Biology Experiments to be written in Biology Practical File

Biology Practical File
(Nova ICSE Biology-Lab Manual)

Students of Class IX as per the requirement of CISCE (ICSE Board), have to make a Practical File in the Subject of Biology.

Instructions to be followed for writing experiments:

(i) On the ruled lined pages: Write the experiment number (as given in the list of experiments to be performed for Session 2021-22); Aim of the experiment; Requirements, Procedure, Observations, Conclusions, Precautions (if any) All these details are described by the publisher (of the Practical File) in the beginning of the file.

(ii) On the blank pages: Draw the diagram/s or table (if any) related to the experiments. Make use of the pencil only for making the diagrams.

(iii) New experiment will start from a new page.

(iv) Do not use any other colour pen in the 'Practical File' except blue pen. You may write headings using black pen.

(v) For reference a sample 'Practical File' made by a student is being attached with.

BIOLOGY PRATICALS - IX

As per the guidelines from the Council (ICSE), the students of Class IX are required to perform following experiments for the session 2021-22

Expt – 1 To study the parts and working of a Simple Microscope.
Expt – 2 To study the parts and working of a Compound Microscope.
Expt – 3 To examine an onion peel under the microscope to study various parts of the cell.
Expt – 4 To identify the parts of lungs through a chart or model.
Expt – 5 To study the mechanism of breathing.
Expt – 6 To study the floral parts of a flower.
Expt – 7 To examine the human cheek cell under microscope to study various parts of the cell.
Expt – 8 To test the presence of Carbohydrates / Starch / Glucose / Proteins and Fats.
Expt – 9 To examine and identify specimens belonging to different groups of animals.

NOVA®

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Biology

Lab Manual

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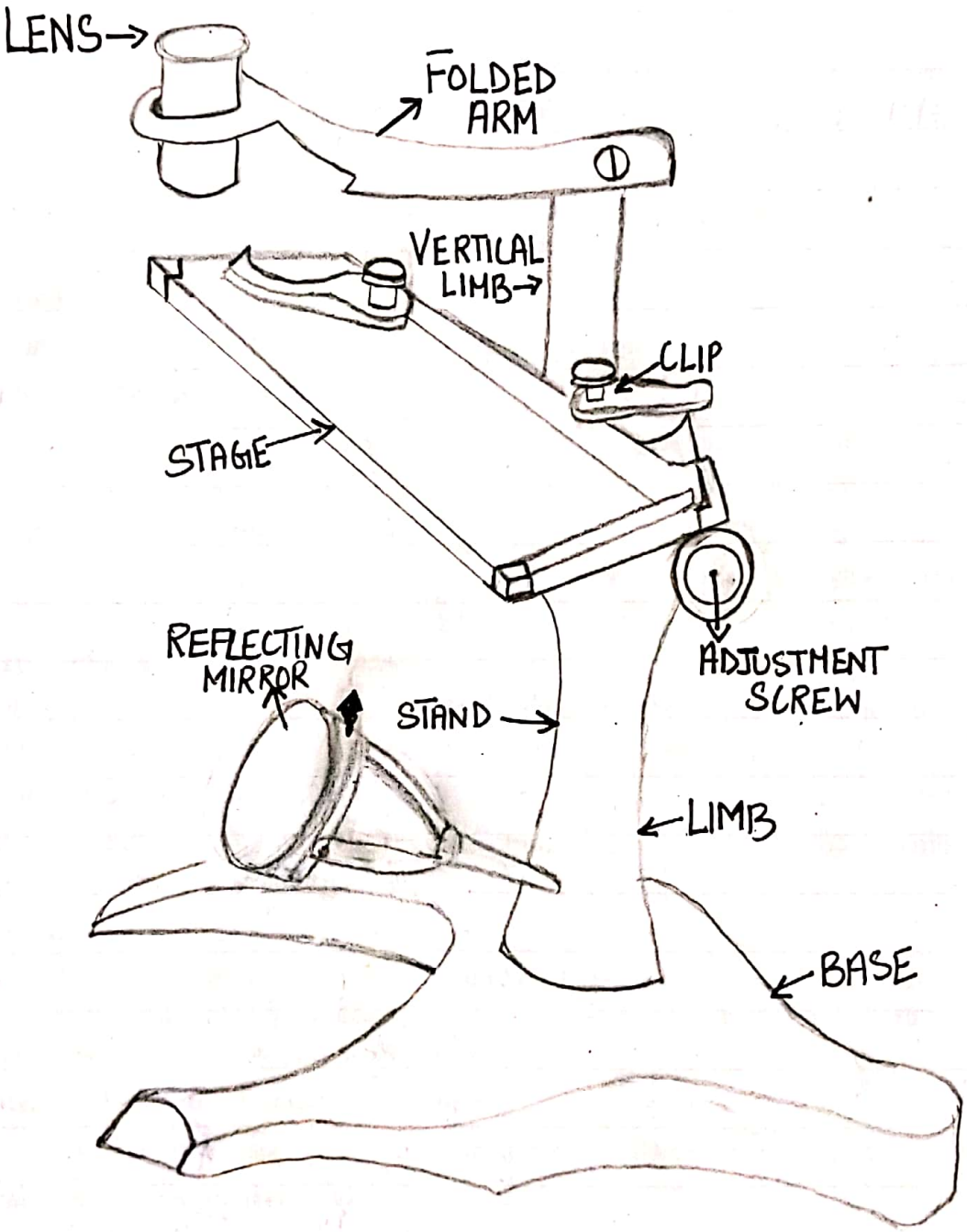
Experiment-1

Aim: To study the parts and working of a simple Microscope.



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Experiment - 1

To study the parts and working of a Simple Microscope:

The microscope is one of the most important tools of science. A microscope is an instrument that magnifies small objects so that they can be clearly and easily seen. It produces an image much larger than the original object.

There are different kinds of microscopes such as the light (or optical) microscopes and the electron microscopes. In a school laboratory, two types of light microscopes are used.

Simple Microscope has a single lens through which the upturned image of the object is seen.

To see any object, clean and dry the glass stage and then place the slide or the specimen to be seen on this stage. Fix the slide firmly with the clips. Observe the object with the help of the lens and adjust the mirror. Turn the adjusting screw up or down as the need may be for seeing a clear and sharp magnified specimen.

The dissection microscope or simple microscope (as one lens is used) is usually used to observe small animals or flowers, to see larger sections or to perform dissections of small animals.

Nil

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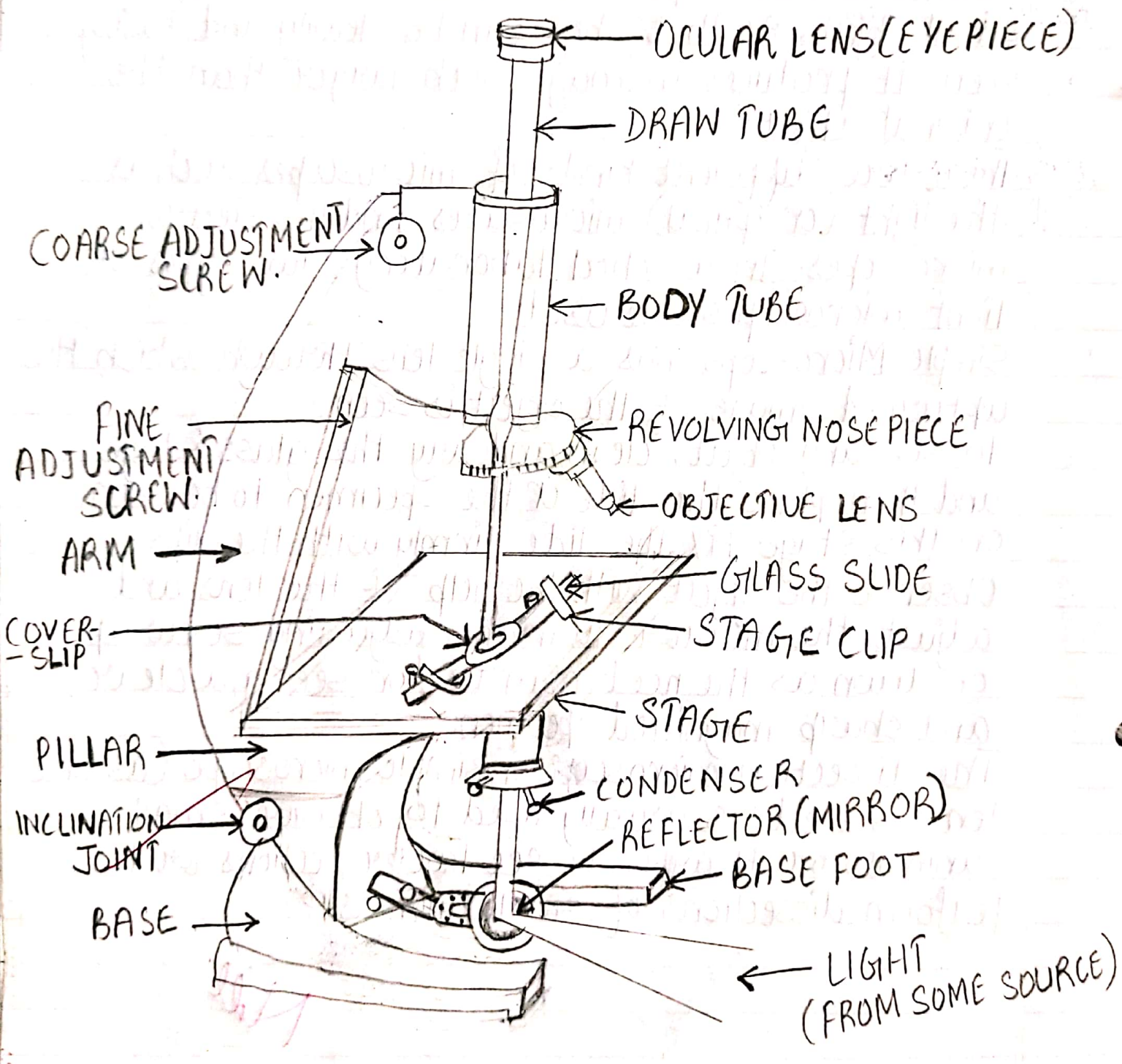
EXPERIMENT-2

AIM: To Study the parts and working of a compound microscope.



