

The forebrain is also called as Prosencephalon.

The forebrain is the anterior part of the brain, which comprises the cerebral hemispheres, the thalamus, and the hypothalamus. It also consists of two subdivisions called the ten-telencephalon and diencephalon. Along with the optic nerves and cranial nerves, the forebrain also includes the

olfactory system, or sense of smell as well as the lateral and third cerebral ventricles.

The cerebrum is the largest part, which occupies two-thirds of the brain's volume and covers most other brain structures. It is involved in controlling the major functions like our learning ability and emotions.

The cerebrum consists of the cerebral cortex and other subcortical structures. It is composed of two cerebral hemispheres that are joined together by C-shaped nerve fibre called the corpus callosum.

The cerebrum is further divided into four sub-sections or lobes:

The frontal Lobe:

The frontal lobe is found just below the forehead. It is mainly responsible for the parts of speech, judgements, reasoning, solving problems, planning and for motor functions including movements. The frontal lobe is also associated with the self-regulated behaviours, facial expressions, controlling inhibition, to pay attention, to remember and to control emotions.

The parietal Lobe:

The parietal lobe is found at the upper back of our brain. This lobe functions by controlling all our complex behaviours, including senses of vision, the sense of touch, spatial orientation and body awareness. It manages body position, movements, the perception of stimuli, orientation, handwriting and visuospatial processing.

The occipital Lobe:

The occipital lobe is found at the back. It is mainly associated with visual processing systems such as body postures, gestures and expressions.

The Temporal Lobe:

The Temporal lobe is found near to ours ears and is associated with the speech, hearing, recognition and processing of auditory stimuli.

Midbrain:

The midbrain is also called as Mesencephalon.

The midbrain is the smallest region of the brain, found at the centre of the brain, between cerebral cortex and hind brain. It comprises tectum, cerebral peduncle, tegmentum, cerebral aqueduct, substantianigra, several nuclei and fasciculi.

The midbrain is responsible for hearing, vision, sleep cycle, temperature regulation, alertness, etc. It contains a large number of dopamine-producing neurons in the substantianigra, degeneration of these neurons is related to parkinson's disease.

Hindbrain:

The hindbrain is also called as Rhombencephalon

The hindbrain is located at the lower back part of the brain. It is mainly composed of the cerebellum, brain stem, pons and the medulla.

The cerebellum controls activities such as balance, coordination and muscle movements. The cerebellum is present at the back side of the brain at the base. The cerebellum is responsible for coordination and balance.

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11) Define the genetics? Explain the Mendel's Laws?

Genetics:

Genetics is the science which deals with the mechanisms responsible for similarities and differences among closely related species. The term 'genetic' was coined by william Bateson in 1905. It is derived from the Greek word 'genesis' meaning grow into or to become. so, genetics is the study

of heredity and heriditary variations, it is the study of the transmission of body features: i.e, similarities and difference, from parents to offspring and the laws related to this transmission.

Mendel's Laws:

The two Mendel's experiments lead to the formation of Mendel's laws known as laws of inheritance which are:

1. Law of Dominance
2. Law of segregation
3. Law of Independent Assortment

1. Law of Dominance:

phenotype of parents ⟶ pure tall × pure dwarf

Genotype ⟶ TT tt

Gametes ⟶ (T) (t)

F_1 generation ⟶ Tt

(Hybrid tall)

1. The genotype of an individual is made up of the many alleles it possesses.
2. An individual's physical awareness appearance, or phenotype, is determined by its alleles as well as by its environment.
3. The presence of an allele does not mean that the trait will be expressed in the individual that possesses it.

