Experiment #01:-

"Identification of Biochemicals from biological materials:"

Preliminary Test

Sr.No	Test	Experiment	Observation	Inference
01-	Heating	Take some original solution in a test tube and heat slowly.	No precipitate.	Protein absent and carbohydrate present
			white precipitate.	Protein present.
02-	Spot test	Pour a drop of O.S. on a filter paper and allow to dry.	A clear greasy spot is formed on the filter paper	Lipid (fat or oil) present.

Qualitative tests for Carbohydrate (Starch)

Sr.No	Test	Experiment	Observation	Inference
03-	Iodine test	2.5 ml. of O.S. + few drops of iodine solution added drop by drop.	Blue-black colour.	starch confirmed.

Qualitative test for Carbohydrate

(Reducing sugars)

Sr.No	Test	Experiment	Observation	Inference
04-	Benedict's test	2.5ml. of Benedict's solution + 5-10 drops of 0.5. Boil for two mins and allow to stand.	The initial blue colouration turns green, then yellow to orange and many finally form a brick red precipitate.	A reducing sugar such as glucose or fructose or maltose or lactose present.
05-	Fehling's test	2ml. of 0.5. + 1ml. of fehling's solution. Shake and boil for two minutes and allow to stand.	The initial blue colour turns green then yellow and finally forms brick red Precipitate.	Presence of some reducing sugar confirmed.

Qualitative test for Carbohydrate

(Non-reducing sugar)

Sr.No	Test	Experiment	Observation	Inference
06-	Benedict's test	2ml. of 0.S. + 1ml. of dilute Hcl. Boil for five minutes. Then add 2 ml. of benedict solution. Again boil for Two minutes.	Red, yellow or green precipitate.	Presence of non-reducing sugar done sucrose (sugar) confirmed.
07-	Fehling's test	2ml. of 0.S. + 1ml. of dilute Hcl. Boil for five minutes + a small amount of NaOH + 1ml. of fehling's solution. shake and boil.	The initial blue colour turns green then yellow and finally gives brick-red precipitate.	Presence of non-reducing sugar sucrose (table sugar) confirmed.

Qualitative tests for proteins

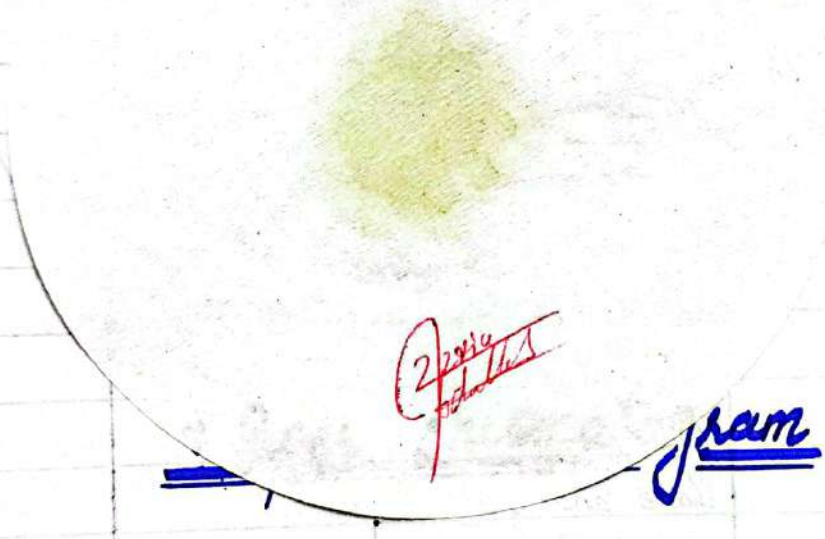
Sr. No	Test	Experiment	Observation	Inference
08-	Millon's test	2ml. of 0.5. + 7 drops of Millon's reagent.	white precipitate	Protein present.
		-Same-; Boil.	Brick red colour.	Protein confirmed.
09-	Biuret test	3ml. of 0.5. + 3ml. of 5% NaOH solution. Shake well and add 2 drops of 1% copper sulphate solution and shake.	Violet or pink or red colour.	Protein confirmed.

Qualitative test for lipids

(fats and oils)

Sr. No	Test	Experiment	Observation	Inference
10-	Sudan III test	2 ml. of the given material + 2 ml. of water + few drops of Sudan III solution. Shake well.	A red coloured layer appears on the surface.	Lipid (fat or oil) present.
11-	Emulsion test	2 ml. of the given material + 2 ml. of absolute ethanol. Shake vigorously. Add 4 ml. of cold water. Shake and then allow to stand.	A cloudy white emulsion (suspension).	Lipid (fat or oil) confirmed.

"Extraction and chromatography of leaf Chloroplast Pigments"



Diagram

Aim / objective:-

Separation of chlorophyll pigments using paper chromatography.

Result (observation):-

when acetone - petroleum ether mixture is poured over the chloroplast extract on the filter paper, it flows around and carries with it different pigments.

Conclusion:-

A paper chromatogram is formed that consist of different pigments from periphery to the centre.

Experiment #02:-

"Extraction and chromatography of leaf chloroplast Pigments"

Materials:-

Fresh or frozen spinach (bean or grass or geranium) leaves; 80% Aceton; 90% Acetone – petroleum ether mixture, Pestle and mortar, filter paper or chromatography papers Whatman No. 1, Funnel, Dropper, Glass wool, Beakers. Spirit lamp or Bunsen burner, Tripod stand, Forceps or tongs, Ethyl alcohol, water bath, Pins, Pencil, Test tube with cork lid (fitted with pin), Sand.

Procedure:-

Take some green leaves of spinach (or other) in mortar. Grind the leaves along with some sand (sand will facilitate grinding). Add to this a small quantity of aceton and mix thoroughly with the help of mortar. Filter this mixture, through the glass wool, in a beaker. The filtrate is a raw solution of leaf pigments including chlorophyll.

Technique – I:-

Take a filter paper. Put some filtrate or chlorophyll extract drop by drop, in the centre of

the filter paper (chromatography paper). Before the filtrate dries, pour some acetone-petroleum ether mixture over it. The mixture will flow around and will carry with it various leaf pigments with different speeds. This will result in the formation of a paper chromatogram, consisting of different pigments arranged in different concentric circles or zones. The outermost zone will be yellow in colour representing the carotene. Next to this will be yellowish-brown zone of xanthophyll. Inner to this will be the blue-green zone of chlorophyll-a. The innermost or central zone will be olive-green zone of chlorophyll-b.

Aim/objective:

Separation of chlorophyll pigments using paper chromatography.

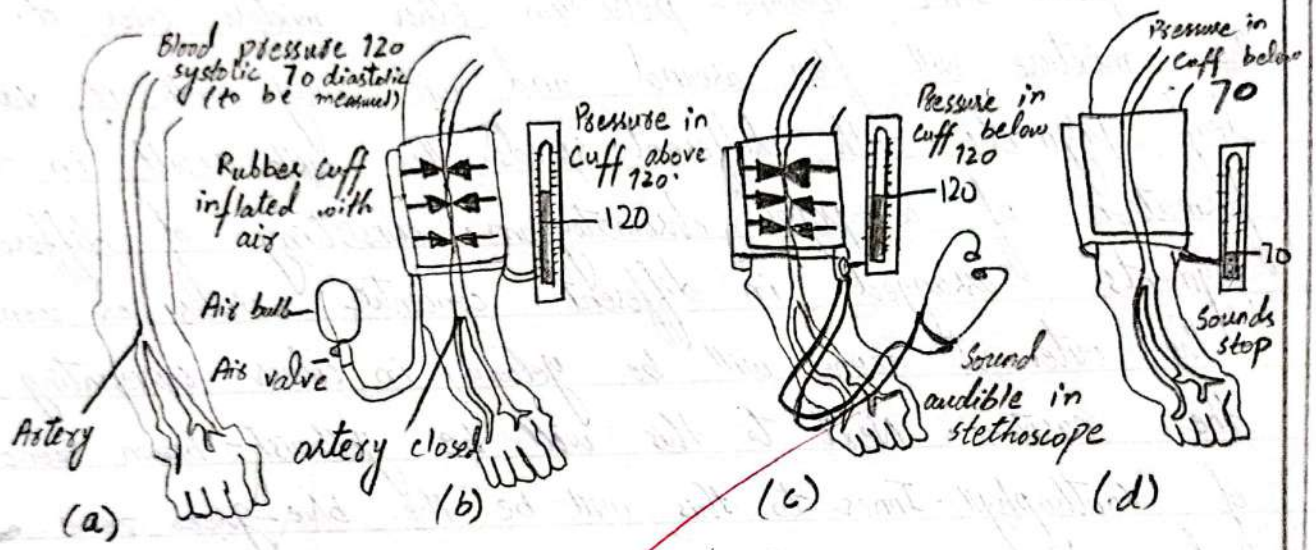
Result (observation):

When acetone-petroleum ether mixture is poured over the chlorophyll extract on the filter paper, it flows around and carries with it different leaf pigments with different speeds.

Conclusion:

A paper chromatogram is formed that consists of different pigments, which are yellow carotene, yellowish-brown xanthophyll, blue-green chlorophyll a and olive-green chlorophyll b, from periphery to the centre.

"Measurement of Blood pressure (B.P.)"



	B.P at rest at intervals of 10 min.	B.P after exercise at intervals of 10 min.
1.	120/70 mmHg	150/100 mmHg
2.	120/70 mmHg	130/90 mmHg
3.	120/70 mmHg	120/70 mmHg

Aim/objective: Measurement of blood pressure (B.P.)

Results (observations): (1) Sound from blood pulsing heard in the stethoscope when cuff was deflated (systolic pressure - S.P)

(2) Sound disappeared later when cuff was further deflated (diastolic pressure = D.P)

~~(3)~~ Conclusions:- (1) B.P of the object person at rest

(2) B.P of the object person after exercise

Experiment #03:-

"Measurement of Blood pressure (B.P.)"

Materials:-

=> A young healthy person (object).
=> Sphygmomanometer.
=> Stethoscope.

Procedure:-

Ask the object / person to be seated comfortably and relaxed. Wrap the inflatable cuff of the pressure gauge. This pressure closes the artery so that no blood flows past the cuff. When this occurs the pressure exerted by the cuff exceeds the blood in the artery. With the help of stethoscope, listen for sounds of blood flow below the cuff. If the artery is closed / there is no pulse below the cuff. Now, gradually deflate the cuff until the sound from blood pulsing into the artery below the cuff can be heard in the stethoscope. This occurs when the blood pressure is greater than the pressure exerted by the cuff. Note the pressure at this point, this is the systolic pressure, the high pressure exerted by the contracting ventricles. Deflate the cuff further until the

sound disappears. Note this point also. This is the diastolic pressure. At this point the blood flows freely with the diastolic pressure remaining in the artery when the heart is relaxed.
Take at least three readings at an interval of about 10 minutes. Take the mean and record. This would be blood pressure at rest. Now ask the same person to do light exercise by either going upstairs quickly or brisk sitting-standing for twenty times. Measure blood pressure again after intervals of 10 minutes and record. This would show that the blood pressure is high just after exercise and that it gradually decreases to normal

	B.P. at rest at interval of 10 min	B.P. after exercise at interval of 10 min
01-	120/70 mmHg	150/100 mmHg
02-	120/70 mmHg	130/90 mmHg
03-	120/70 mmHg	120/70 mmHg

Aim/objective:-

Measurment of blood pressure (B.P.).

Results (observations):-

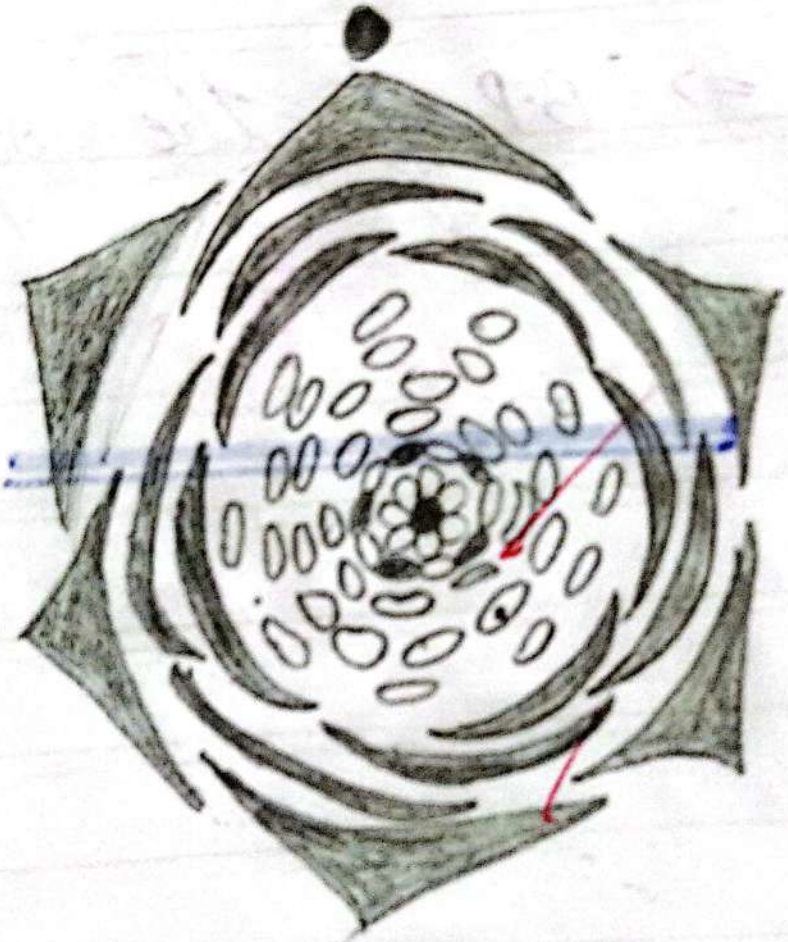
=> sound from blood pulsing heard in the stethoscope when cuff was deflated (systolic pressure = S.P).

=> Sound disappeared later when cuff was further deflated (diastolic pressure = D.P).

Conclusion :-

=> B.P of the object person at rest.

=> B.P of the object person after exercise.



Experiment #4:-

"Technical Description of some flowers:"

Rosa Indica (Rose vern. Gulab) (Family: Rosaceae)

Leaf (of rose):-

Alternate ; petiolate ; Stipulate radrate ; Pinnate compound ; Imparipinnate.

Leaflet:-

Sub-sessile ; Ovate ; Herbaceous ; Margin serrate ; Apex acute ; surface glabrous ; Venation unicostate and reticulate.