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Experiment-2

To study the parts and working of a Compound Microscope.

Compound microscope is used for higher magnifications and is called a compound microscope as it consists of two types of lens system.

Setting the microscope:

1. Carefully take out the microscope from its wooden case and place it on your working table with its arm towards yourself and the stage and mirror away towards source of light.
2. Clean the stage with a clean muslin cloth and the lens with lens paper.
3. Then rotate the nose piece to make the low power objective in line with the tube.
4. By using the coarse adjustment, raise the body tube about one inch above the stage/slide.
5. Look through the eye piece with one eye and adjust the mirror so that the light reflects through the hole in the stage.
6. Clean the slide you want to examine and then place it on the stage so that the object you want to observe is in the middle of the hole of the stage.
7. Now, look through the eye piece and lower the body tube with the help of coarse adjustment till the specimen comes in view.
8. Now, focus the object sharp with the help of fine adjustment.
9. Never use coarse adjustment while focusing under high power as it may break the coverslip.

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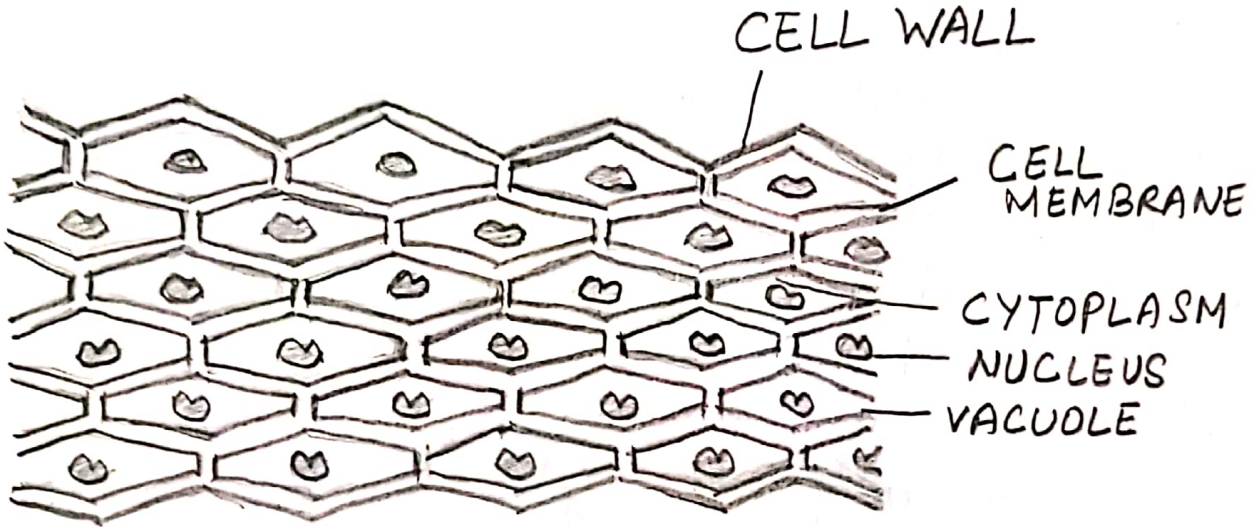
EXPERIMENT-3

AIM: To examine an onion peel under the microscope to study various parts of the cell.



STRUCTURE OF AN ONION PEEL

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Experiment-3

AIM OF THE EXPERIMENT :-

To examine an onion peel under the microscope to study various parts of the cell.

REQUIREMENTS :-

Microscope, onion bulb, glass slide, cover slip, petridish, watch glass, forceps, brush, needles, blade, safranine stain, filter paper and glycerine.

PROCEDURE :-

(a) Take a piece of onion and with the help of a forcep gently pull a thin, transparent peel from its underside.

(b) Keep this peel in water in a petridish or watch glass.

(c) Add a few drops of safranine stain in the watch glass to stain the peel.

CAUTION: Both over staining and under staining should be avoided.

(d) Cut the portion of the peel to a proper rectangular or square shape of appropriate size (2 to 3mm) with the help of a blade and a needle. Place one such piece in a drop of water on a glass slide.

(e) Remove the excess of water or stain, if any, from the slide surrounding the peel with the help of a blotting paper.

(f) Add a drop of glycerine on the slide over the peel and

(g) put the coverslip gently.

NOTE: Care must be taken to avoid the entry of air bubbles while placing coverslip and the mounting should be done in the centre of the slide.

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(g) After placing the coverslip press it a bit with needle to spread the glycerine and peel properly.
(h) Examine the slide under the microscope, first under the low power and then under high power.
(i) Draw rough sketches of some cells with as much details of inside cell contents as you can see under the microscope.

OBSERVATIONS :-

(i) There are a large number of cells lying side by side with distinct cell walls.
(ii) A distinct, red stained nucleus is present in the side ~~centre~~ of the cell.
(iii) Vacuoles are present in the cell cytoplasm.
(iv) Intercellular spaces are absent.
(v) The cytoplasm is darkly stained on the inner surface of the cell wall.
(vi) Cells are polygonal in shape, and compactly arranged.

PRECAUTIONS :-

(i) Slide should be clean.
(ii) Always use a brush to transfer the peel from watch glass to the slide.
(iii) Material should never be allowed to dry.
(iv) Keep the coverslip carefully to avoid the entry of air bubbles.
(v) Mounting of the material should be done in the centre of the slide.
(vi) Excess of water or safranine stain coming out of the slides of the coverslip should be removed with the help of a filter paper.

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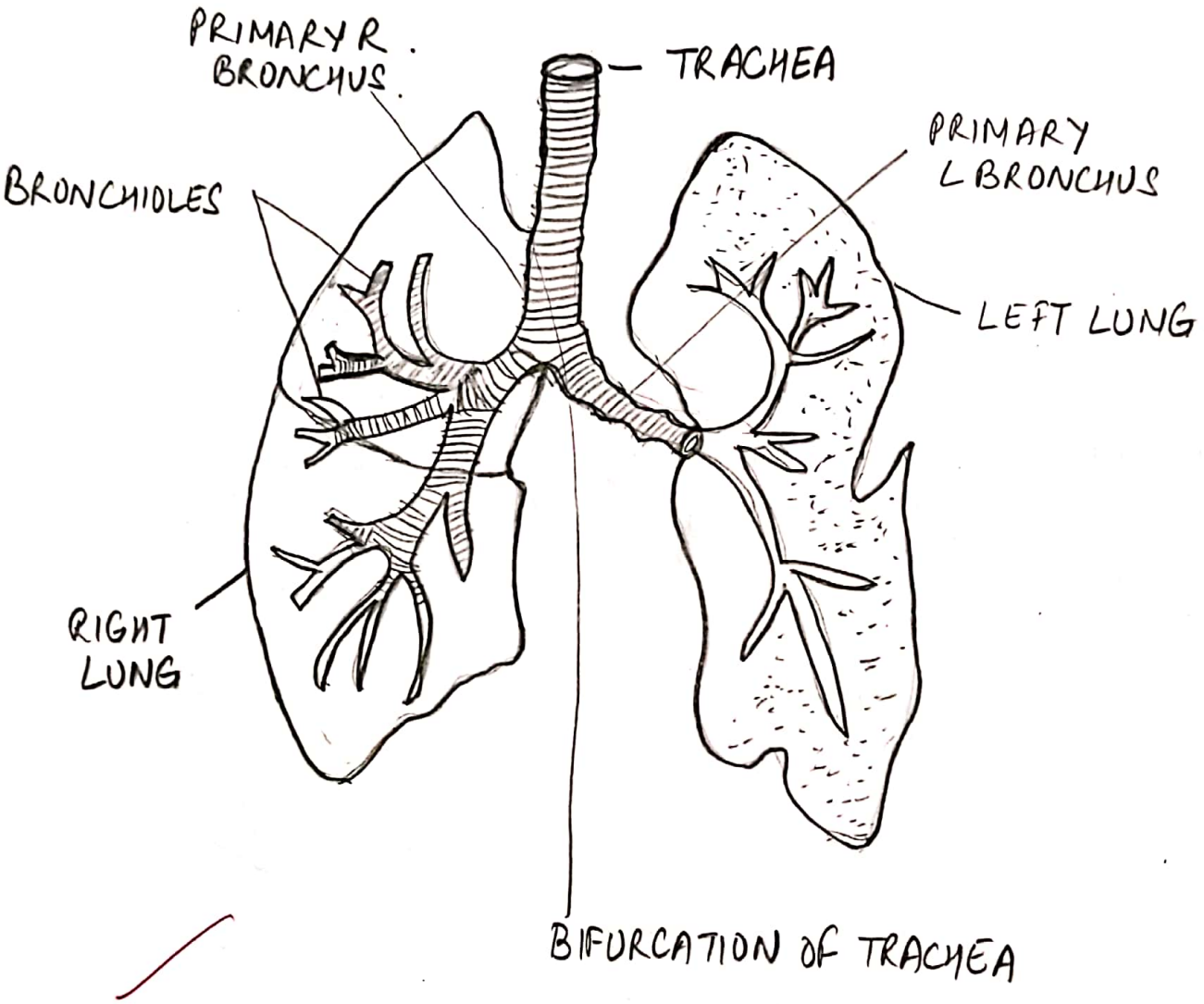
EXPERIMENT-4