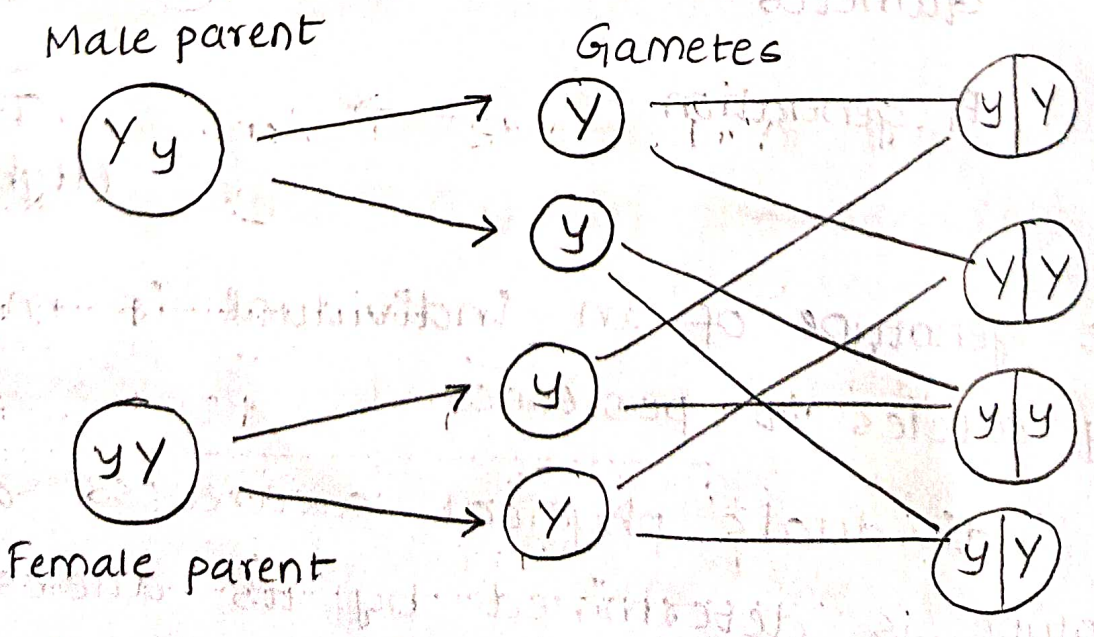
4. If the two alleles of an inherited pair diffe
(the heterozygous condition), then one determines t
organism's appearance and is called the dominant
allele; the other has no noticeable effect on the
organism's appearance and is called the recessive
allele.

5. Thus, the dominant allele will hide the phenotyp
effects of the recessive allele.

6. This is known as the law of Dominance but it
is not a transmission law: it concerns the expressio
of the genotype.

7. The upper case letters are used to represent
dominant alleles whereas the lower case letters
are used to represent recessive alleles.

2. Law of segregation :



1. The law of segregation states that every individual organism contains two alleles for each trait, and that these alleles segregate (seperate) during meiosis such that each gamete contains only one of the alleles.

2. An offspring thus receives a pair of alleles for a trait by inheriting homologous chromosomes from the parent organisms: one allele for each trait from each parent.

3. Hence, according to the law, two members of a gene pair segregate from each other during meiosis; each gamete has an equal probability of obtaining either member of the gene.

3. Law of Independent Assortment:

INDEPENDENT ASSORTMENT
Alleles sort Independently

	YR	Yr	yR	yr
YR	YYRR	YYRr	YyRR	YyRr
Yr	YYRr	YYrr	YyRr	Yyrr
yR	YyRR	YyRr	yyRR	yyRr
yr	YyRr	Yyrr	yyRr	yyrr

9 : 3 : 3 : 7

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INDEPENDENT ASSORTMENT
Alleles sort Independently

	YR	Yr	yR	yr
YR	YYRR	YYRr	YyRR	YyRr
Yr	YYRr	YYrr	YyRr	Yyrr
yR	YyRR	YyRr	yyRR	yyRr
yr	YyRr	Yyrr	yyRr	yyrr

9 : 3 : 3 : 7

1. The law of independent assortment; unliked or distantly linked segregating genes pairs behave independently.

2. The law of independent assortment states that alleles for seperate traits are passed independently of one another.

3. Mendel found support for this law in his dihybrid cross experiments. In his monohybrid crosses, an idealized 3:1 ratio between dominant and recessive phenotypes resulted. In dihybrid crosses, however he found a 9:3:3:1 ratios.

4. This shows that each of the two alleles is inherited independently from the other, with a 3:1 phenotypic ratio for each and 1:2:1:2:4:2:1:2:1 ratio of the nine possible genotypic ratio.

Explain the various steps DNA finger printing and applications?