Inflorescence:

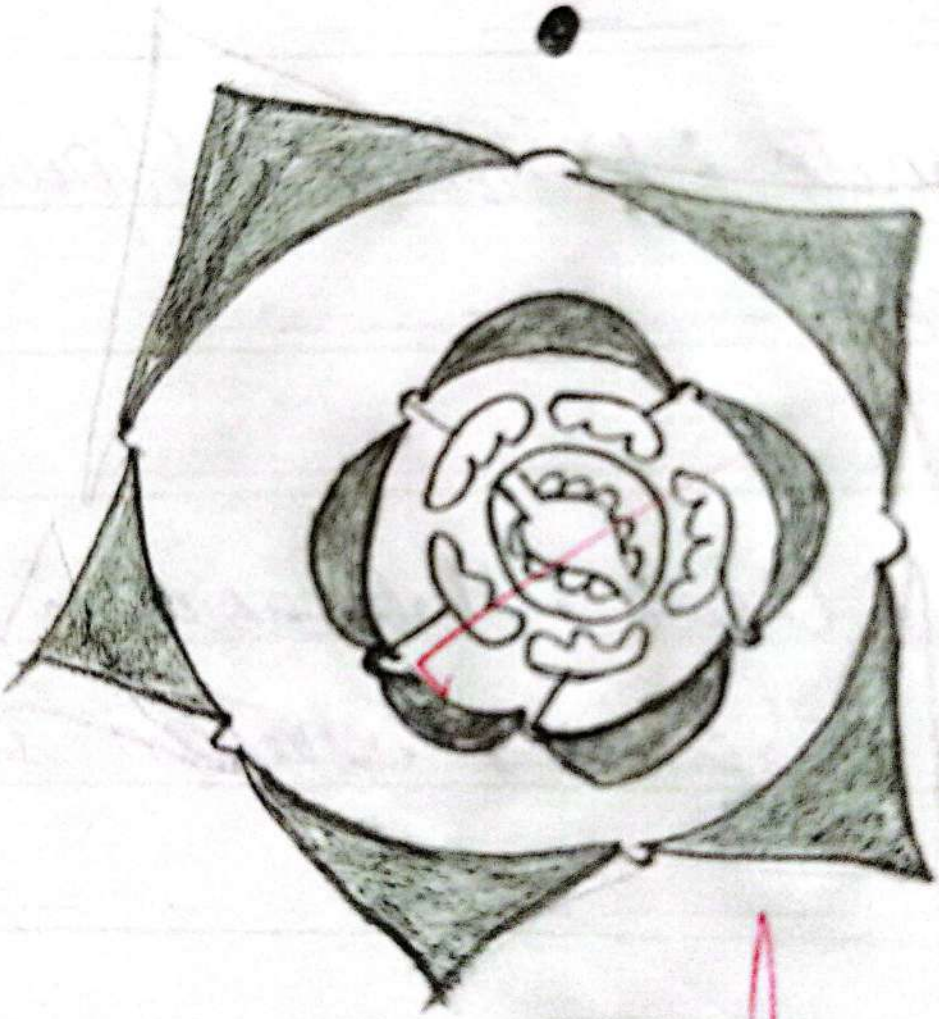
Large solitary or paired terminal flowers on short lateral branches.

Calyx:

Sepals 5, Gamosepalous ; Imbricate ; Persistent ; Hairy ; Green ; Inferior.

Floral formula:

$$\oplus \, \varphi \, K_{(5)} \, C_{5-\infty} \, A_{\infty} \, G_{\underline{\infty}}$$



Solanum nigrum (Nightshade vern. Mako)
(Family : Solanaceae)

Inflorescence:

Rhipidium type of uniparous cyme.

Flower:

Pedicellate ; Ebracteate ; Complete ; Hermaphrodite ; Actinomorphic ; Pentamerous ; Hypogynous ; Wheel shaped ; white.

Calyx:

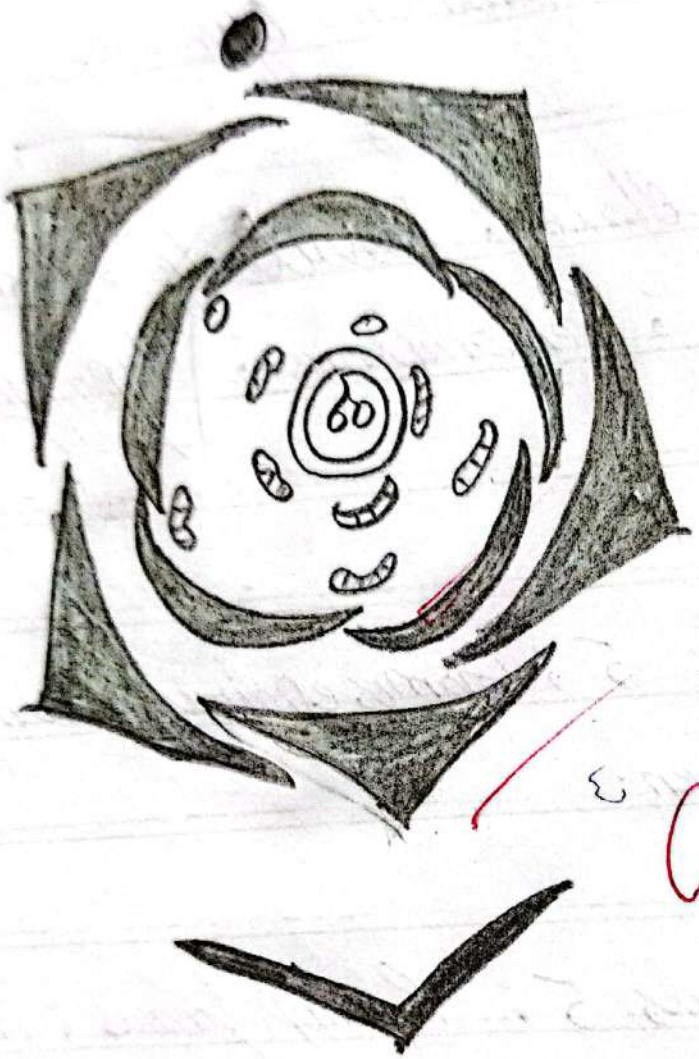
Sepals 5 ; Gamosepalous ; Campanulate ; Hairy ; inferior ; Green.

Corolla:

Petals 5 ; Gamopetalous ; inferior ; Rotate ; white ; non-serrated.

Floral formula:

$$\oplus \; \delta \; \overset{\uparrow}{+} \; K_{(5)} \; \widehat{C_{(5)} \; A_{(5)}} \; G_{(2)}$$



Cassia fistula (Amaltas) (Family: Leguminosae; sub family: Caesalpiniaceae)

Leaf (of amaltas):-

Alternate ; Peniolate ; stipulate ; stipules very small; Pinnate compound ; Paripinnate ; 3-5 pairs of leaflets (pinnae).

Leaflet:

opposite ; sub sessile ; Ovate ; Coriaceous, Glabrous, Margin entire , Apex acute ; venation unicostate and reticulate.

inflorescence:

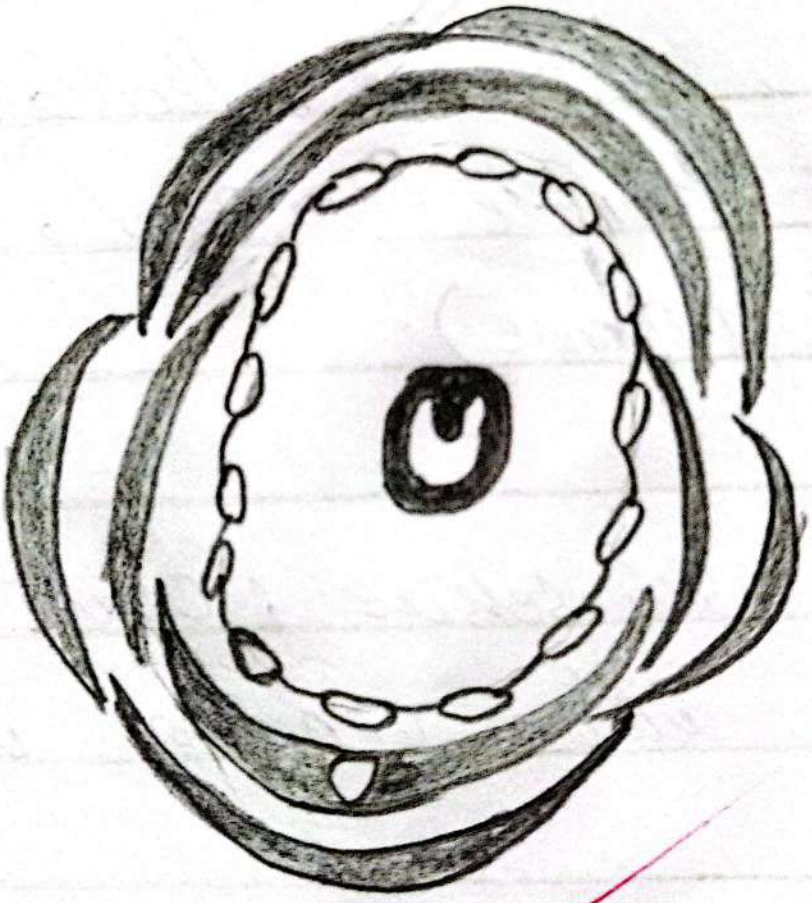
Axillary or extra axillary , long pendulous , compound raceme.

Calyx:

Slightly sepals (5) ; Polysepalous ; imbricate ; old sepal interior ; inferior ; slightly petaloid

Floral formula:

$$\% \; \uparrow \; K_5 \; C_5 \; A_{5+5} \; G_{\underline{1}}$$



Lathyrus odoratus, sweet pea (Phool Matar)
Flowers from January to March (Family: Leguminosae: sub family: Papilionaceae)

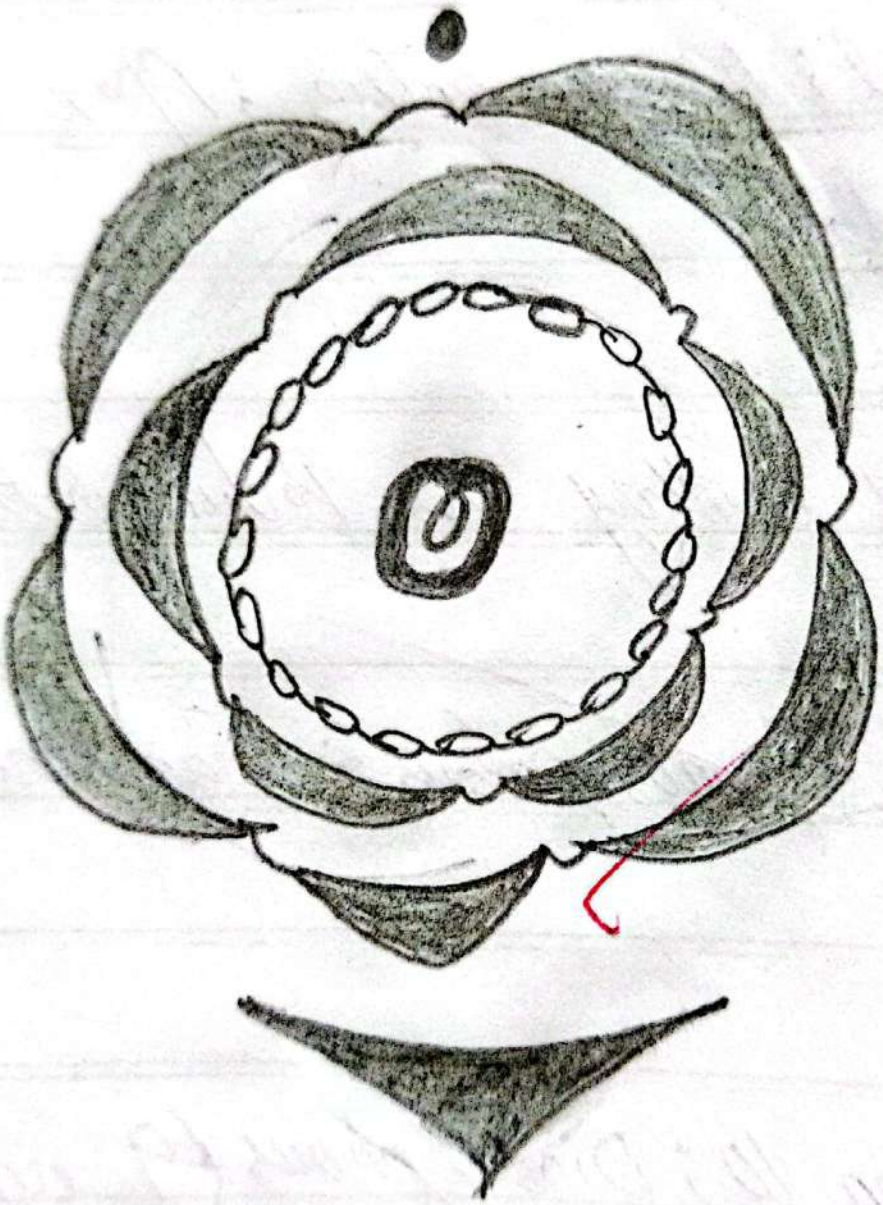
Leaflet:
Sessile; Oval; Margin entire; Apex acute; Venation unicostate and reticulate.

Inflorescence:
Solitary axillary or Peduncular racemo.

Calyx:
Sepals 5; ~~Gamosepalous~~; Campanulate; inferior; Green; Hairy.

Androecium:
Stamen 10; Diadelphous (9 united to form a tube around the ovary and one free); inferior; anthers basifixed.

Floral formula:
$\% \; \varphi \; \uparrow K_{(5)} \; C_{1+2+(2)} \; A_{(9)+1} \; \underline{G_{1}}$



Albizzia lebbek (shisin) Flowers from April to may (Family: Leguminosae ; Sub family: Mimosaceae)

Leafs (of sisis):

Alternate ; Petiolate ; stipulate ; stipules small ; compound ; Bipinnate.

Inflorescence:

Pedunculate ; Cymose heads which may be solitary or in clusters of 2-4 in the axils of upper leaves. The central flower in each head is the largest.