AIM: To identify the structure of the lungs.



BRANCHES OF TRACHEA AND LUNGS

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Experiment - 4

AIM OF THE EXPERIMENT :-

To identify the structure of lungs.

REQUIREMENTS :-

Chart or model or specimen of lungs of a goat.

PROCEDURE :-

Observe the specimen/chart/model and identify its parts. Draw a diagram of lungs and label its various parts.

OBSERVATIONS :-

(i) Lungs are a pair of soft, spongy, pinkish, elastic, conical, hollow organs situated one on either side of the heart and are connected to larynx by the trachea.

(ii) They are smooth, composed of numerous polyhedral areas externally.

(iii) Lungs are covered by double membranes called Pleural membranes and enclose a narrow space - pleural sac.

(iv) Lungs are externally divided into lobes by grooves or fissures.

(v) The trachea divides to two primary bronchus which enter each lung and divides to form secondary and tertiary bronchi. The tertiary bronchi undergo repeated branching. and the ultimate fine branches are called Respiratory bronchioles, which open into alveolar ducts leading to alveolar sacs or air sacs.

(vi) (i) The right lung has three lobes - superior, middle and inferior.

(ii) The left lung has two lobes - superior and inferior, smaller than right lung.

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(vii) Internally each lobe has many lobules which consists of tiny lobular bronchioles. These bronchioles are subdivisions of the bronchi which enter each lung from the trachea.

(viii) The terminal bronchioles lead to small passages which are called alveolar ducts.

(ix) The alveolar ducts open into sac like structures called alveoli which are lined by a single layer of flattened thin wall cells. The alveoli increase the surface area for the exchange of gases.

(x) The alveoli are surrounded by blood capillaries and the deoxygenated blood gets oxygenated and the carbon dioxide which enters the alveoli is passed out of the lung through the passages which ultimately is passed out of the body during breathing out movement in expiration.

Nil

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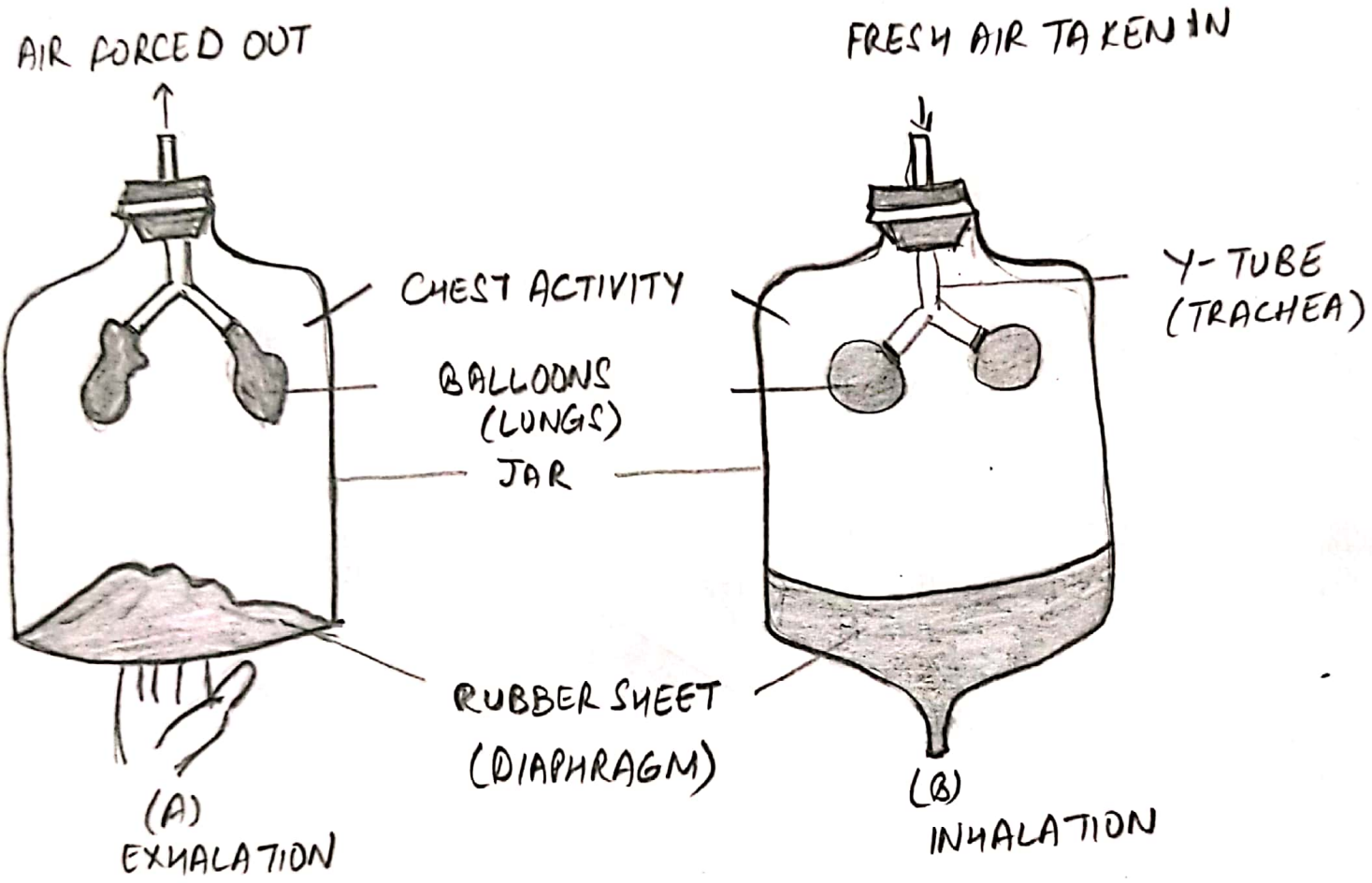
EXPERIMENT-5

AIM: To study the mechanism of breathing.



MECHANISM OF RESPIRATION

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EXPERIMENT-5

AIM OF THE EXPERIMENT:-

To study the mechanism of breathing.

REQUIREMENTS:-

A bell jar, one holed stopper, a Y-shaped glass tube, two balloons, a thin sheet of rubber or polythene, string/thread.

PROCEDURE:-

Set up the apparatus as shown in the Fig. Care must be taken that no air enters the bell jar through the rubber sheet or the edges of stopper.

Here jar represents Rib-cage. The stem of the Y-glass tube represents the trachae, the fork of the tube, the two bronchi and the two balloons represent the two lungs. The rubber sheet tied firmly around the rim at the bottom of the jar represents the diaphragm. Tie a thread in the middle of the rubber sheet on the lower side for manipulating the 'diaphragm'. Make the connections air-tight by applying vaseline.

OBSERVATIONS:-

(1) Gently press the diaphragm by your hand upwards (A) and observe the changes in the balloons. The balloons collapse, resulting in forcing out the air (Exhalation).

(2) Now, pull the diaphragm downwards (B) and observe the changes in the balloons. The balloons expand, resulting in the intake of fresh air (inhalation).

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EXPLANATION :-

(a) When diaphragm is pressed upwards, the air inside the balloons is forced out (representing exhalation) and thus, balloons collapse.

(b) When diaphragm is pulled downwards, the air from outside is drawn in (representing inhalation) and thus balloons inflate.