DNA FINGERPRINTING:

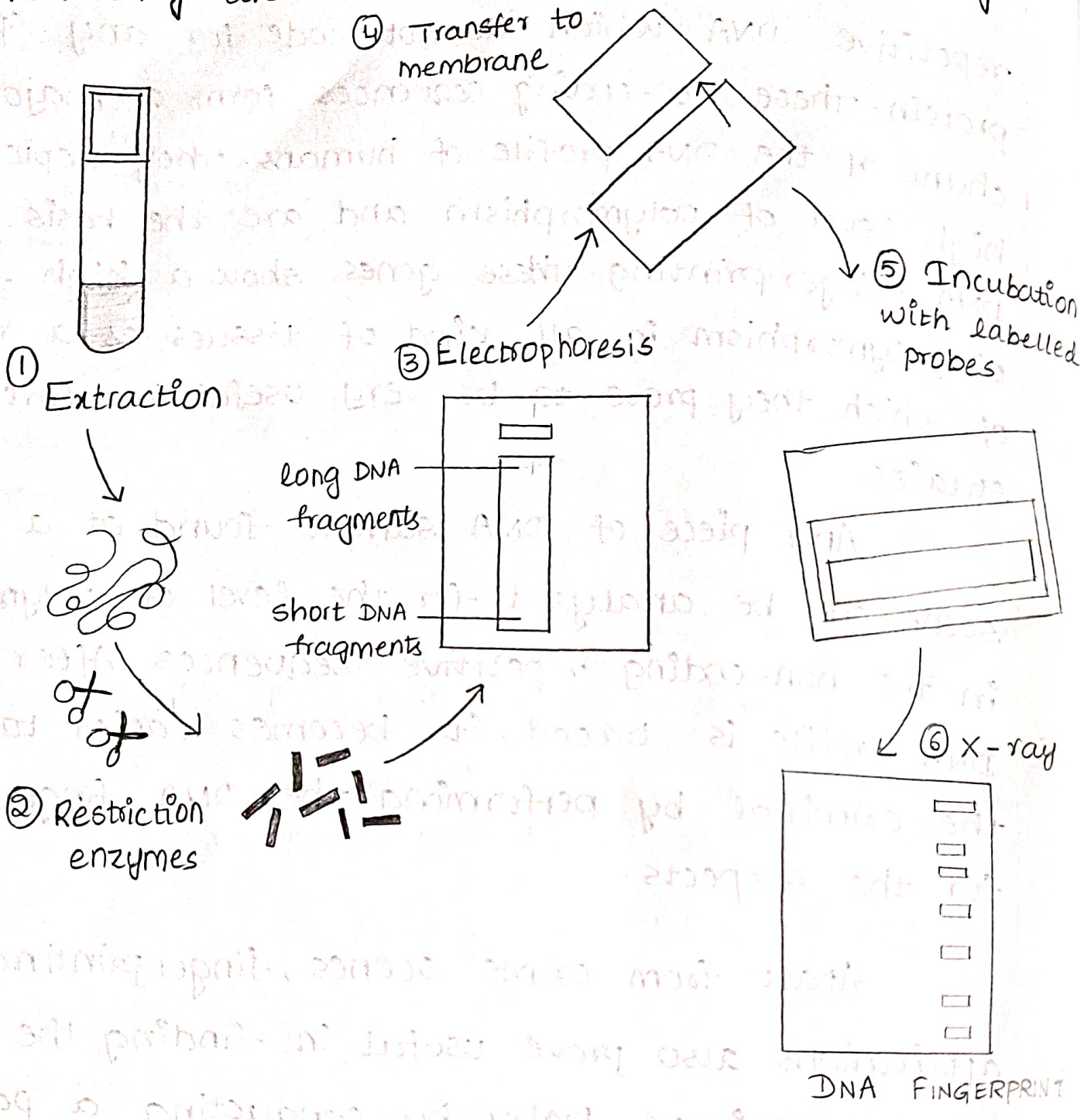
" DNA Fingerprinting is a technique that shows the genetic make up of living things. It is a method of finding the difference between the satellite DNA regions in the genome".

Satellite DNA regions are stretches of repetitive DNA which do not code for any specific protein. These non-coding sequences form a major chunk of the DNA profile of humans. They depict a high level of polymorphism and are the basis of DNA finger printing. These genes show a high level of polymorphism in all kind of tissues as a result of which they prove to be very useful in forensic studies.

Any piece of DNA sample found at a crime scene can be analysed for the level of polymorphism in the non-coding repetitive sequences. After the DNA profile is traced, it becomes easier to find the criminal by performing the DNA fingerprinting for the suspects.

Apart from crime scenes, finger printing applications also prove useful in finding the parents of an unclaimed baby by conducting a paternity test on a DNA sample from the baby.

Following are the steps of DNA fingerprinting:



DNA fingerprinting steps:

Alec Jeffreys developed this technique in which he used satellite DNAs also called ~~VNTRs~~ VNTRs (Variable Number of Tandem Repeats) as a probe because it showed the high level of polymorphism.