Flower:

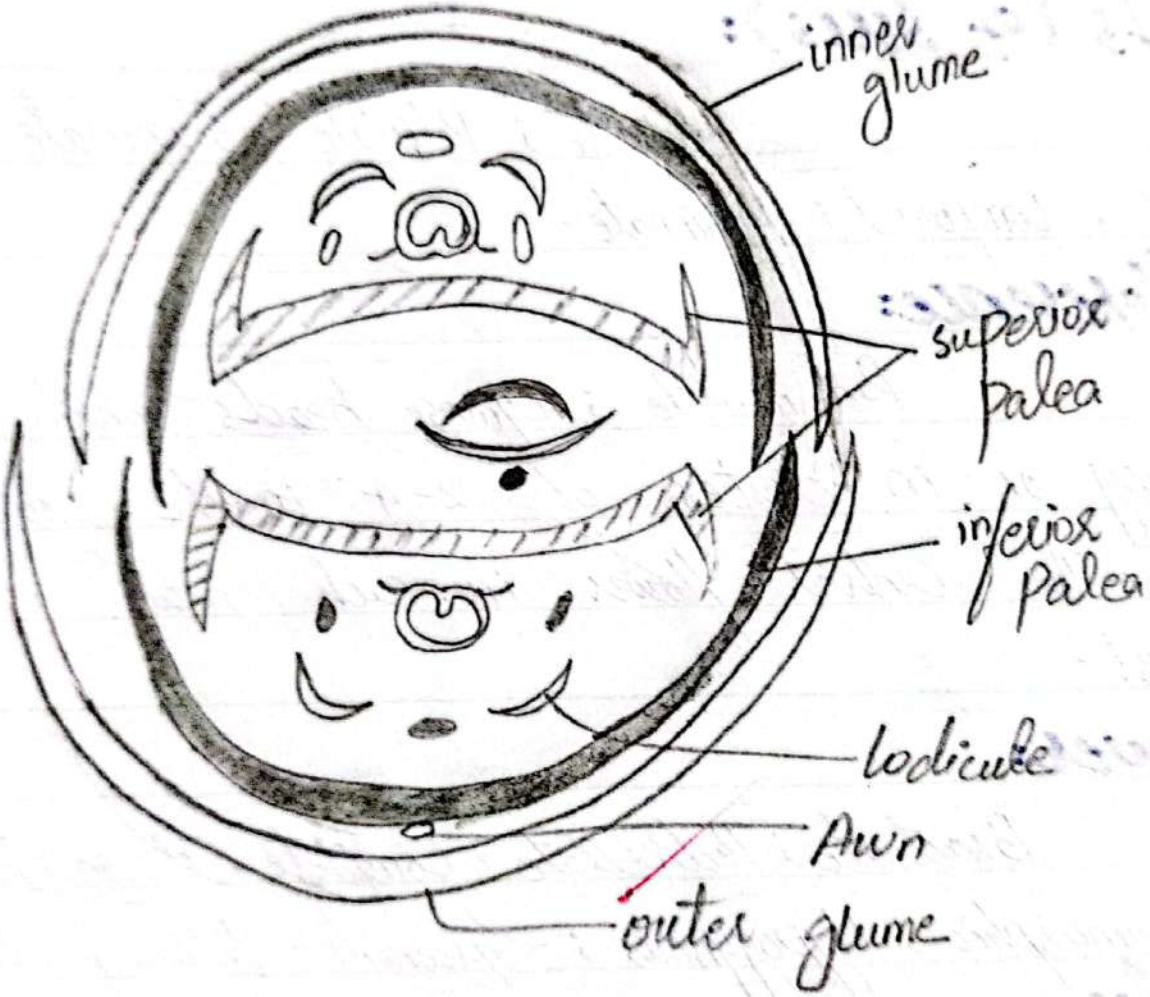
Bracteate ; Pedicellate ; Complete, Hermaphrodite ; Actinomorphic ; Hypogynous ; Greenish-Yellow ; Flagrant.

Calyx:

Sepals 5 ; Gamosepalous ; small, Toothed ; campanulate ; Green, inferior.

Floral formula:

$\oplus \, \bigcirc \, \overset{\uparrow}{K_{(5)}} \, C_{(5)} \, A_{(\infty)} \, \underline{G_{\perp}}$


inner glume
superior palea
inferior palea
lodicule
Awn
outer glume

Monocotyledons: Avena Sativa, Oat (Jai)
(Family: Gramineae or Poaceae)

Inflorescence:

Panicle of spikelets.

Perianth:

2 scale like perianth leaves called as lodicules which lie at the base against the superior palea, inferior.

Androecium:

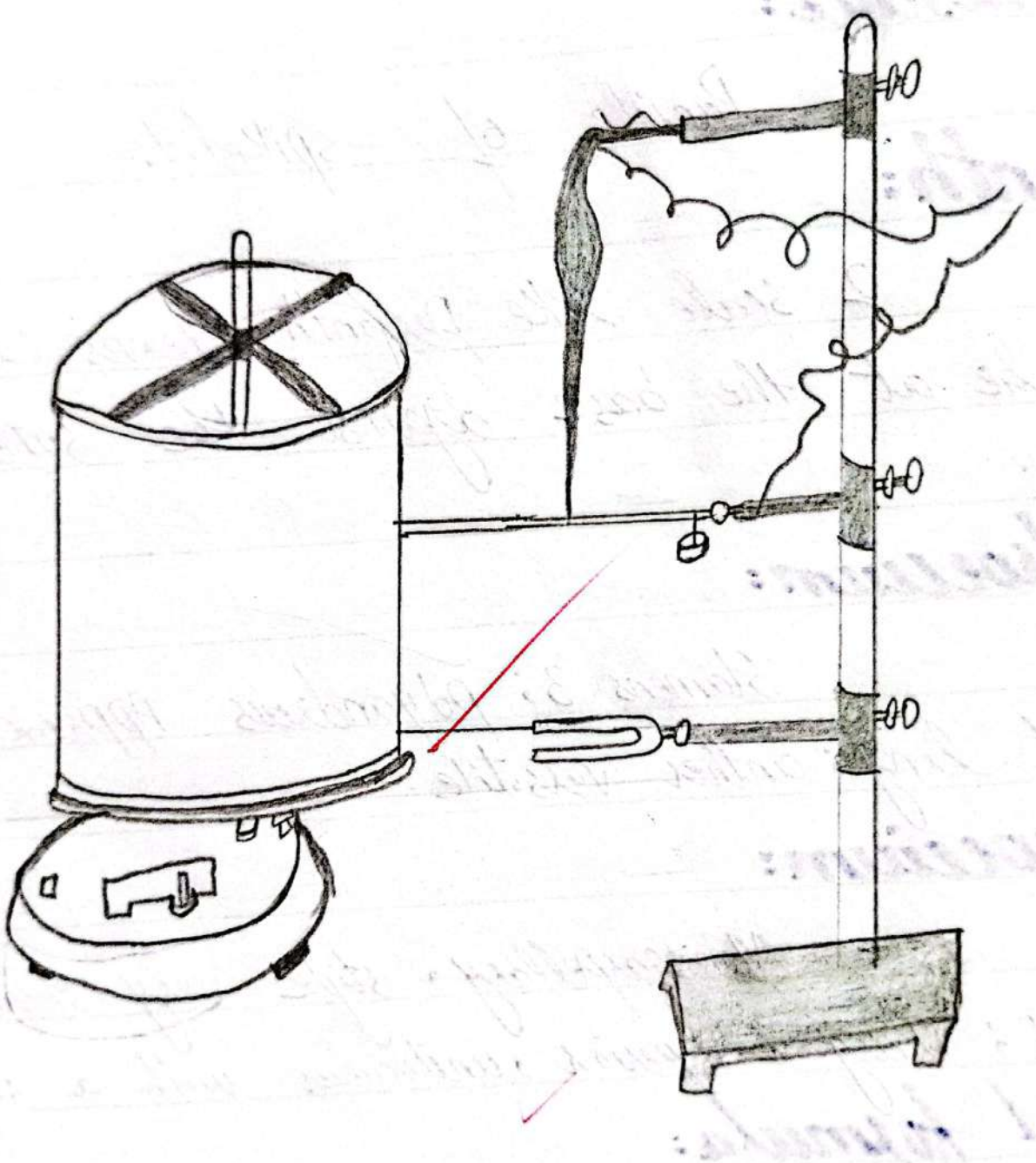
Stamens 3; polyandrous Approx 1 cm; inferior, filament long; anther versatile.

Gynoecium:

Monocarpellary, style very short; stigmas 2, feathery; Ovary, superior, unilocular with a single basal ovule.

Floral formula:

$\%\ \uparrow\ \mathrm{P_2\ (Lodicules)\ A_3\ \underline{G_1}}$



Experiment #05:-

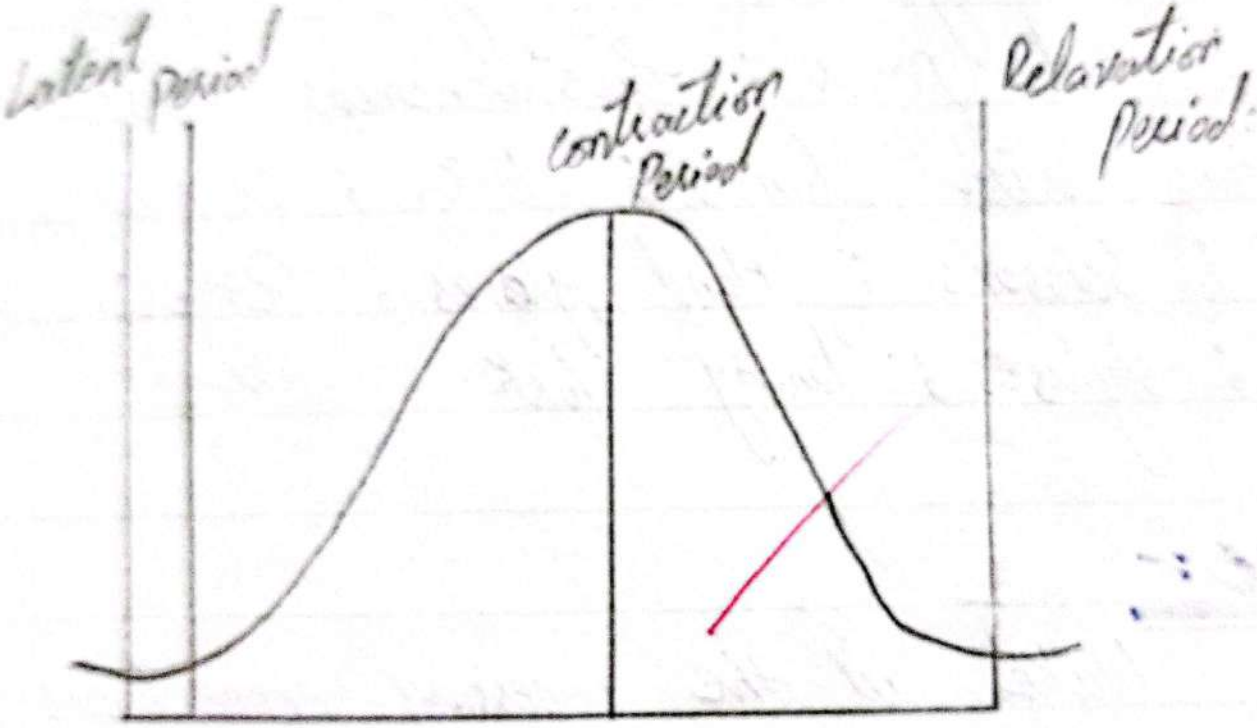
"Study of simple muscle twitch using frog's muscle"

Materials:-

Dissecting board ; Kymograph ; Motor or battery ; smoked paper ; Gastrocnemius muscle of frog ; stand with clamps ; Hooks ; connecting wires ; scalpel ; Scissors ; Hand gloves ; Ringer's solution for frog ; styluses ; Tuning fork.

Procedure:-

Make all the necessary connections. Adjust the base of the recording drum or rotating cylinder of the Kymograph in the horizontal position by levelling the screws. Wrap the smoked paper around the recording drum and make a base line on it. Mount the gastrocnemius muscle with its proximal end attached to a fixed hook and its distal end connected by means of another hook to a lever with a pointed stylus at its tip. Adjust the stylus on the revolving drum to record the muscle contractions in the form of a curve. If desired to record an appropriate



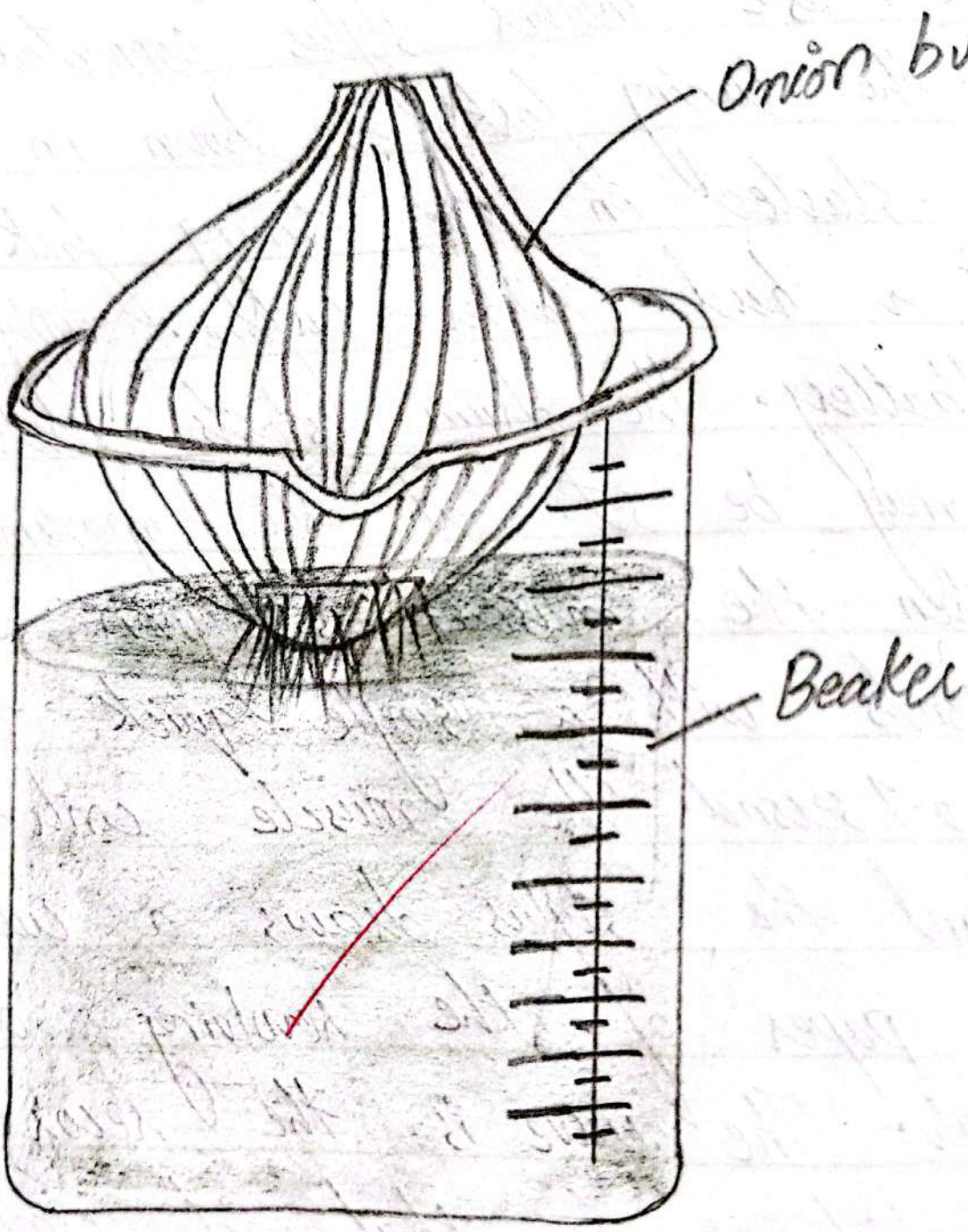
Simple muscle twitch curve

time scale and to mark the point when the muscle is stimulated, use another stylus connected with a lever through the tuning fork as shown in diagram. Vibrations may be started in the tuning fork by striking it against a hard rubber surface. Apply the current with motor / battery. The drum starts revolving clockwise. Its speed may be set at the maximum. You will see that when the muscle is given a single stimulus it responds with a single quick twitch lasting for about 0.1 second. The muscle contraction moves the lever and the stylus draws a curve on the smoked paper of the revolving drum of the kymograph. The curve is the record of a single twitch which reveals that it comprises the following three successive phases:

(i) **Latent period:-**
It is the interval between the stimulation of the muscle and the begining of its visible shortening. It lasts for less than 0.05 seconds.