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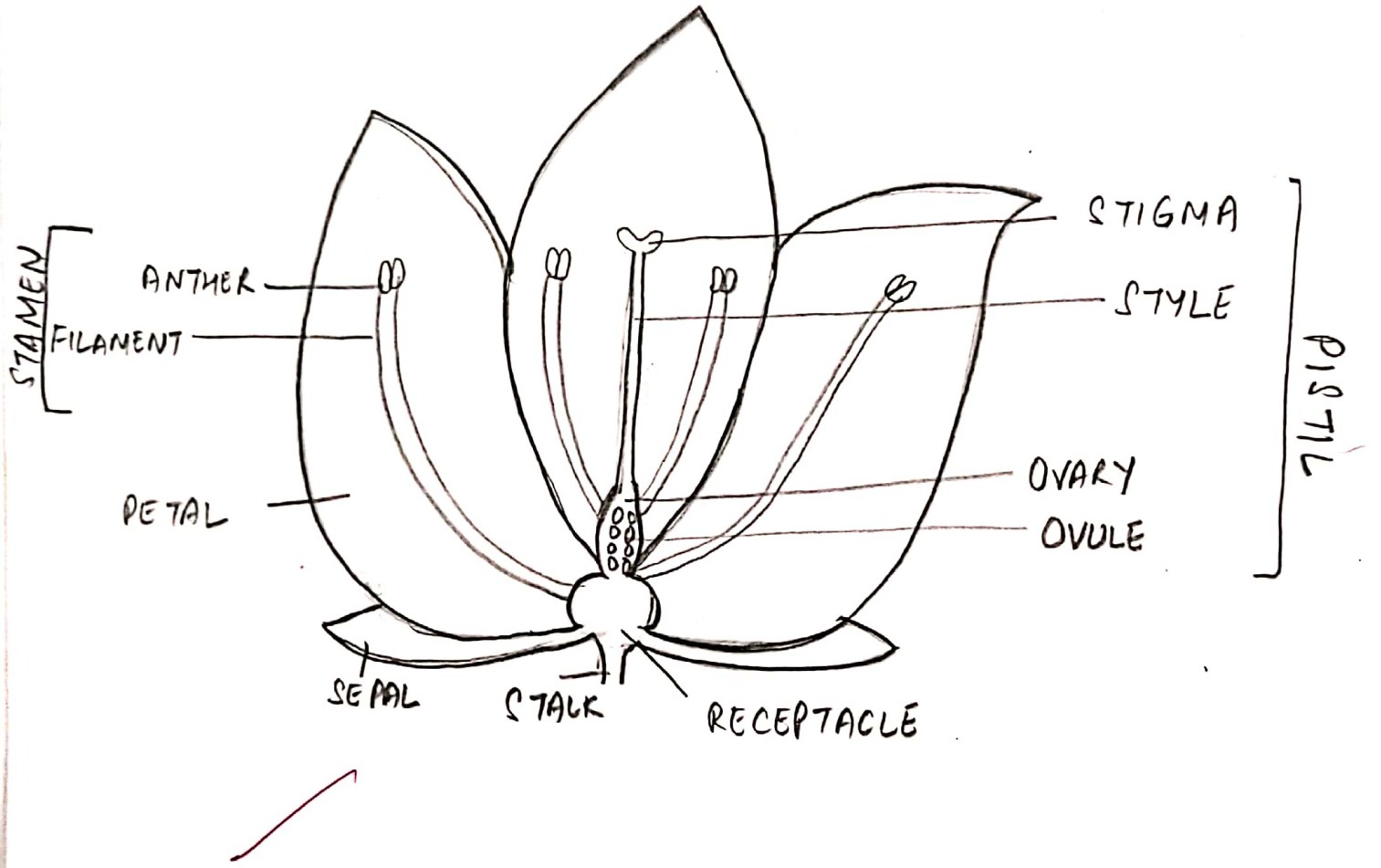
EXPERIMENT-6

AIM: To study the floral parts of a flower.



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EXPERIMENT-6

AIM OF THE EXPERIMENT :-

To study the floral parts of a flower.

REQUIREMENTS :-

Hibiscus flower / Petunia flower, hand lens, blade, needles, glass slides and forceps.

PROCEDURE :-

Examine the specimen of the flower or the inflorescence provided very carefully with the hand lens.

Draw labelled diagrams of the entire flower. Then cut its vertical section with the help of the blade and draw the diagram of the cut flower. Label the parts.

In another specimen of the same flower, with the help of the forceps pull out each whorl starting from the outside. Draw each whorl separately and record your observations as per the following key:-

Inflorescence - Is the inflorescence solitary - terminal or axillary? Name the types of inflorescence - racemose or cymose.

Flower - Is the flower bracteate or ebracteate, pedicellate or sessile; complete or incomplete; unisexual or bisexual; regular or irregular; hypogynous or epigynous; and nature of bracts or bracteoles if present; shape of the flower because of the shape of the corolla, colour.

Calyx - Number of sepals or lobes, polysepalous or gamosepalous, shape if sepals fused.

Corolla - Number of petals, polypetalous or gamopetalous, shape of corolla if fused.

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Shape- Free corolla-cruciform, caryophyllaceous, rosaceous, papilionaceous etc. and colour. (When there is not much difference between the sepals and petals, the term perianth is used, sepaloid or petaloid: polyphyllous or gamophyllous), Fused corolla-Tubular, funnel shaped, urn shaped, ligulate, bilabiate etc.

Androecium- Number of stamens, free or united. If united, adelphous (monoadelphous, or diadelphous), syngenesious or epipetalous or epiphyllous.

Gynoecium- Number of carpels, syncarpous (fused) or apocarpous (free) ovary superior or inferior, number of chambers or loculi, nature of placentation, number of ovules in each loculus of the ovary.

Style- Long or short, Free or fused.

Stigma- Distinct-simple, lobed or branched and state their number, hairy, etc.

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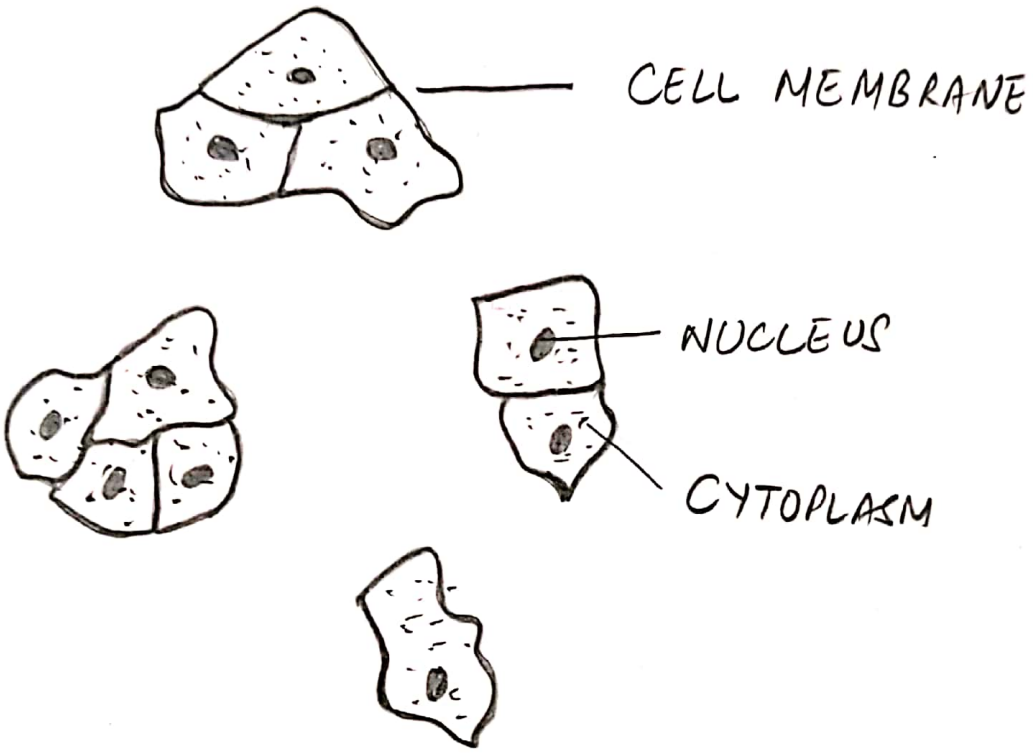
EXPERIMENT-7

AIM: To examine a human cheek cell under the microscope to study various parts of the cell.



CHEEK EPITHELIAL CELLS (Squamous Epithelium)

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EXPERIMENT-7

AIM OF THE EXPERIMENT :-

To examine a human cheek cell under the microscope to study various parts of the cell.

REQUIREMENTS :-

Microscope, clean tooth pick, slides, coverslip, needles, brush, methylene blue stain, watch glass and filter paper.

PROCEDURE :-

(a) Wash off food particles from your mouth by brushing and rinsing.
(b) With the help of a clean tooth pick or a clean slide gently scrap the inner side of the cheek to get some epithelial cells.
(c) Put the scrappings on a clean slide and spread it with a needle. Add a drop of water and a drop of methylene blue.
(d) After two minutes, remove the stain and add a drop of glycerine on the slide.
(e) Put the coverslip gently to avoid the entry of air bubbles.
(f) Press it with a needle to make the cells spread uniformly under the coverslip.
(g) Examine the slide under the microscope, first at lower resolution and then at higher resolution of microscope
(h) Draw rough sketches of some cells with as much detail of inside cell contents as you can see under the microscope.