Isolating the DNA

↓

Digesting the DNA with the help of restriction endonuclease enzymes

↓

Seperating the digested fragments as per the fragment size by the process of electrophoresis.

↓

Blotting the seperated fragments onto synthetic membranes like nylon.

↓

Hybridising the fragments using labelled VNTR probes

↓

Analysing the hybrid fragments using autoradiography

DNA fingerprinting Applications:

1. DNA analysis in forensic tests
2. can be used to establish paternity tests
3. In criminal investigations
4. To determine the freqeuncy of specific genes in a population which gives rise to diversity.
5. can be used to trace the role of genetic drift in evolution
6. Personal identification

16) What is parasitism? Explain plasmodium Vivax life cycle?

Parasitism:

"parasitism is defined as the relationship between different species in which one organism lives on or in the other organism and benefits from it by causing some harm".

The organism that is benefitted is called the parasite, while the one that is harmed is called the host.

Life cycle of plasmodium vivax:

It is divided into:

1. Asexual life cycle (or) schizogony in man
2. sexual life cycle (or) sporogony in female Anopheles mosquito

1. Asexual life cycle:

schizogony is the process of asexual reproduction by which plasmodium undergoes asexual multiplication in liver cell and RBCs of man. It occurs in human liver cell and in RBC.

Asexual cycle in human is completed in following phases:

1. pre-erythrocytic schizogony
2. Exo-erythrocytic cycle
3. Erythrocytic cycle
4. post-erythrocytic cycle
5. Formation of gametocytes

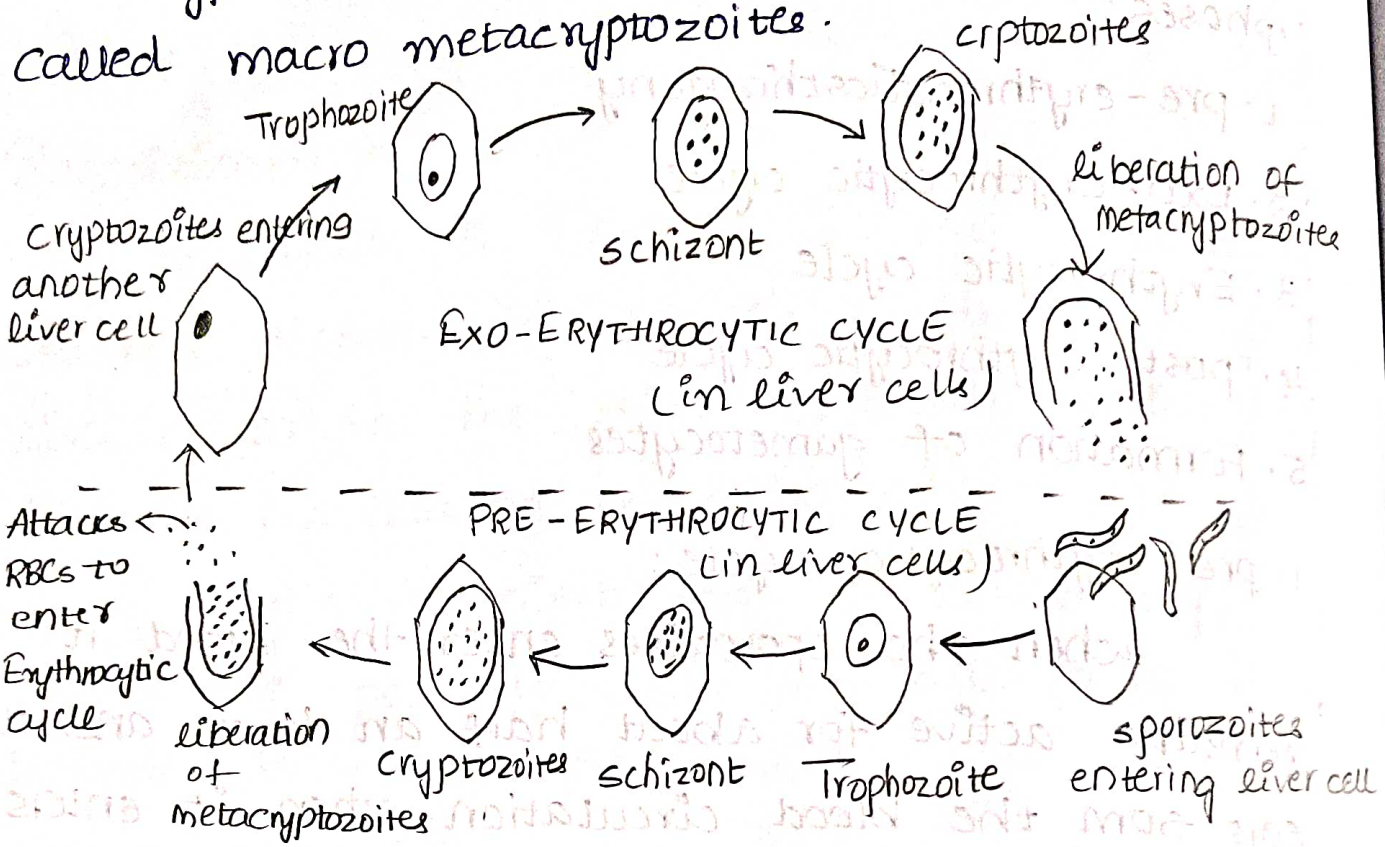
1. pre-erythrocytic cycle:

When the sporozites enter the blood it remains active for about half an hour and disappears from the blood circulation. Then it enters into parenchymatous cell of liver through blood circulation by secreting lytic enzymes from the apical cap. sporozoites in liver cell grow in size and become spherical in shape called schizonts. The process of formation of many cryptozoites from single sporozoites in liver cell is called pre-erythrocyticschizogony. It is completed in 8-10 days.

2. Exo-erythrocytic cycle:

The cryptozoites are ready to infect the fresh liver cell where they grow and become schizont. the same process of formation of many metacryptozoites from the cryptozoites in liver cell is called exo-erythrocyticschizogony. some metacryptozoites are smaller in size called micro

metacryptozoites and some are larger in size called macro metacryptozoites.



3. Erythrocytic cell:

This cycle starts when the micro metacryptozoites enter into erythrocytes. single metacrptozoite enters into single RBC and passes through trophozoite stage, signet ring stage, amoeboid stage and schizont stage.

4. post-erythrocytic cycle:

sometimes, some merozoites produced after erythrocytic cycle invade the liver cell and undergo another schizogonic development in the liver cell. this is called post-erythrocytic cell.

5. Formation of gametocytes:

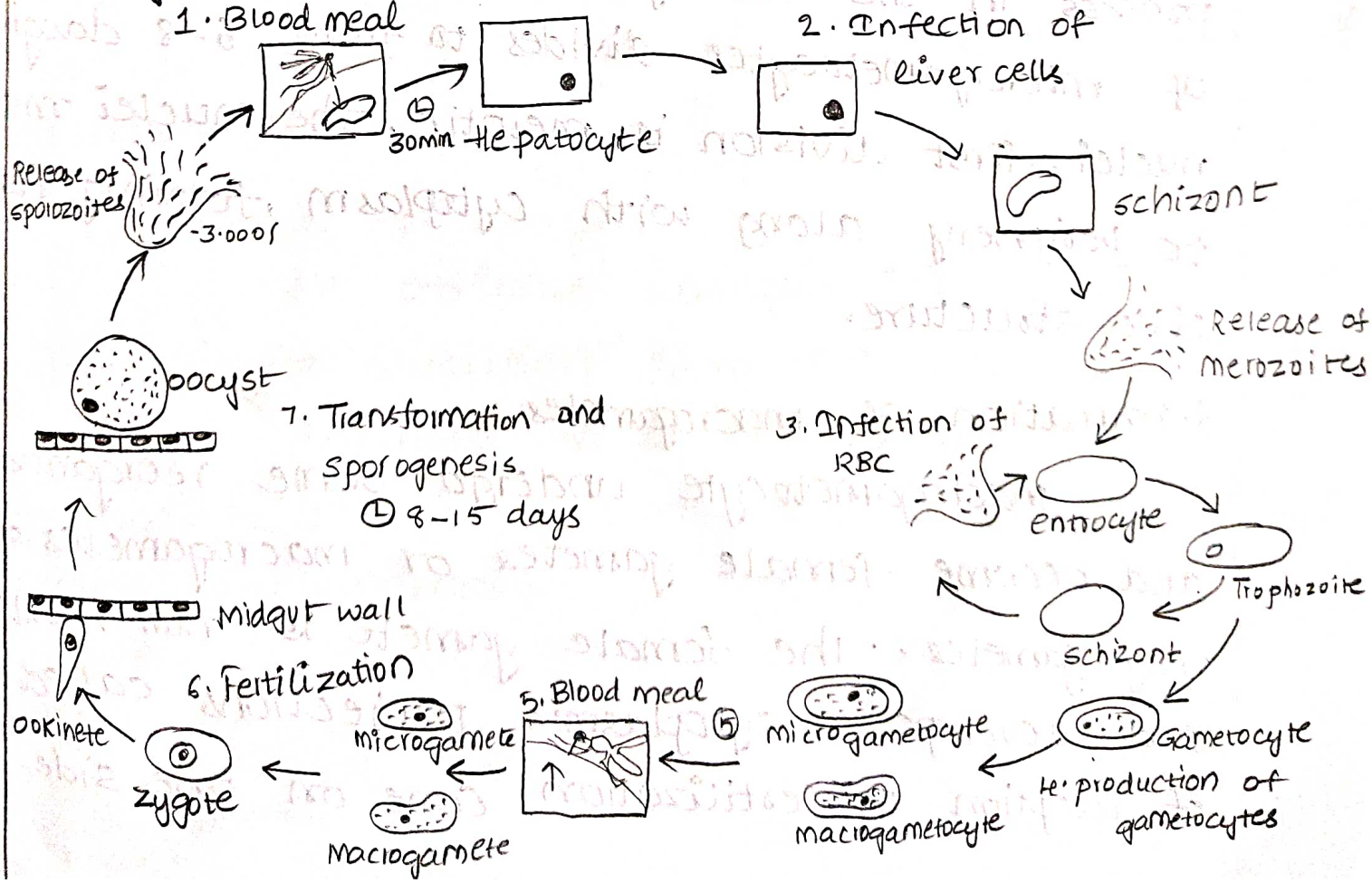
After some generation of erythrocytic cycle, some of the merozoites invade the new RBC.