(ii) **Contraction period:-**
Contraction period is about 0.045 second in duration, during which the muscle shortens.

(iii) **Relaxation:-** The longest of three lasting for 0.05 seconds.


Onion bulb
Beaker

Experiment #5 :-

"Preparation of root tip squashes to study stages of mitosis"

Material :-

Compound microscope ; Onion root tips ; Tapper ; Spirit lamp ; 1 Molar hydrochloric acid ; 2% aceto-carmine or aceto-orcein solution (stain) ; Forceps ; Spatula ; Slides ; Cover glasses (slips) ; Filter paper or paper towel or blotting paper ; watch glass ; Dropper.

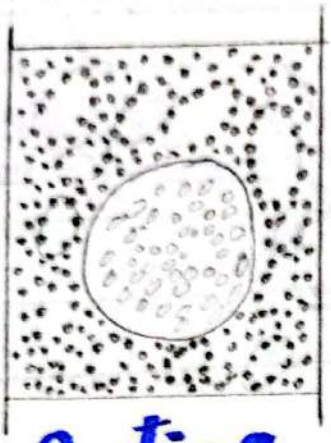
Procedure :-

Put a drop of water in the centre of clean slide. Place a root tip on the drop of water and crush it with a clean spatula or a razor blade or a sharp scalpel.

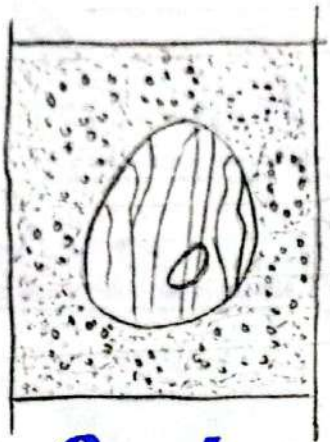
Blot dry the slide. Add a drop of aceto-carmine stain to the root tip on the slide and tap it lightly with tapper. Wait for five minutes and then place a cover slip over it.

Experiment #5 :-

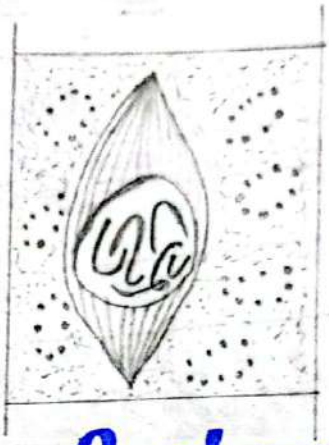
"Preparation of root tip squashes to study stages of mitosis."



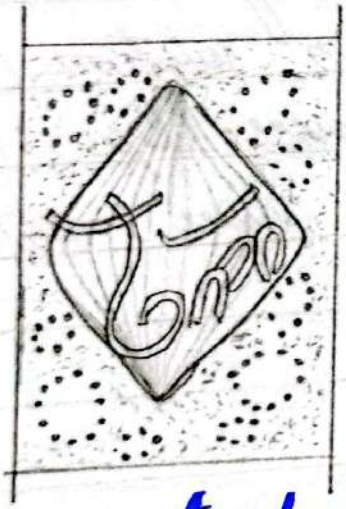
Resting cell



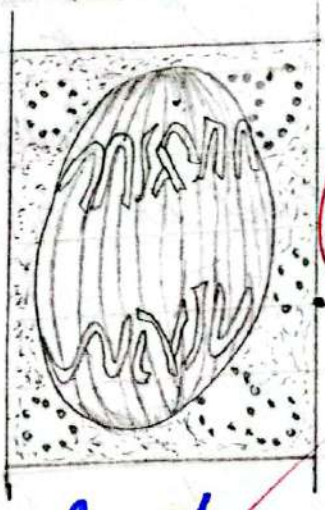
Prophase



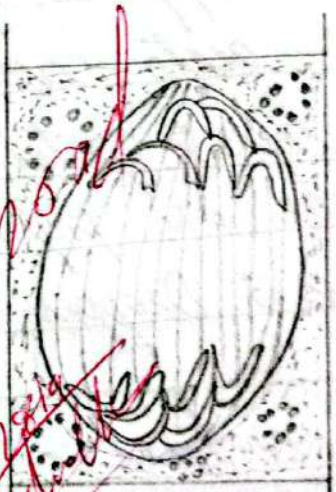
Prophase



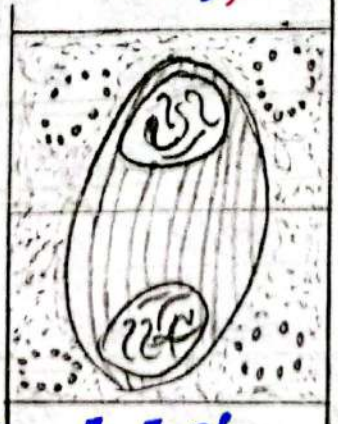
Late metaphase



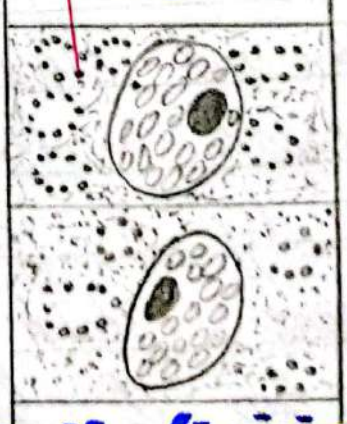
Anaphase



Early telophase



Late telophase



Cell division completed

Press the cover slip gently by a pad of filter paper, with the thumb, taking care to avoid any lateral movement of cover slip. Get maximum spreading and flattening of material.

(1) Prophase:-

The chromosomes become visible within the nucleus. Each of them consists of two coiled threads known as the chromatids, which are held together by a common centromere. Later the chromatids untwist from each other, the nucleoli and later the nuclear membrane disappear.

(2) Metaphase:-

The chromosome move and attach themselves by their centromeres on the spindle fibres at the equator, in a ring called as the equatorial plate.

(3) Anaphase:-

The two chromatids of each chromosome separate at the centromeres as

independent chromosomes. As a result, the number of chromosomes in the cell is doubled than normal. Now the chromosome begin to separate into two groups, each consisting of the diploid number. Each group carries one of the two daughter chromosomes, formed as above. One group slides over the spindle fibres to one pole and the other to the other pole. Consequently, the number of chromosome at each pole is the same as in the parent cell.

(4) Telophase:-

The chromosomes at each pole shorten, twist, uncoil, become visible and develop around them a new nuclear membrane. In this way, a new daughter nucleus is formed at each pole in which appears the nucleolus. The spindle disappears and a new cell wall is formed in the middle of the cell thus, dividing it into two daughter cells.

Experiment # 06:-

"Preparation of squashes of rhoeo discolar floral buds to study meiosis and observation of life stages of meiosis from prepared slides and study of polytene chromosomes."

Materials:-

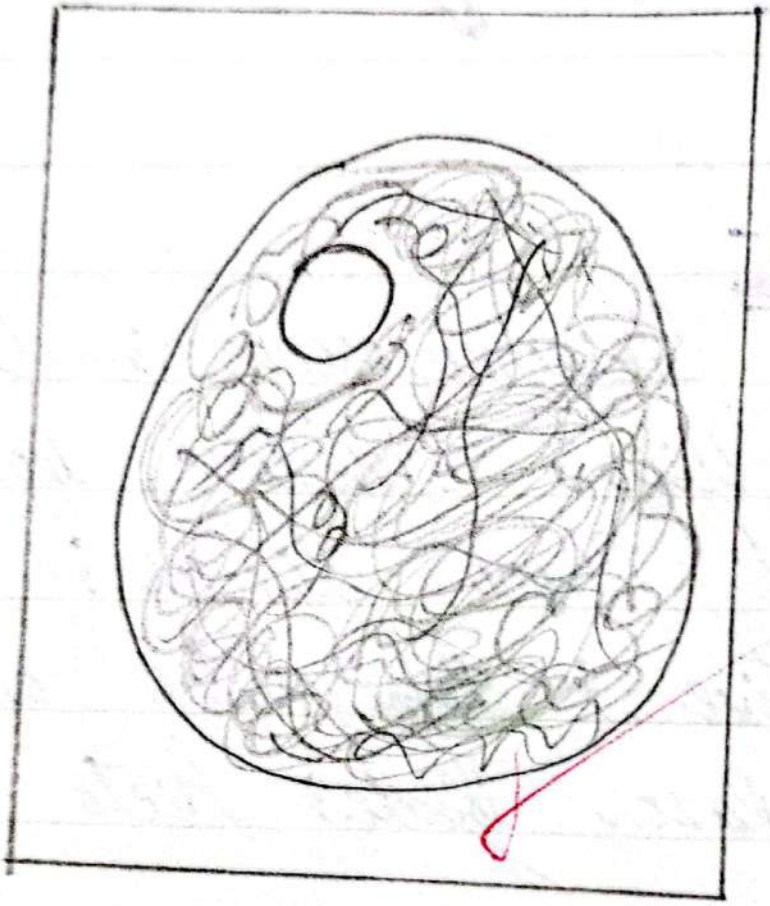
Stereomicroscope ; Compound microscope ; Slides ; Cover slips ; Dissecting box ; Fresh or preserved floral buds of Rhoeo discolor ; Carnoy's solution or Farmer's fixative ; Refrigerator or Freezer ; 70% ethyl alcohol ; Razor blade ; Aceto-carmine ; Filter paper ; spirit lamp.

Preparations:-

Carnoy's solution, Farmer's fixative and acetocarmine solution can be prepared as describe in the begining.

Procedure:-

Place an entire inflorescence or an individual preserved flower bud of Rhoeo discolor



Resting stage

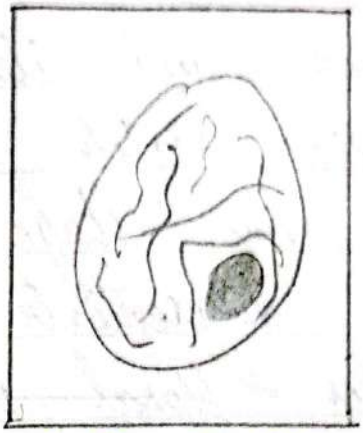
in a watch glass. Add a few drops of 70% ethyl alcohol to keep it moist. Since the flower bud and its anthers are very small, place the watch glass containing the flower bud on the stage of a Stereomicroscope in order to differentiate and separate the anthers from other floral parts. It is better to examine the flower bud against a dark background, because the killed and fixed plant material is bleached white by the fixative and the alcohol. A black card placed. If possible, remove the anthers wall from the drop of stain. Place a cover slip over the stain. Press the cover slip gently by a pad of filter paper or paper towel with the thumb taking care to avoid any lateral movement. Heat the slide gently over the flame. Examine the slide under the low and high powers of the microscope and search for the following stages.

Meiosis-I

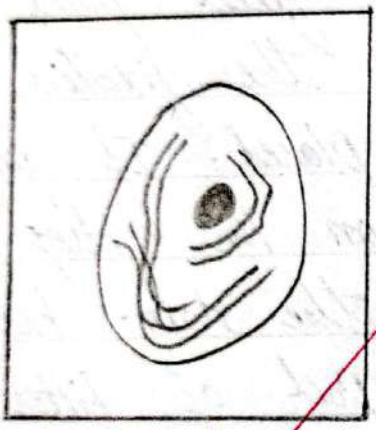
(1) Prophase-I:-

It is distinguished into the following five substages:-

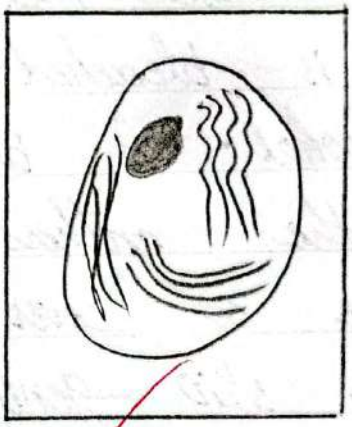
Early leptotene



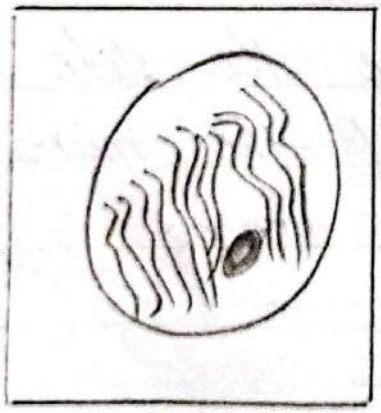
Late leptotene



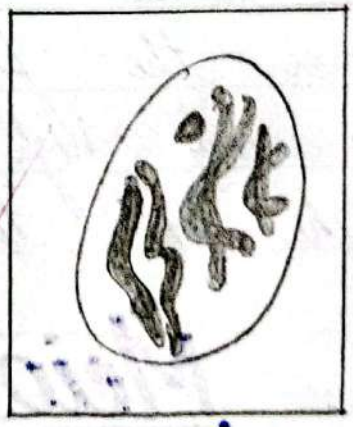
Zygotene



Pachytene



Diplotene



Diakinesis

(a) leptotene:-

The nucleus increase in size. The chromosome become visible within the nucleus. Each chromosome consists of two chromatids held together by a common centromere.

(b) zygotene:-

The homologus chromosomes undergo pairing.

(c) Pachytene:-

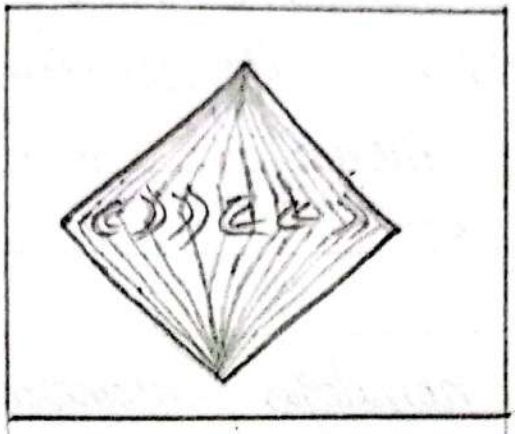
The synapsis is completed. The pairs of chromosomes are called bivalents. Since each bivalent consists of four chromatids, it is also called as a tetrad. The chromosomes shorten and thicken.