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OBSERVATIONS :-

(i) Large number of flat, polygonal and irregular-shaped cells can be seen with a thin cell membrane.
(ii) A prominent nucleus is present in the centre of each cell.
(iii) Cytoplasm gives a granular appearance.
(iv) Absence of cell wall, central vacuole and chloroplasts characteristics of plant cells.

PRECAUTIONS :-

(i) Take small amount of the material and it should be spread properly so that the cells are widely separated.
(ii) Scrap the cheek lining gently so as to avoid any injury.
(iii) Drain off extra stain carefully with the help of a filter paper.
(iv) Avoid any air bubble on the slide while keeping the coverslip on the slide.
(v) Mounting material should be placed in the centre of slide.
(vi) Slides and coverslips should be clean and free from dust and fingerprints.

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EXPERIMENT-8

AIM OF THE EXPERIMENT:- TO TEST FOR THE PRESENCE OF CARBOHYDRATE, STARCH AND GLUCOSE, PROTEINS AND FATS.

EXPERIMENT	OBSERVATION	CONCLUSION
I. TEST FOR CARBOHYDRATES - STARCH Take 2mL of the given solution or the solution prepared. Add a few drops of iodine solution.	Given solution turns blue-black.	The sample contains starch.
II. TEST FOR GLUCOSE 1. Take 5mL of the given solution in a test tube. Add 5mL of Fehling solution A and 5mL of Fehling solution B and boil.	Given solutions turn deep blue. Blue solution turns green-yellow, orange and then brick red precipitate is formed.	Given solution of food has glucose.
2. To 5mL of given food sample add 5mL of Benedict's reagent. Heat it gently.	Blue solution is formed. Solution changes to orange colour and then brick red precipitate is formed.	Given food sample is of glucose
III. TEST FOR NON-REDUCING SUGAR SUCROSE. 1. To 5mL of given solution add, 1mL of NaOH solution 1mL of cobalt nitrate solution.	Solution turns violet in colour.	Sugar is present.
2. To 5mL of food solution add 1mL of HCl. Heat gently. Cool and neutralise with sodium bicarbonate ($NaHCO_3$) solution. Add Benedict's reagent and Heat.	Reddish orange precipitate appears.	Sugar is confirmed.
IV. TEST FOR PROTEIN. **BIURET TEST:-** 1. To 5mL of food solution add 3mL of NaOH solution and 1 or 2 drops of 1% $CuSO_4$ solution.	Turns mauve or violet.	Food contains protein.
MILLION'S REAGENT TEST:- 2. To 5mL of food solution add 2mL of Million's reagent and boil.	Curdy yellow colour precipitate appears. Turns into red mass.	Protein is confirmed.

Experiment-8

AIM OF THE EXPERIMENT:

To test for the presence of carbohydrates, starch, glucose, protien and fats.

REQUIREMENTS:

Test tubes, Fehlings solution A and B, Benedicts reagent, sodium hydroxide solution, copper sulphate solution, Iodine solution, hydrochloric acid, Million's reagent, Sudan-III dye and food supplies to be tested.
For Starch: Potato, wheat flour or starch powder.
For Glucose: Banana, apple, grapes or glucose powder.
For Sucrose: Sugarcane juice or table sugar.
For Protiens: Pulses (Soyabean Pea), gram flour (Besan), albumin of egg.
For Fats: Groundnuts, ghee, butter, mustard oil.

PROCEDURE

If the given food to be tested is a powder, add distilled water to prepare a solution. In case of fruits, extract the juice or if it is a solid, crush it with mortar and pestle, add a little water and make a solution. Then test the food samples as given in the table.

PRECAUTIONS:

1. Take only the required amount of food stuff.
2. Use the chemicals/reagents judiciously.
3. Keep the mouth of test tube away from your body while heating.
4. Handle and use concentrated acids very carefully.
5. Donot use excess amount of reagent. Use them only in required amounts.

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EXPERIMENT	OBSERVATION	CONCLUSION
V. TEST FOR FATS. Grease Spot test :- 1. Take a little of the food sample. Rub on a white sheet of paper.	Paper turns greasy.	Fat is confirmed.
Sudan-III Dye test :- 2. To 5mL of the food solution add 2-3 drops of Sudan-III dye. Shake it well.	Small droplets of fat turn red and float at the surface.	fat is confirmed.

Experiment-9

AIM OF THE EXPERIMENT:

To examine and identify specimens belonging to different groups of animals.

(a) Phylum Porifera – The sponges.

General Characteristics:

1. They are mostly found in air in the sea
2. They are simplest first multicellular animals.
3. All animals have numerous pores called ostia, through which water enters.
4. Water goes out through a single opening called osculum on the top.
5. Their body is supported by a skeleton of fine spicules.
6. They have cellular level of organisations.
7. They are attached to substratum.
8. They are diploblastic.
9. The shape is variable - vase-like, cyclindrical, cup-shaped, spherical
10. Asexual reproduction takes place by budding, regeneration.
11. Ostio lead into a cavity - spongocoel.

Examples: Sycon, Euspongia, Spongilla etc.

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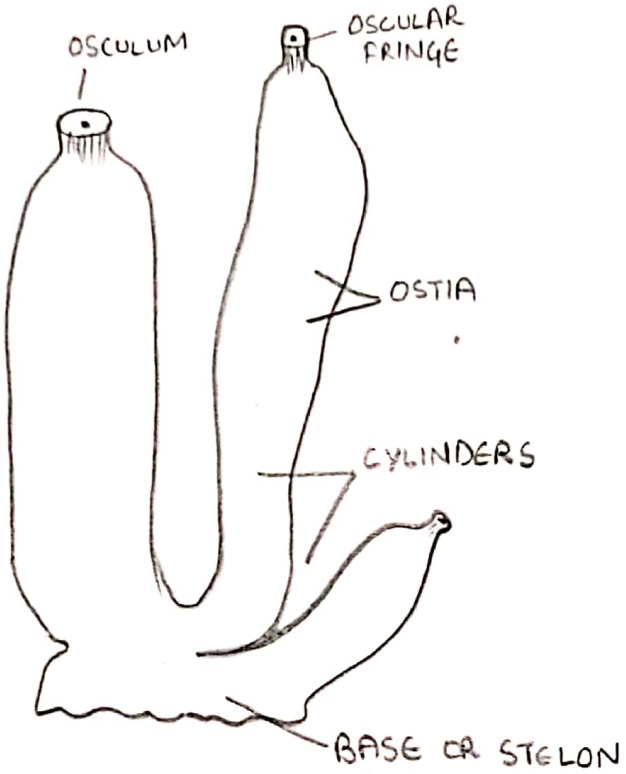
EXPERIMENT-9

AIM OF THE EXPERIMENT:

TO EXAMINE AND IDENTIFY SPECIMENS BELONGING TO DIFFERENT GROUPS OF ANIMALS.



SYCON

(b) Phylum Coelenterata (Animals with stinging cells)

General Characteristics:

1. All are aquatic colonial forms except Hydra - a fresh water form.
2. Multicellular, diploblastic, radially symmetrical animals.
3. They have a central body body cavity called coelenteron or entron
4. They have tentacles which are supplied with special stinging cells are called nematoblasts.
5. The shape of the animals may be cylindrical or umbrella-like.
6. Reproduction is asexual or sexual.
7. Polymorphism - Presence of more than one type of individuals in the colony.
8. They have tissue-level of organisation.

Examples: Hydra, Aurelia, Physalia etc.