They grow in size but not develop into schizonts instead they develop into gametocytes. The gametocytes are of two types:

i) Macrogametocytes or female gametocytes: These are large (10-12 μ) and numerous in number. They have small compact peripheral nucleus. They have reserved food materials and the cytoplasm is dark in color.

ii) Microgametocytes or male gametocytes: These are smaller (9-10 μ) motile and few in number. They have large centrally placed nuclei. They lack reserved food and stains faintly hence the cytoplasm is light in color and clear.

Life cycle in mosquito or sexual cycle in mosquito:



When female Anopheles mosquito bites an infected persons, they suck the gametocytes and other stages of erythrocytic cycle along with blood. They reach the stomach where all the stages along with RBCs are digested except gametocytes. Now, the lifecycle is continued towards the completion by following processes:

1. Gametogenesis / Gametogony (formation of gametes)

Process of formation of gametes from the gametocytes is called gametogenesis.

2. Formation of microgametes:

Microgametocytes undergo ex-flagellation process in the mid-gut of mosquito. The nucleus of microgametocytes divides to form 6-8 daughter nuclei, first division is meiotic. The nuclei move to periphery along with cytoplasm, forming flagella like structure.

3. Formation of macrogametes:

Macrogametocyte undergo some reorganization and become female gametes or macrogametes or megagametes. The female gamete is non-motile and develops a cytoplasmic projections called cone of reception or fertilization cone on one side.

2. Fertilization :

one microgamete penetrates into macrogamete through the cone of reception and fertilization takes place known as syngamy. A complete fusion of nuclei and cytoplasm of the two gametes occurs resulting in the formation of diploid zygote (or) synkaryon. zygote form in stomach of mosquito about 9 to 10 days after the blood meal.

3. Formation of ookinete :

After fertilization, the zygote remains rounded and non-motile for some time. Then it becomes elongated and vermi-form known as ookinete. ookinete is motile and has pointed ends. It penetrates the wall of stomach with the help of lytic secretion. It settles into the inner portion of stomach wall.

4. Formation of oocysts :

The ookinete changes into spherical shape, take nutrition from the wall of stomach and get enclosed in a thin, elastic and permeable cyst wall, such stage is called oocyst stage (or) sporont.