(d) Diplotene:-

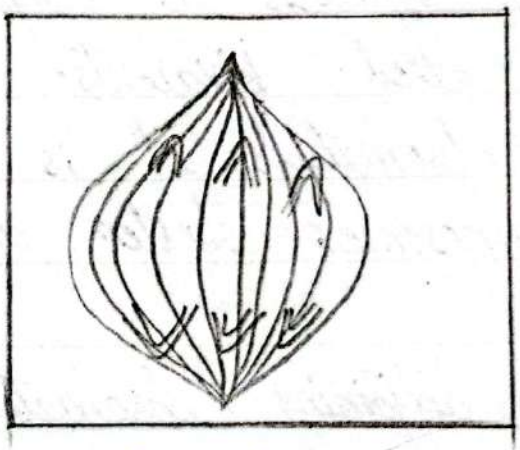
The adjoining chromatids of each tetrad at one or more places at the same level and exchange their segments. The points of interchange of segments are called chiasmata and the process as crossing over. The spindle fibres appears as fine threads.

(e) Diakinesis:-

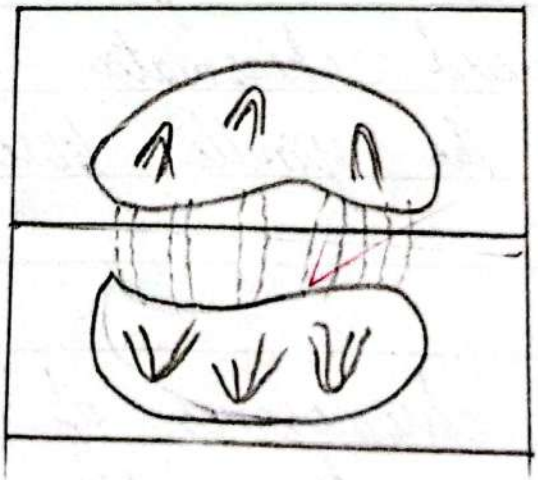
The chromosomes of the bivalents begin to separate. They continue to shorten and thicken. The nucleoli disappears. The chiasmata also disappears. The spindle continues to be completed.



Metaphase-I



Anaphase-I



Telophase-I

(2) Metaphase :-

The nuclear membrane disappears and the spindle is completed. The bivalents get attached at the equator of the spindle fibre by means of their chromosomes, forming the equatorial plate.

(3) Anaphase-I :-

The homologus chromosomes of the bivalents separate and move towards their respective poles due to contraction of the spindle fibres. In this way, half of the chromosomes each with its two chromatids, reach to each pole of cell.

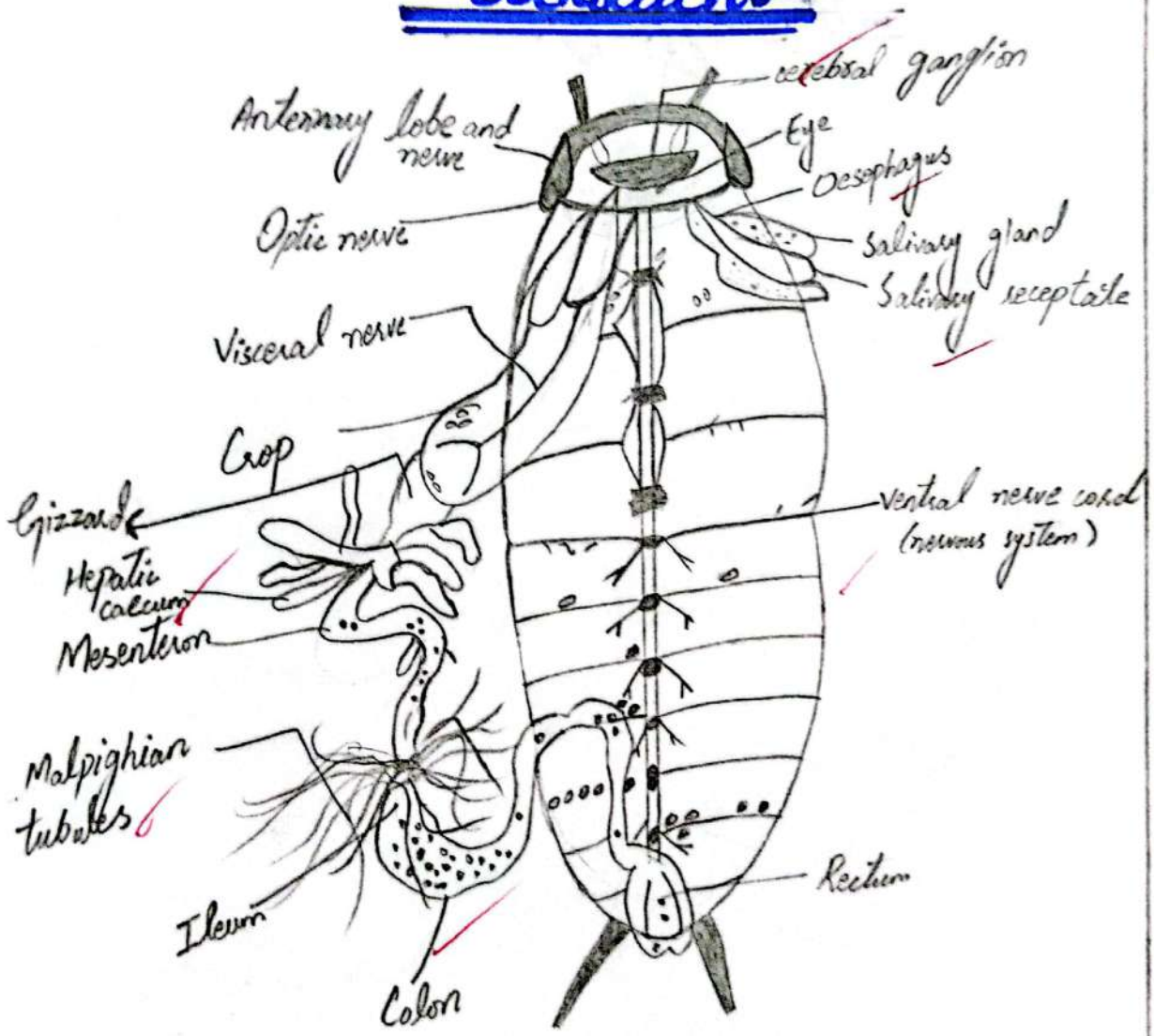
(4) Telophase-I :-

The chromosomes at each pole shorten and gather into the chromatin material, which is surrended by a new nuclear membrane. Consequently, two daughter nuclei are formed in the parent cell in which are produced new nucleoli. The spindle disappears. The cell is divided into two daughter cells, each having haploid.

21.9.2015

Experiment

"Exposure of digestive system of cockroach."

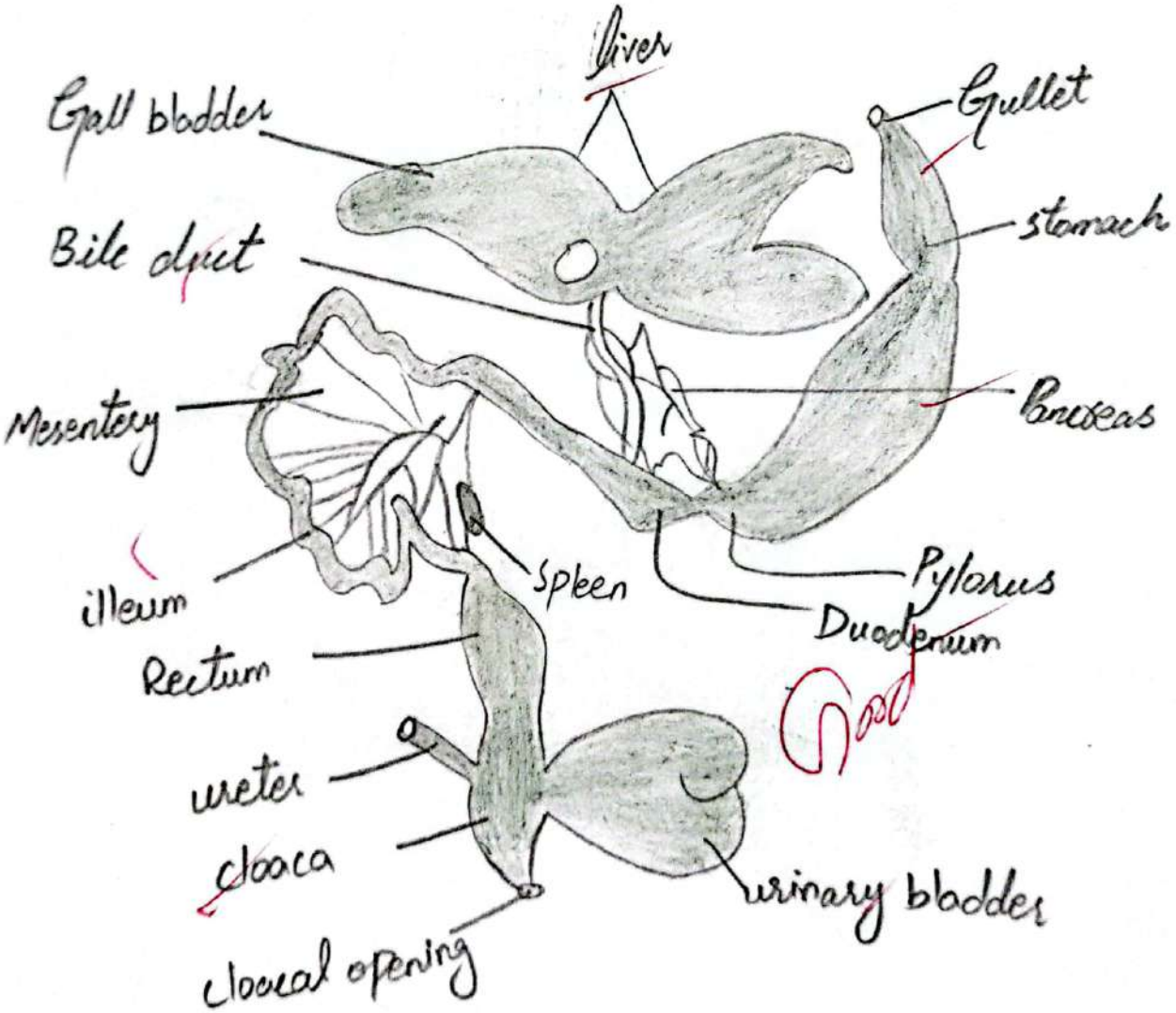


30-01-2023

Good

Experiment# :-

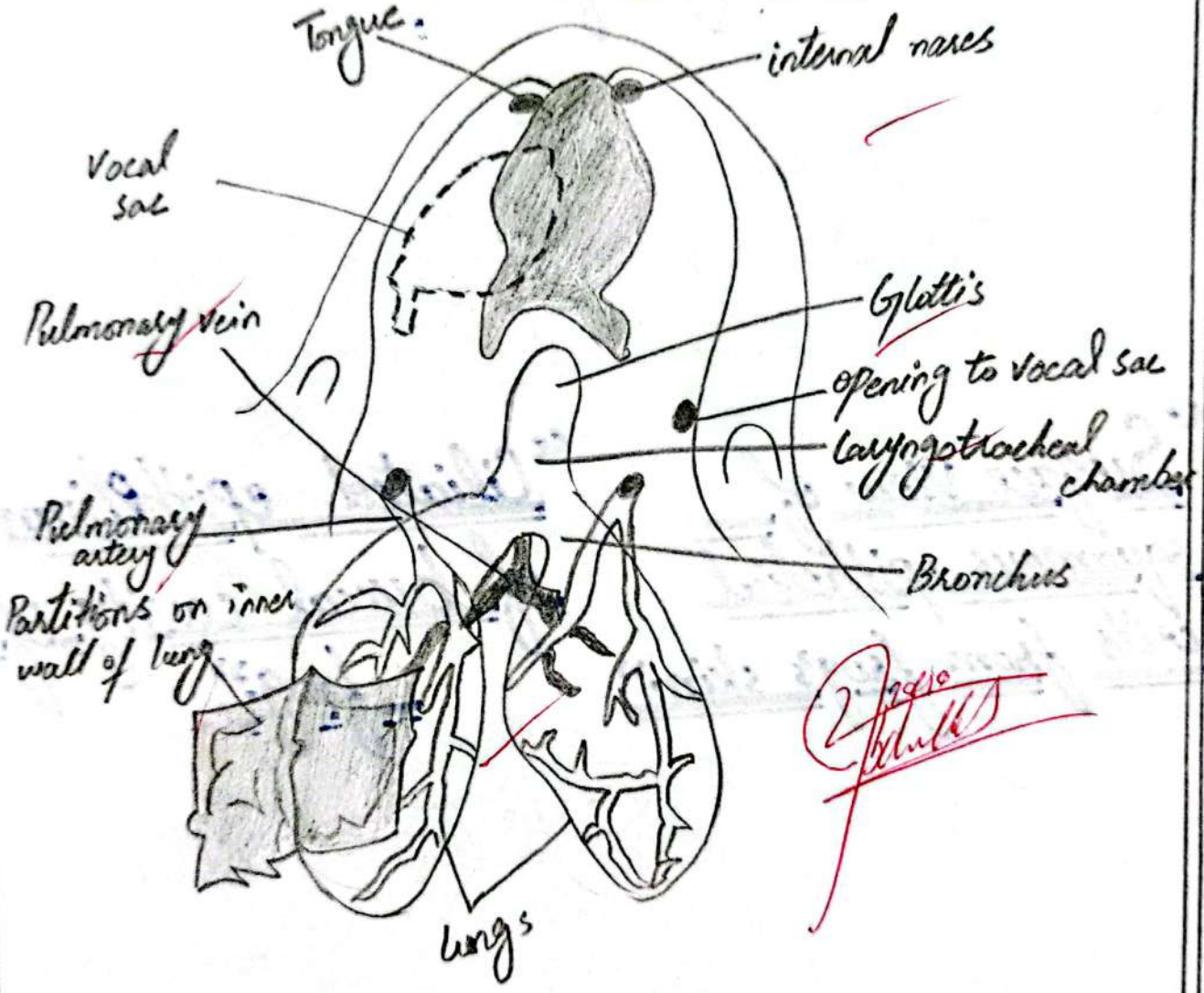
"Exposure of digestive system of frog." :



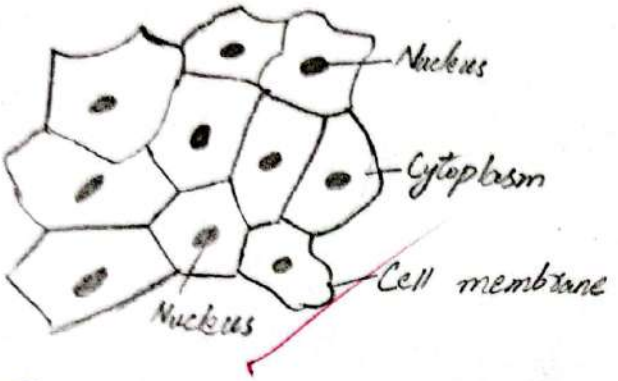
Good

Experiment # :-

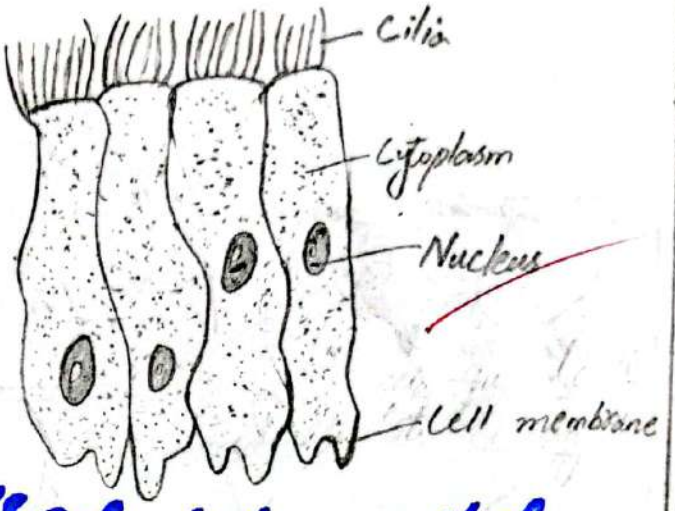
"Exposure of respiratory system of frog."