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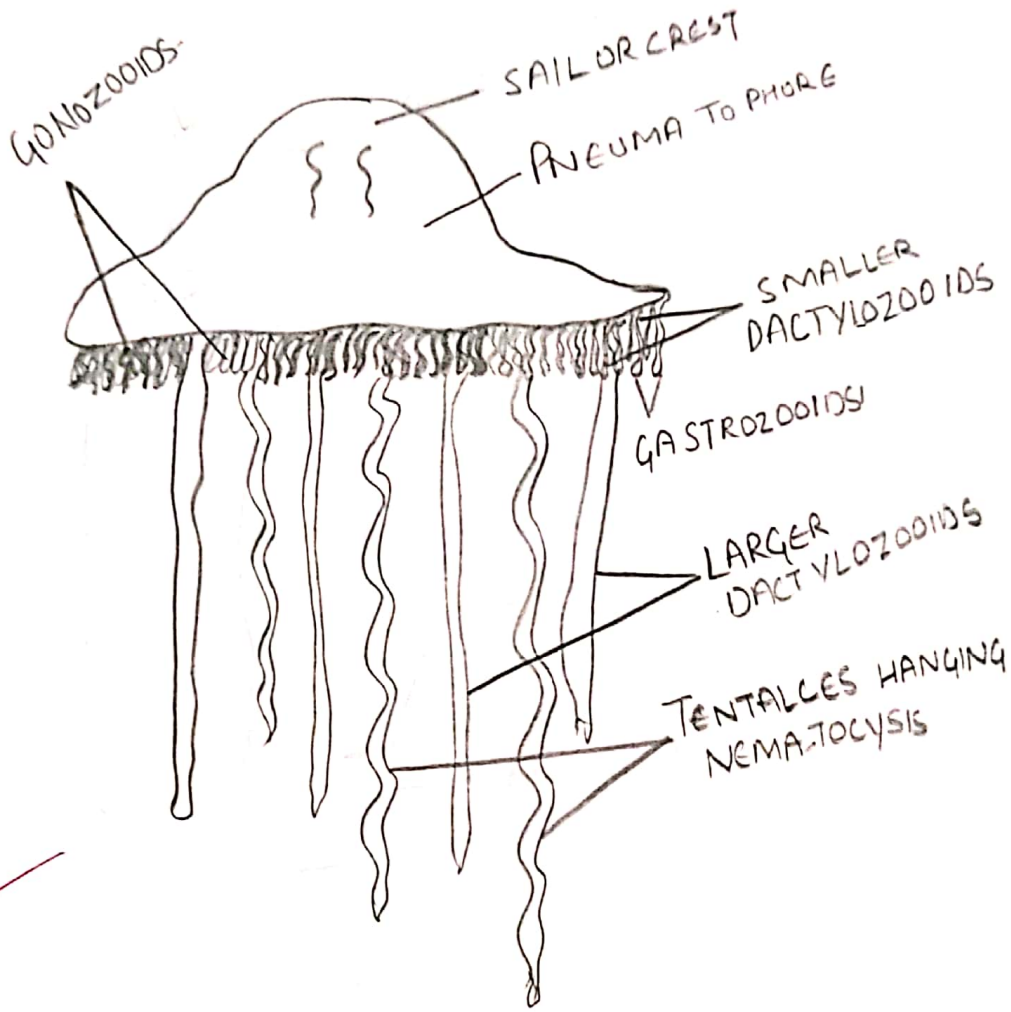


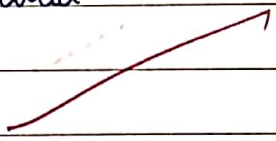
PHYSALIA

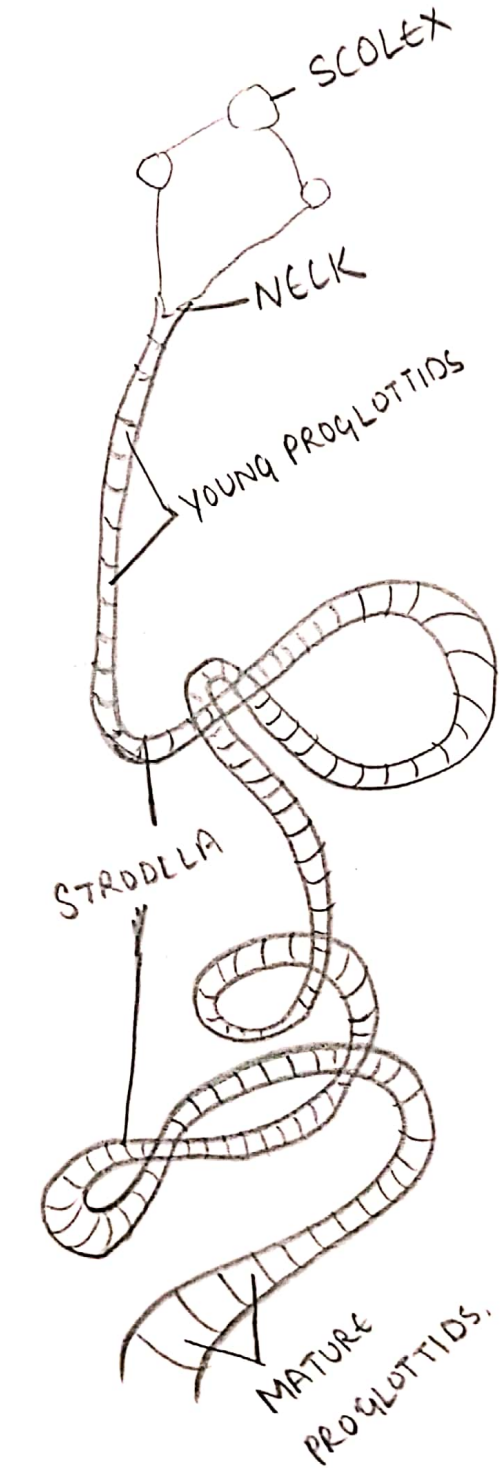
(c) Phylum Platyhelminthes - The flat worms

General Characteristics:

1. This group consists of flat worms which are mostly parasites. Few are free living.
2. They are triploblastic and bilaterally symmetrical.
3. The body may have certain structures for attachment to the host eg, Taenia solium, Planaria
4. All most all systems are absent because of their parasitic mode of life except reproductive system which is very well developed.
5. They usually have complicated life histories which may involve more than one host.
6. They have organ - level of organisation.

Examples: Taenia solium, Planaria.





TAPE WORM

(d) Phylum Annelida – The Segmented Animals

General Characteristics:

1. Mostly free living worms with elongated body showing metameric segmentation.
2. They are bilaterally symmetrical and have a true coelome.
3. Locomotion by setae, suckers or parapodia.
4. Respiration is through general body surface in most of them and by gills in some like dinellus.
5. Most of them are hermaphrodites and development is direct.
6. They have organ-system of level of organisation.
7. The first segment is peristomium, without out growth prostomium.
8. Haemoglobin present in blood plasma.

Examples: Earthworm, Leech, Nereis.

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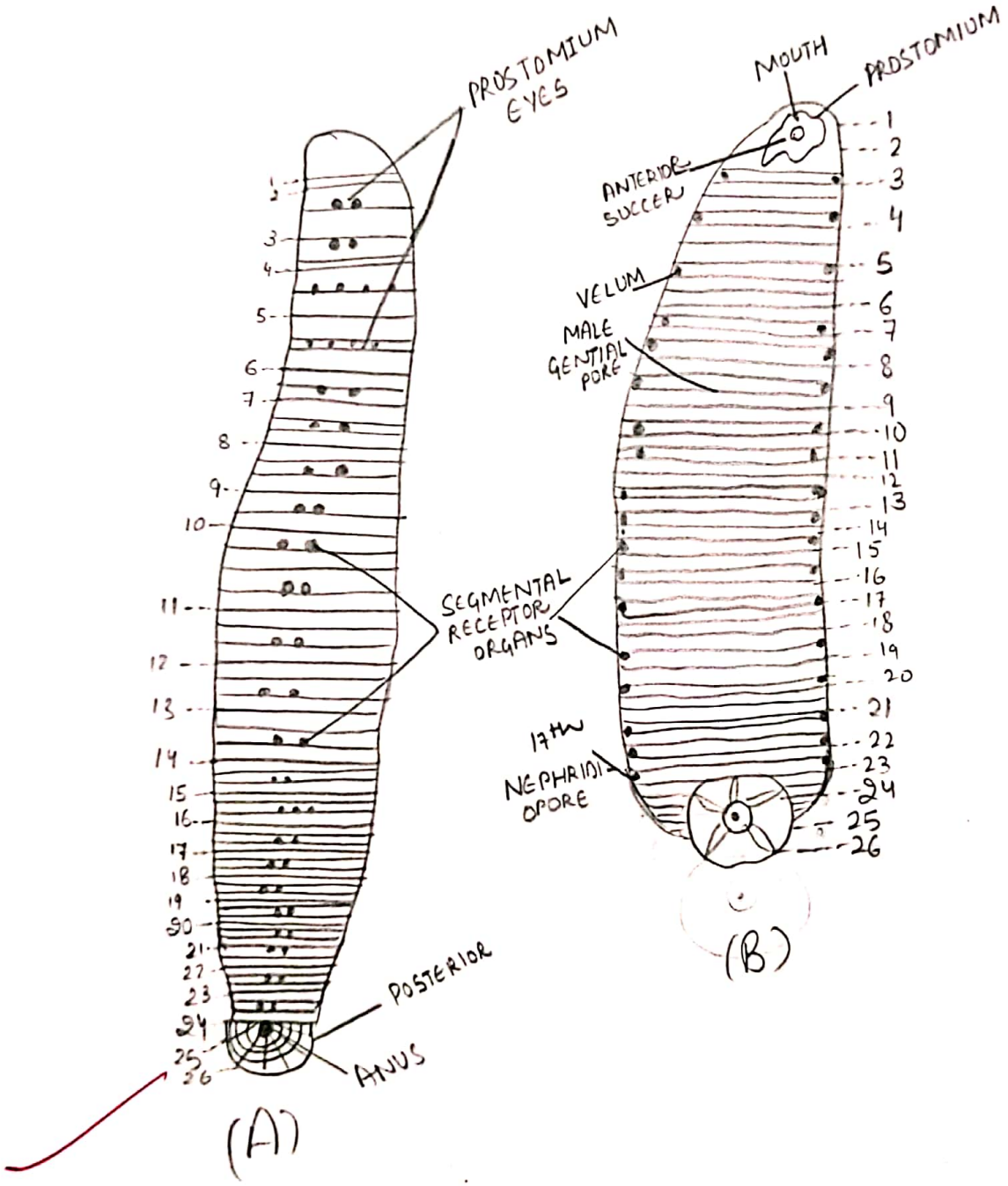