5. Sporogony:

It is a phase of asexual multiplication. It is process of formation of sporozoites from the zygote nucleus by asexual multiple fission. Oocysts matures and develops. The nucleus of oocyst divides first by meiosis and then by mitosis, forming large number of haploid nuclei and forms sporozoites forming cell known as sporoblasts. The nuclei of sporoblast again multiply and cytoplasm gets constricted around them. Thus the resultant structures in the sporoblasts elongate to form slender or sickle shaped sporozoites.

1) Describe meant by classification? write the importance of classification?

Classification of living organisms:

1. The term 'systematics' was coined by Carl Linnaeus. It is derived from the word 'systema', which means orderly arrangement. In his book "systema Naturae", he gave the hierarchical system of classification.

→ Classification is the process of arranging things in groups or classes according to their resemblances and affinities and gives expression to the unity of attributes that may exist amongst a diversity of individuals. The establishment of a hierarchical system of categories on the basis of presumed natural relationships among organisms.

→ The Linnaeus system is made up of seven levels kingdom, phylum, class, order, family, Genus and species.

Kingdom - organisms are placed into kingdoms based on their ability to make food and the number of cells in their body.

Phylum - In plant kingdom, phyla are sometimes called divisions. In the animal kingdom, there are 35 different phyla.

Class, Order, Family: These levels become even more specific. Each level has fewer organisms that have more in common with each other as you move down the levels.

Genus - contains closely related organisms. The genus is the first word in an organism's scientific name.

species - consists of all the organisms of the same type which are able to breed and produce young of the same kind.

Most scientists classify organisms into 5 kingdoms: plants, Animals, Protists, Fungi and Monera.

Five - kingdom system of classification:

→ Robert H. whittaker, an American ecologist proposed the five kingdom classification in 1969.

→ the entire living world was divided into five kingdoms:

1. Monera
2. Protista
3. Mycota (Fungi)
4. Plantae
5. Animalia

He has based his 5-kingdom classification of living organisms on the following factors:

1. structure of cells (either prokaryotic or Eukaryotic)
2. complexity of cells (either unicellular or multicellular)
3. Mode of nutrition (either autotrophic or heterotrophic)

e. phylogenetic relationships (evolutionary history of organisms).

1. MONERA :

a) They are undifferentiated prokaryotic organisms.

b) They are minute, unicellular and microscopic.

c) They are ubiquitous in occurence (they occur anywhere and everywhere).

d) They reproduce asexually by binary fission and sexually by conjugation.

e) They are either autotrophic (or) parasitic in nutrition.

Examples: Archaebacteria (ancient bacteria), Eubacteria (true bacteria), cyanobacteria (blue-green algae).

2. PROTISTA :

a) It includes all unicellular eukaryotic organisms.

b) Most of them are aquatic and inhabit the surface of water bodies as

c) cilia, flagella and pseudopodia are the locomotary organs.

d) They may either be photosynthetic like Euglena, holozoic like Amoeba and parasitic like

e) Binary fission is the most common method of multiplication.

Examples: protistan algae (Euglena-like flagellates), water molds and slime molds, protozoans etc.

3. MYCOTA (OR) FUNGI:

a) They are eukaryotic organisms.

b) They may be unicellular (Yeast, candida) or multicellular (Mushrooms).

c) They lack chlorophyll and are unable to prepare their own food by photosynthesis, They are found in humus rich soil.

d) They are either parasitic (or) saprophytic in nutrition.

e) The vegetative body in multicellular fungi is made up of thin, soft and branched structure called hypha.

f) They reproduce by budding, spores and sexual methods.

g) The reserved food material is glycogen.

h) cell wall is composed of chitin.

Examples: yeasts, molds, Mushrooms, Toadstools, puffballs etc.

4. PLANTAE :

a) They are eukaryotic living organisms.

b) They are either unicellular (spirogyra, Fucus) or multicellular (Moss, pine, Apple).

c) They consist of chlorophyll and are green in color.

d) They are autotrophic and the reserved food material is starch.

e) cell wall is composed of cellulose, hemicellulose, pectin etc.

f) They reproduce sexually by gametes (or) asexually by spores.

example: Algae, Liverworts, Mosses, Ferns, conifers, flowering plants etc.

5. ANIMALIA :

a) They are multicellular eukaryotic organisms.

b) They lack chlorophyll and hence are heterotrophic in nutrition.

c) Reproduction is generally sexual with the production of gametes.

d) Their cells lack cell walls and central vacuoles.

examples: sponges, worms, Arthropods, Molluscs, Echinoderms, lower chordates, Fishes, Amphibians, Reptiles, Birds and Mammals.