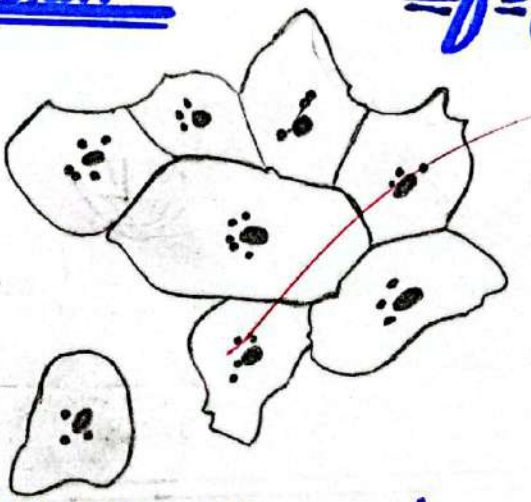
"Study of animal cells."



"Surface view of squamous epithelial cells from frog's skin."

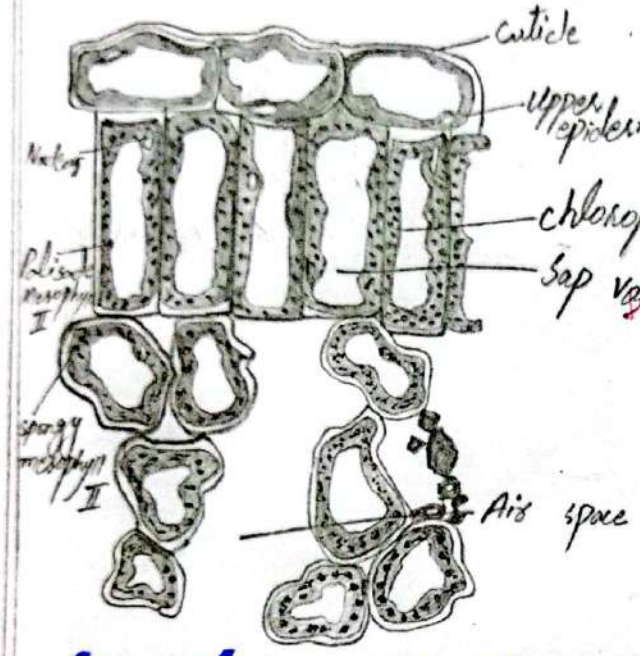


"Ciliated epithelium of buccal cavity of frog."

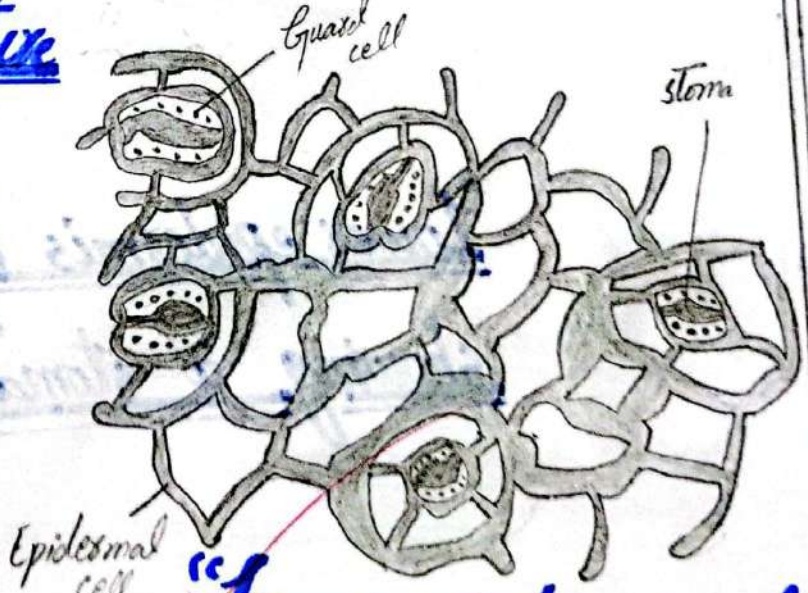


"Cells from human cheek."

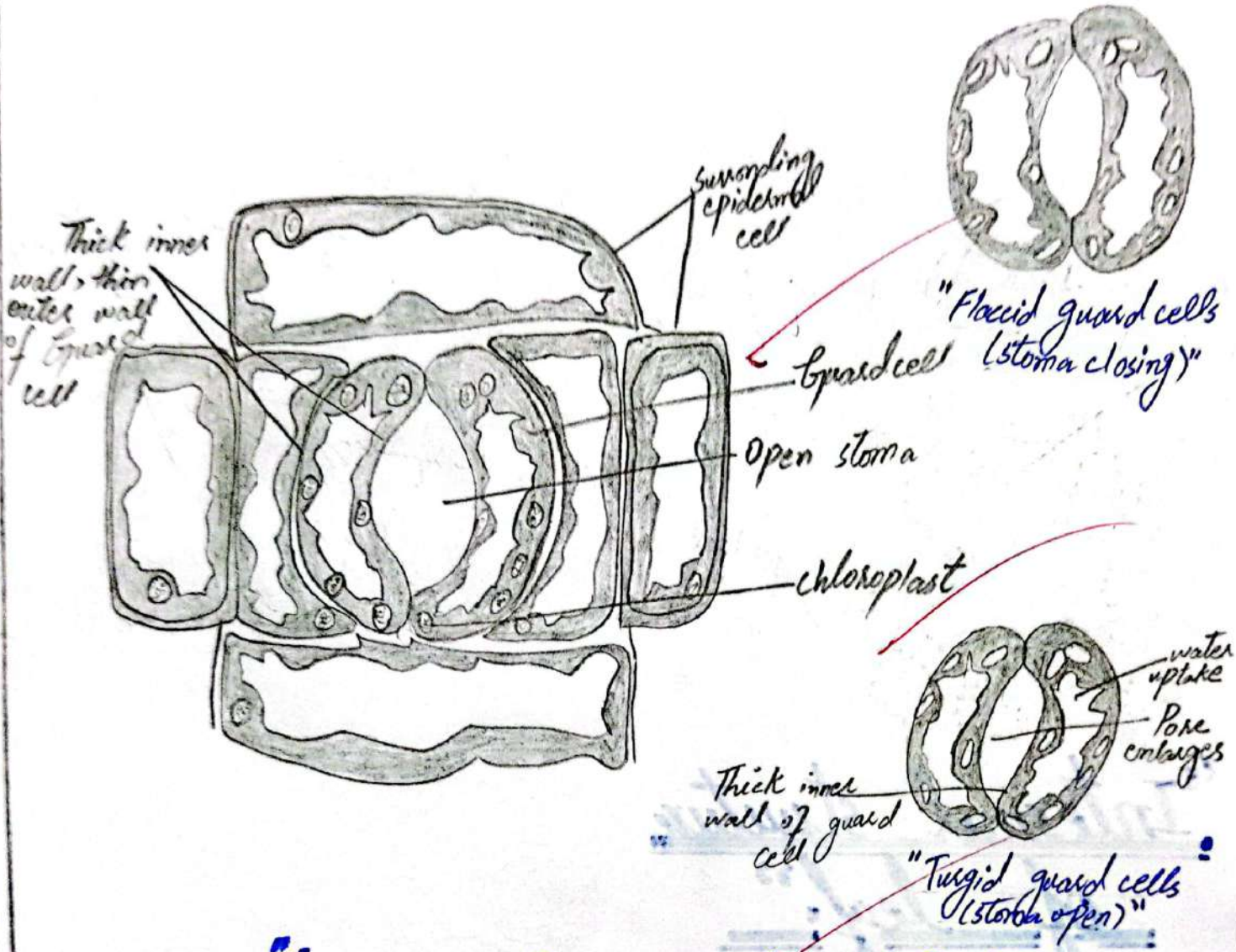
"Study of Plant cells."



"Internal structure of leaf."

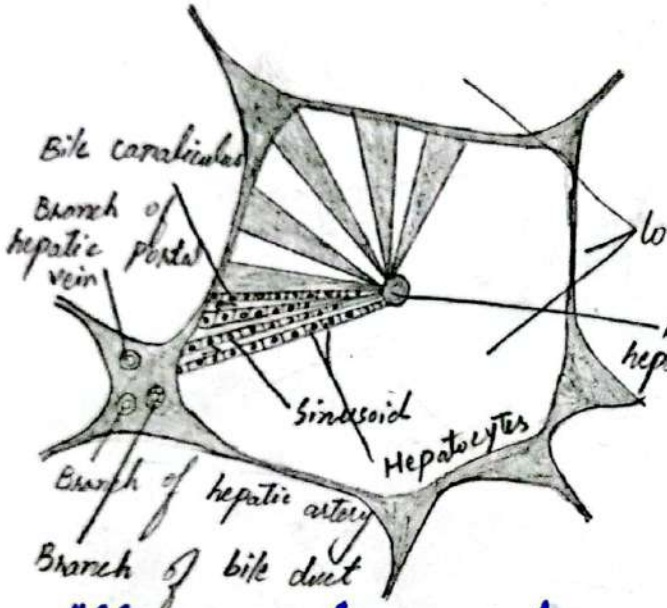


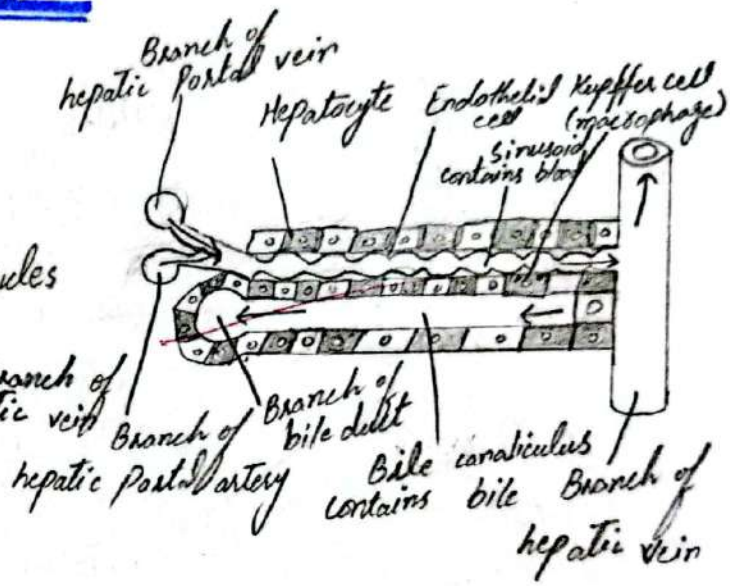
"Lower epidermis of leaf (low power)."



"Lower epidermis of a leaf showing a stoma (under high power)".

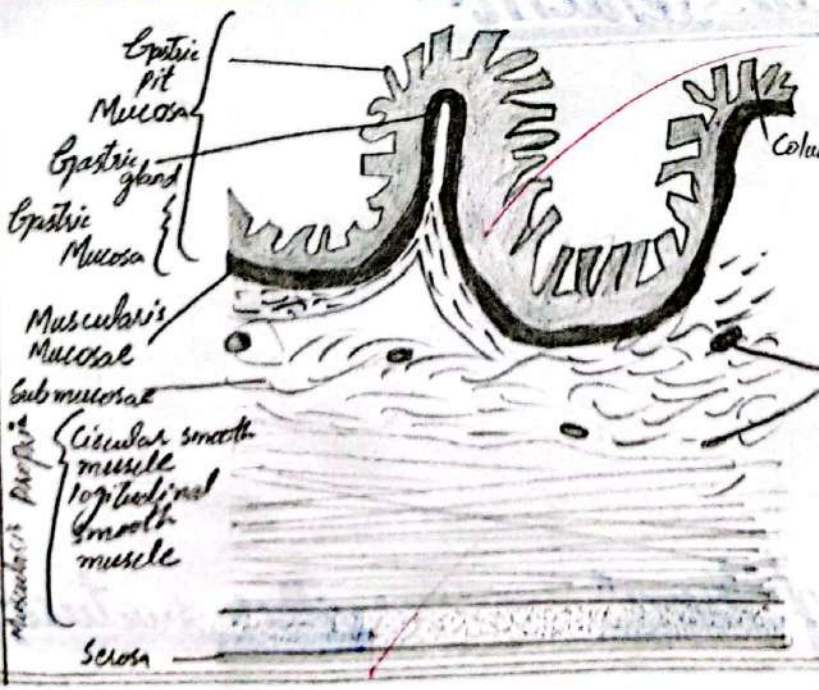
"Study of T.S. of livex"