HIRUDINARIA GRANULOSA

(c) Phylum Aschelminthes

They are round worms and are characterized by the following characteristics:

1. They are found in all types of habitat i.e., in freshwater, sea water, soil and many are endoparasites of animals including man and plants.
2. They are bilaterally symmetrical, unsegmented and cyclindrical in shape.
3. They are triploblastic and have organ system level of organisation.
4. They are pseudocoelomate i.e. body cavity is not lined by peritoneum.
5. Alimentary canal is completed i.e, opens at one end as mouth and at the other end as anus.
6. In parasitic forms respiration is anaerobic but in free living forms it is aerobic and exchange of gases takes place through the general body surface.
7. Excretion is brought about the special gland cells or intracellular canals or both
8. Animals are unisexual, sexes are separate and exhibit sexual dimorphism. Fertilization is internal.
9. They are mostly parasitic but some live free in the soil. Examples: Parasitic forms: Ascaris and Ancylostoma (Hookworm) present in humans. Wuchereria bancrofti (filarial worm) present in lymph vessels in man. Trichinella spiralis (Trichina worms) present in pigs and rats, Eelworms present in potato plants

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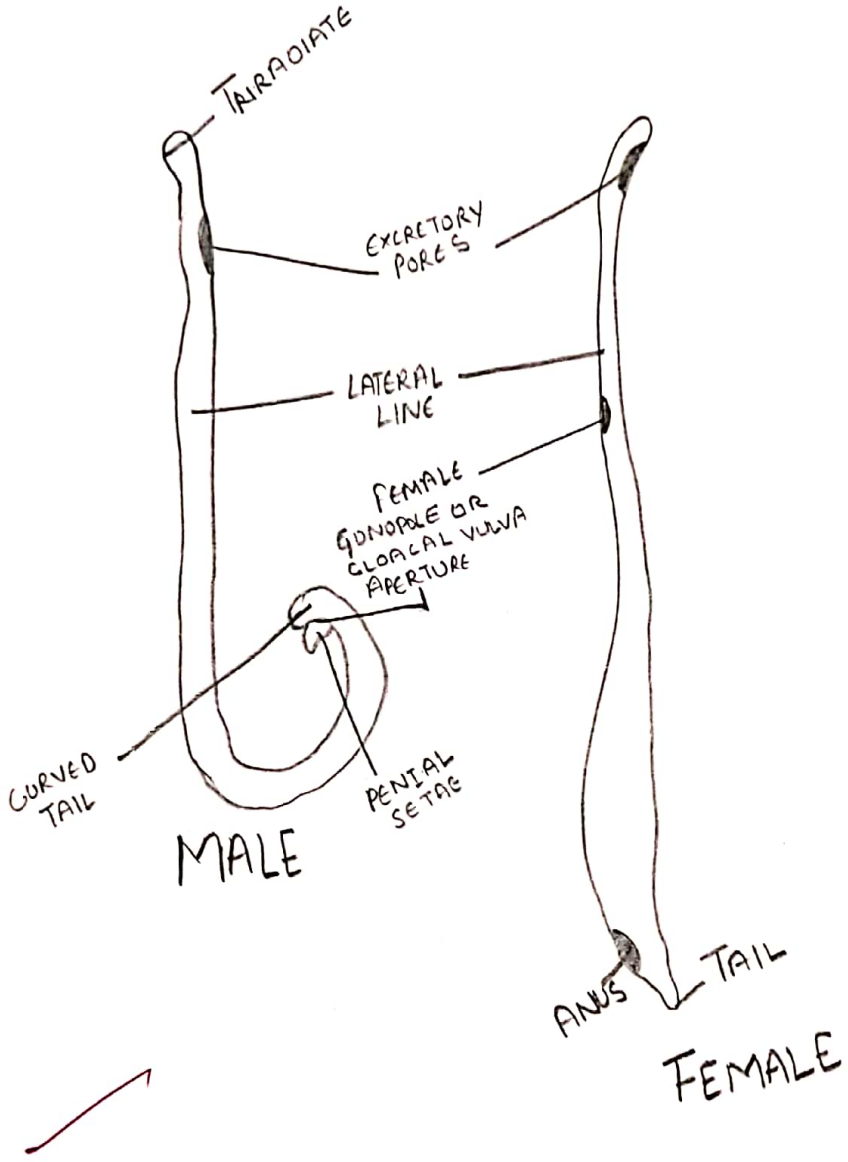


ROUNWORMS (ASCARIS)

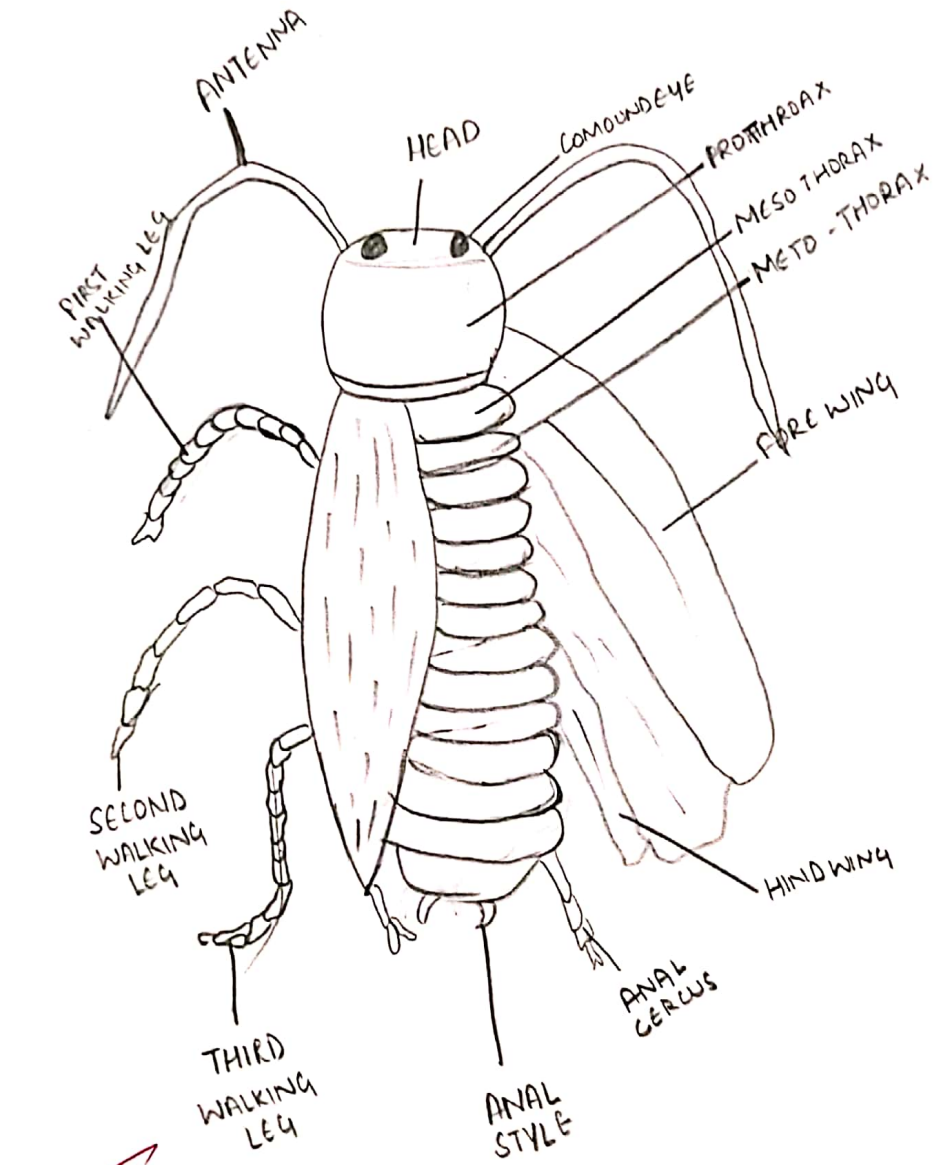
(f) Phylum Arthropoda - the animals with jointed feet.

General Characteristics:

1. They have jointed legs.
2. The body is segmented externally. There is a distinct head.
3. Endocrine glands secrete pheromones.
4. The body is covered with an exoskeleton of chitin.
5. The body is divided into head, thorax and abdomen or cephalothorax and abdomen.
6. They have a haemocoel and circulatory system is open (No vessels, presence of sinuses).
7. They show sexual dimorphism. Fertilization is internal.
8. Compounded-eyes.

Examples:

Cockroach, prawn, spider, crab, scorpion.



COCKROACH

g) Phylum - Mollusca (soft bodied animals)

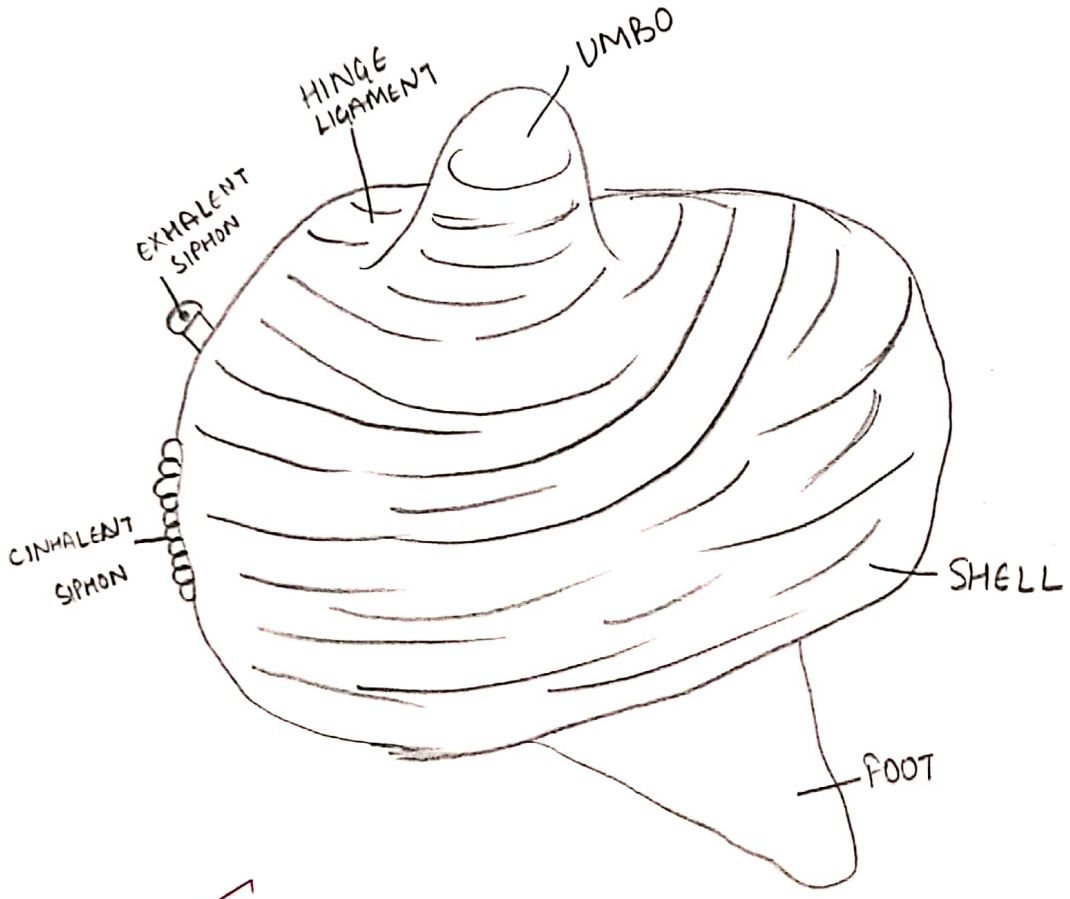
Molluscas are soft-bodied animals and are characterized by the following features:

1. They are mostly marine or freshwater dwelling species, but few are terrestrial in habitat.
2. The body of Molluscs is divided into head, visceral mass and foot.
3. The head bears mouth, eyes and tentacles, and visceral mass encloses body organs.
4. A thick muscular, vascular and glandular fold of the body wall called mantle covers almost the entire body.
5. A hard calcareous shell is secreted by the mantle which may be external or internal.
6. Body cavity is full of blood and is called haemocoel.
7. Respiration takes place through gills called ctenidia, but may also occur through body surface, mantle or even lungs (pulmonary sac).
8. Excretion takes place through sac-like kidneys.
9. Nervous system consits of 3-4 pairs of ganglia (a group of nerve cells) connectives and commissures.
10. Reproduction is sexual. Sexes are seperate.

Examples:

Unio (freshwater mussel), sepia (cuttlefish), Pila (snail), Octopus (devilfish), Loligo (squid).

Teacher's Signature .....



UNIO

h) Phylum - Echinodermata (spinny-skinned animals)

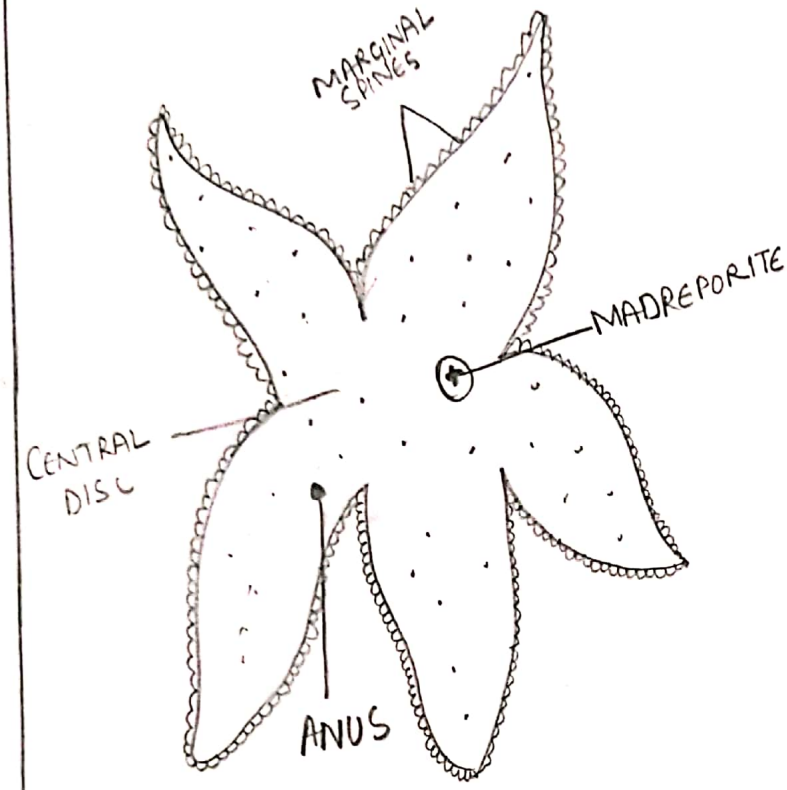
Echinoderms are spinny skinned animals and are characterized by the following features:

1. They are exclusively marine, may be free living or sedentary.
2. Body is either star shaped, cylindrical, globular, flower-like or cucumber-like.
3. They are triploblastic and radially symmetrical.
4. Spines are often present on the body surface, hence, the name echinodermata.
5. Echinoderms have tube-feet for locomotion.
6. Respiration and excretion take place through general body surfaces.
7. They possess a special water-vascular system for the purpose of locomotion and circulation.
8. They produce by sexual methods only. Sexes are separate but there is no sexual dimorphism. Fertilization is external.

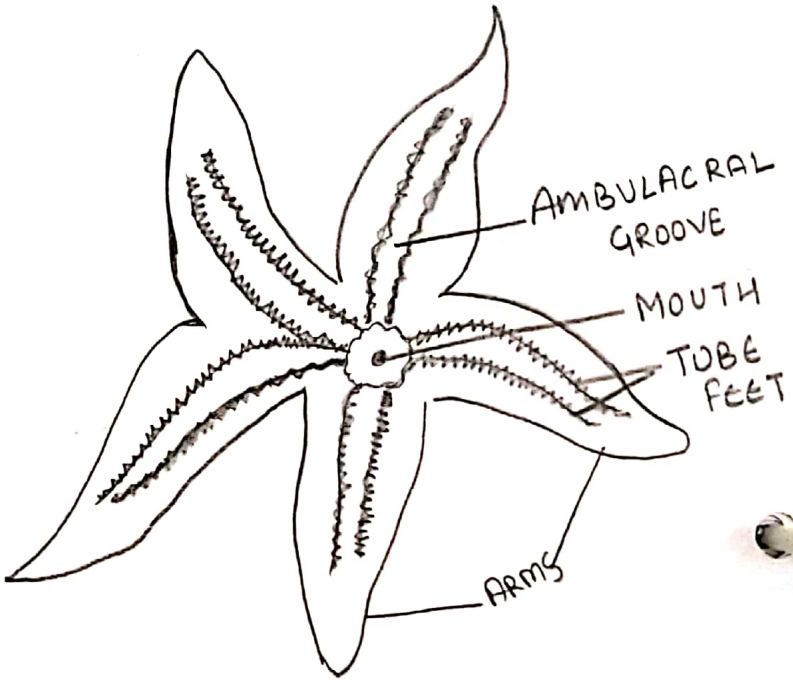
Examples:

Asterias (starfish), Holothuria (sea cucumber), Antedon (sea lily), Echinus (seaurchin), Ophiothrix (brittle star), Neometra (feather star.).

Teacher's Signature .....



ABORAL SURFACE OF STAR FISH



ORAL SURFACE OF STARFISH