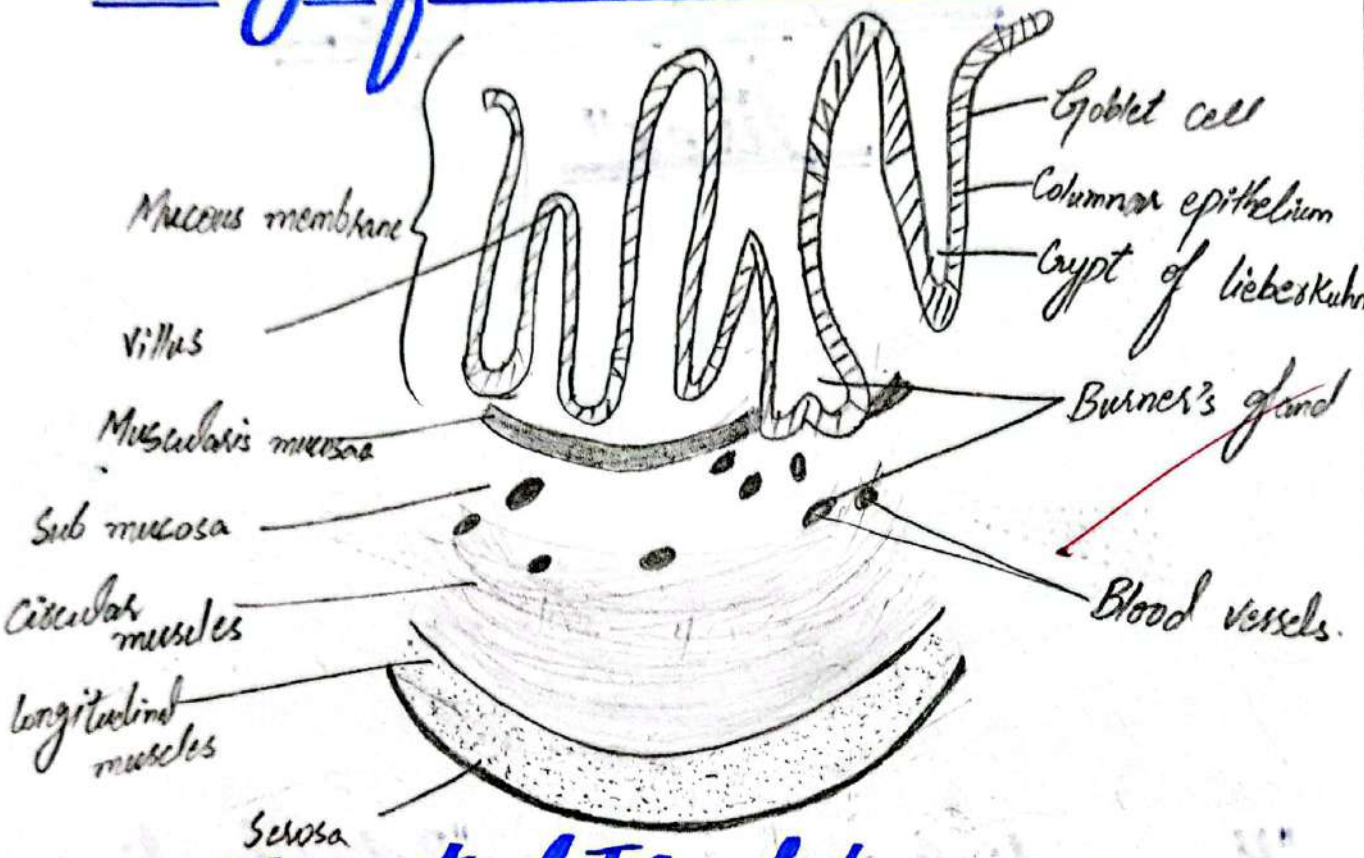
"Human liver, showing one lobule."

"Part of liver lobule (high power)."

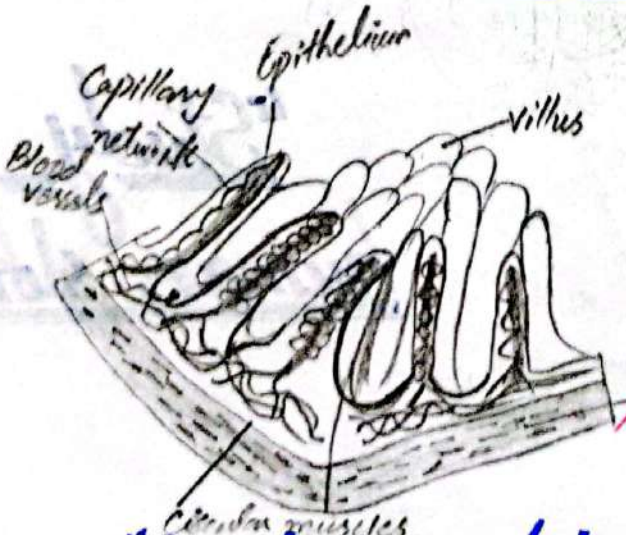


"Study of human stomach."

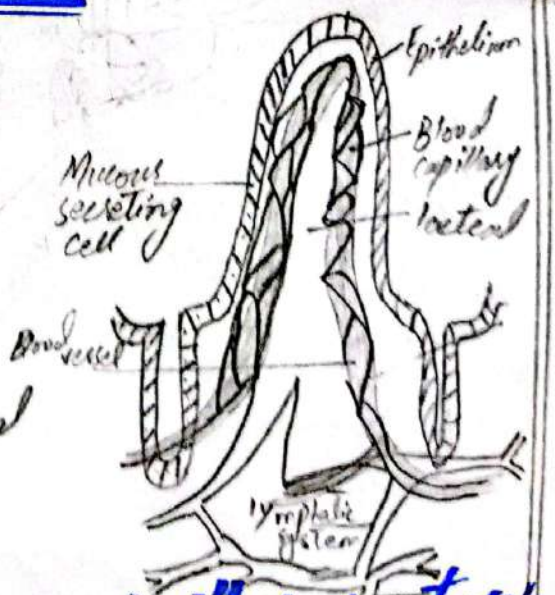
"Study of Small intestine."



"A part of T.S. of human duodenum."

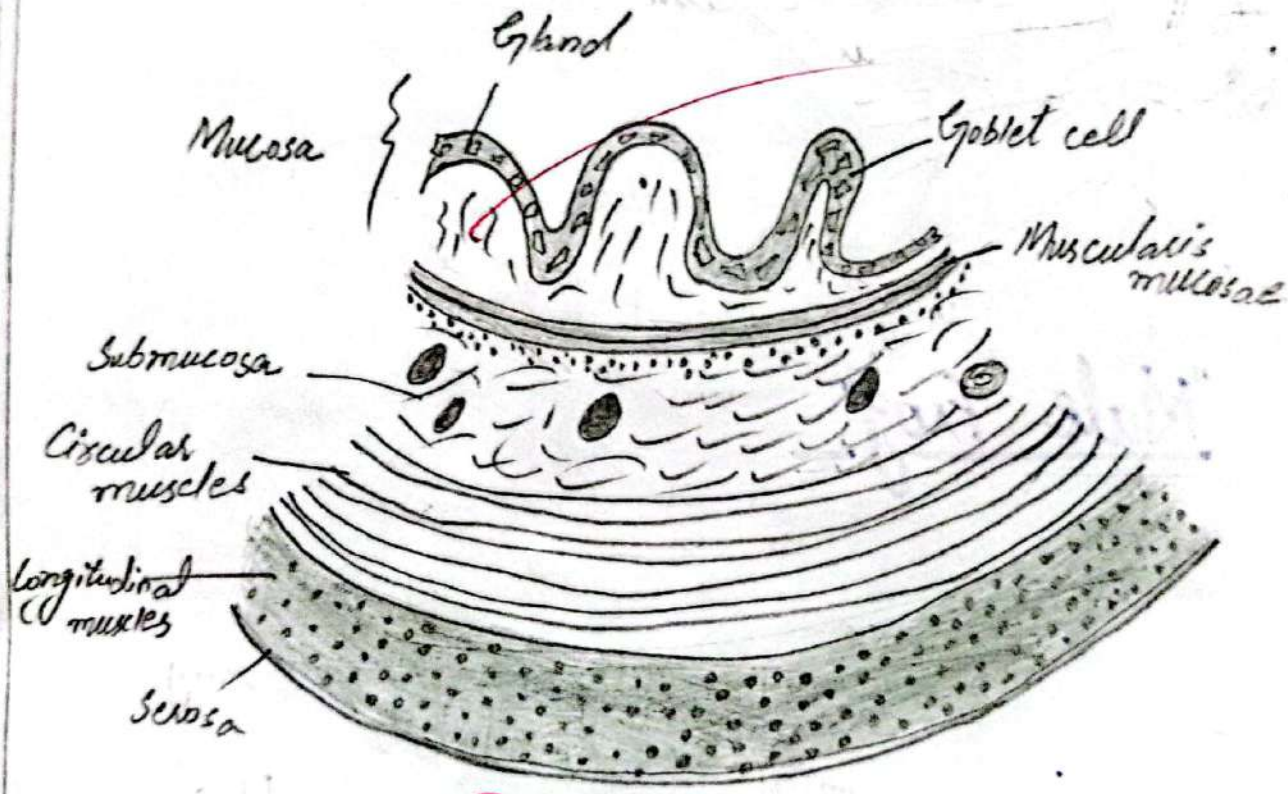


"A part of T.S. of ileum"



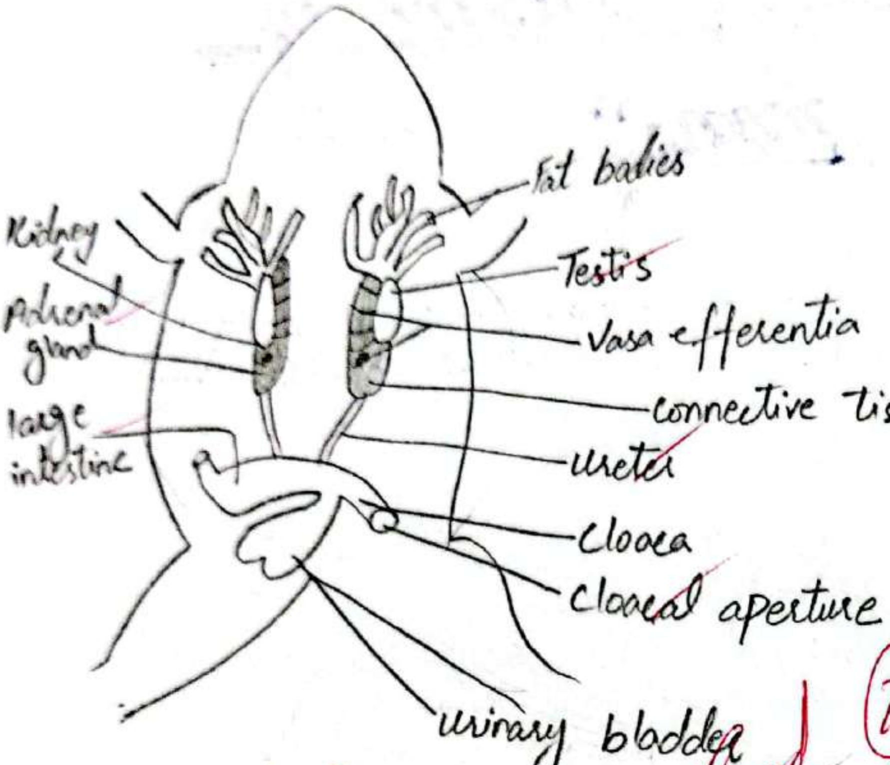
"villus structure"

"Study of large intestine of man."

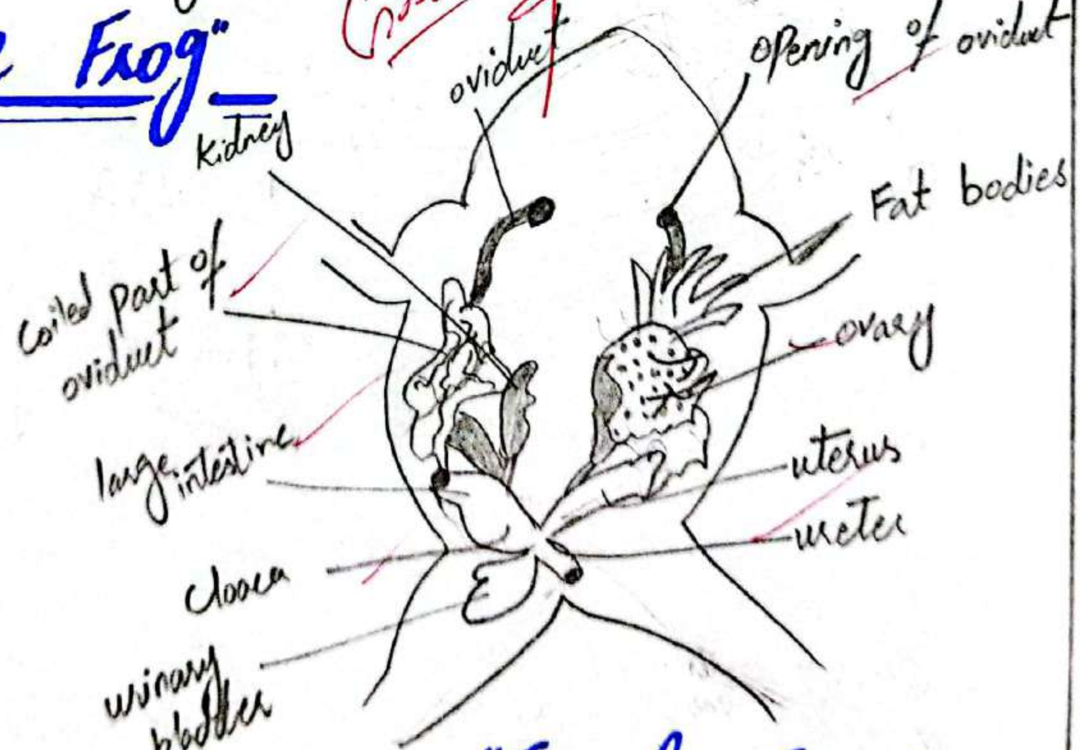


19-08-2023

Experiment # :- "Exposure of urinogenital system of frog"



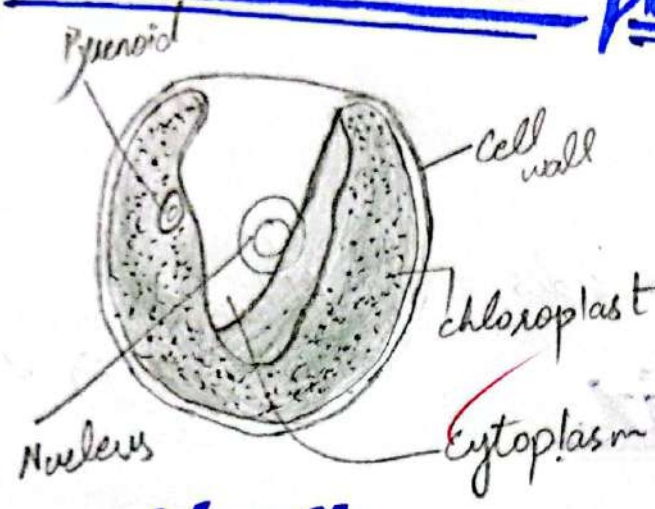
"Male Frog"

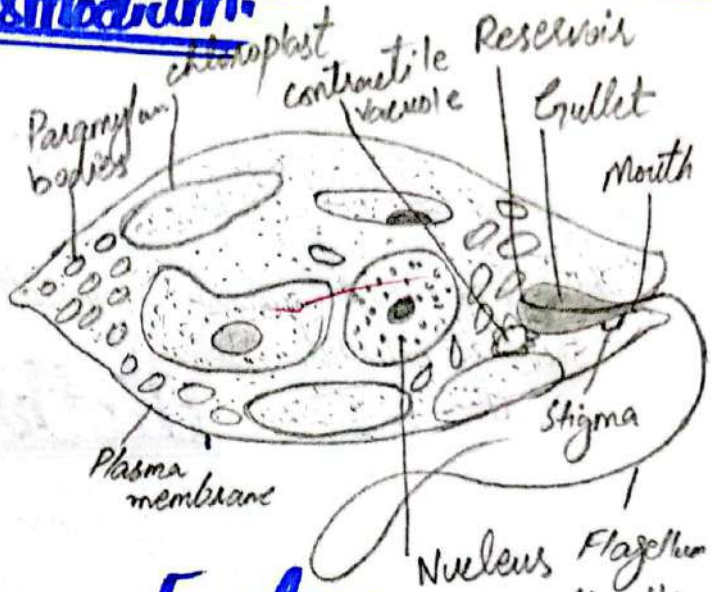


"Female Frog"

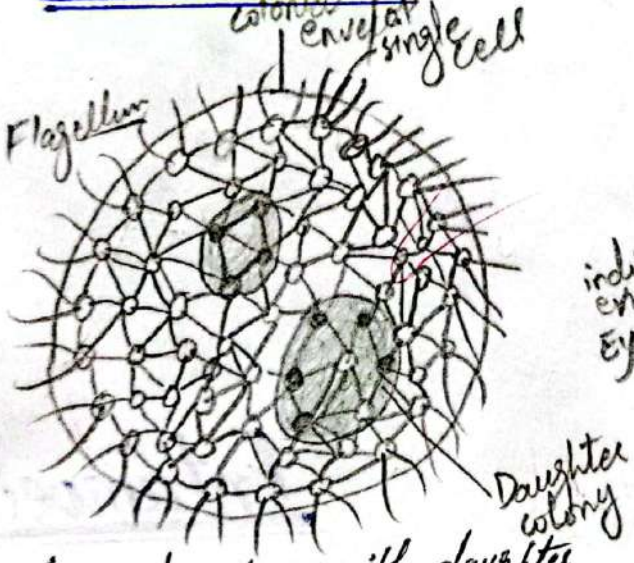
Experiment # :-

"Indentification of chlorella, Euglena, Volvox, ulothrix, Ulva, amoeba, Entamoeba, Paramecium and plasmodium."



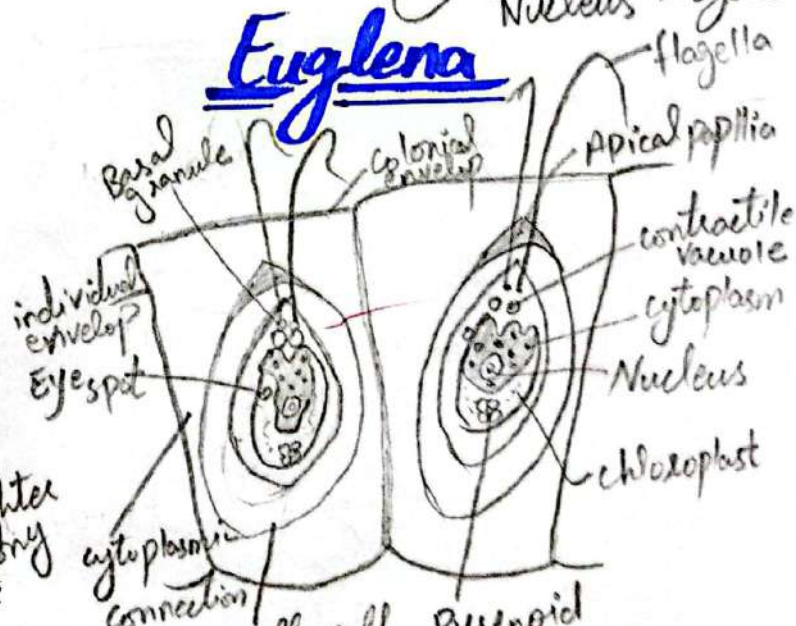


chlorella



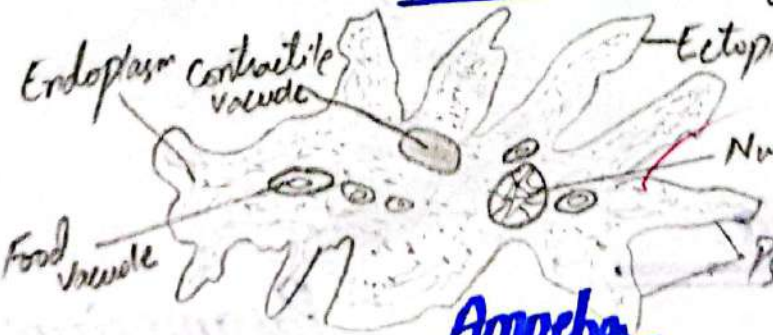
(Parent colony with daughter colonies).

Euglena

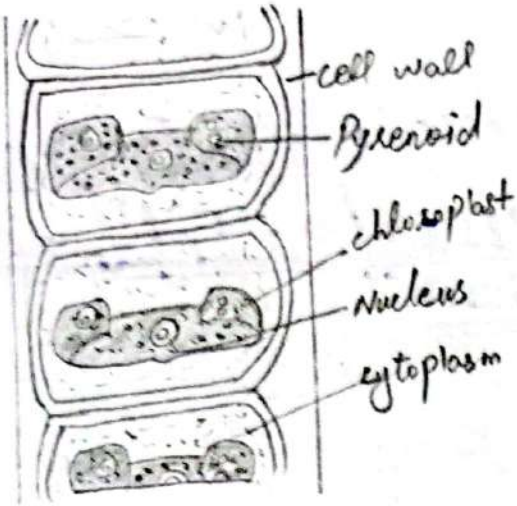


(A part of the colony to show cell arrangment and cell structure).

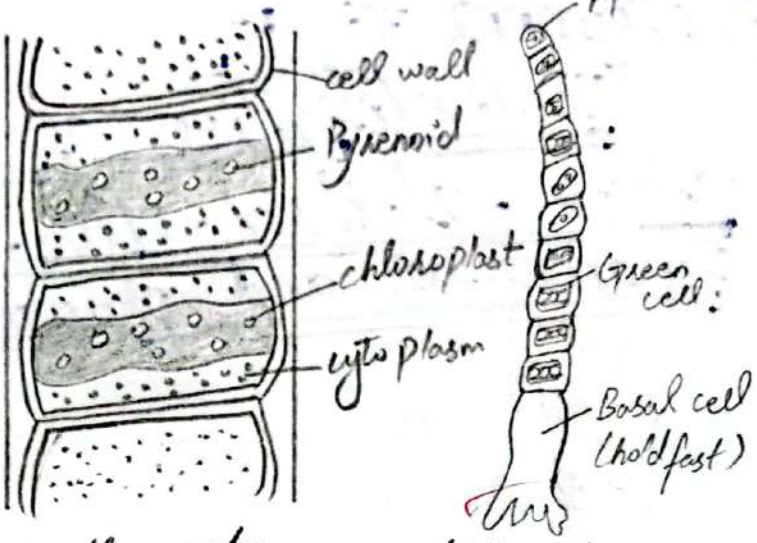
Volvox



Amoeba

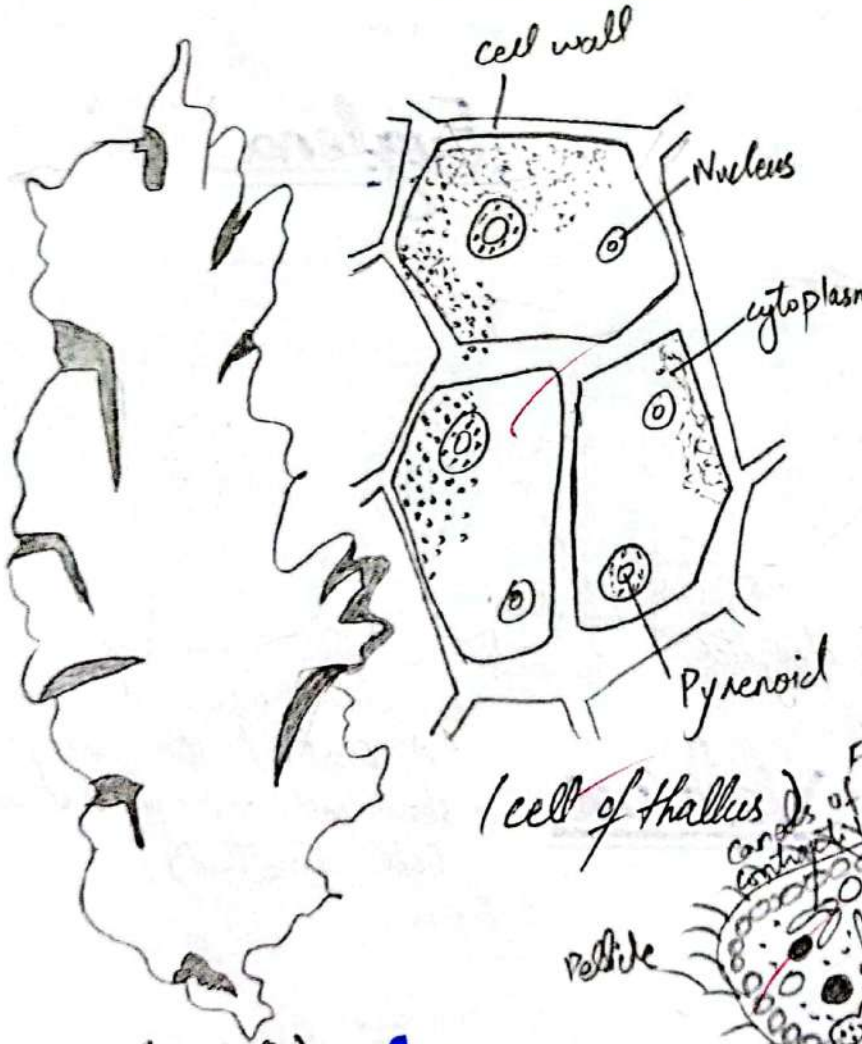


(A single cell viewed from either sides showing internal structures).



(filament showing holdfast).

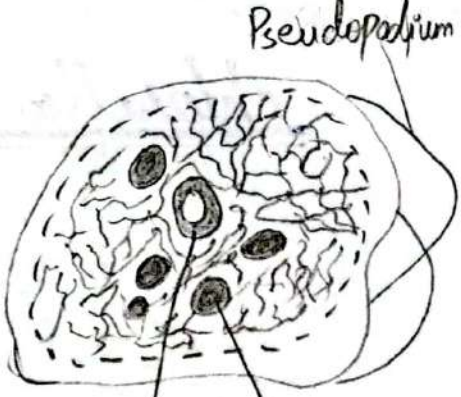
Ulothrix



(cell of thallus)

(A thallus)

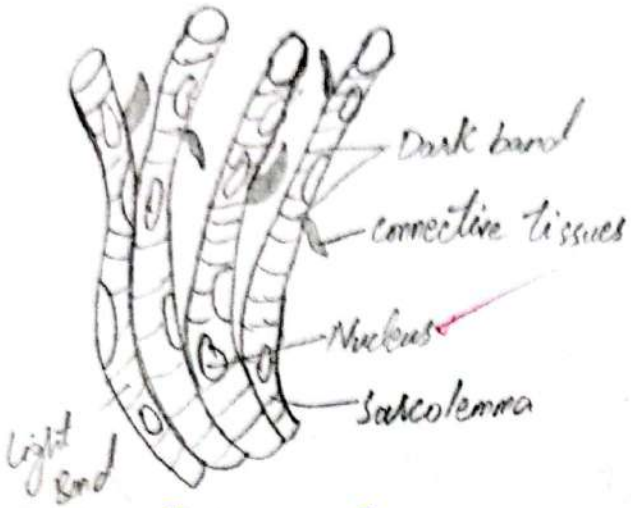
Ulva



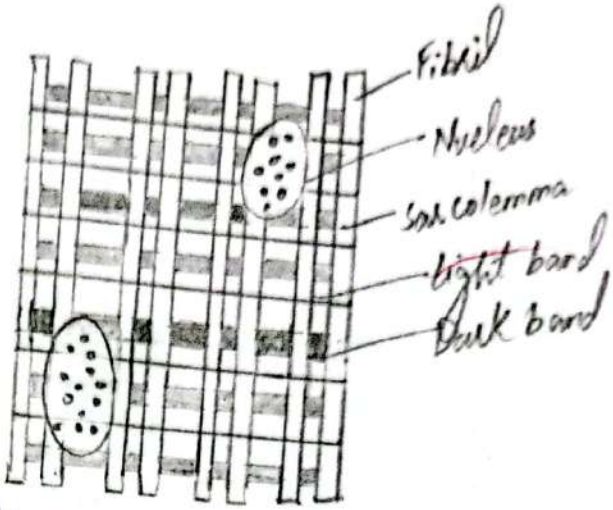
Entamoeba

Paramecium

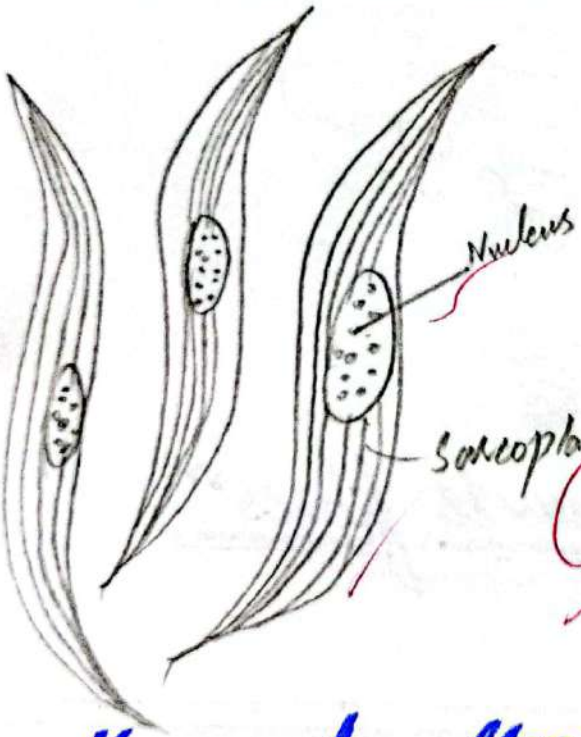
Experiment



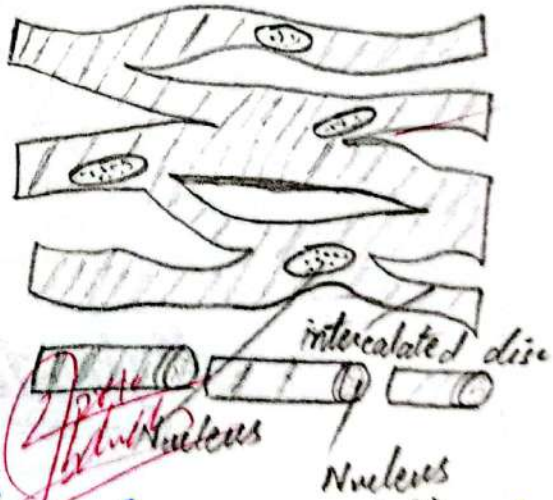
"Skeletal muscle fibres"



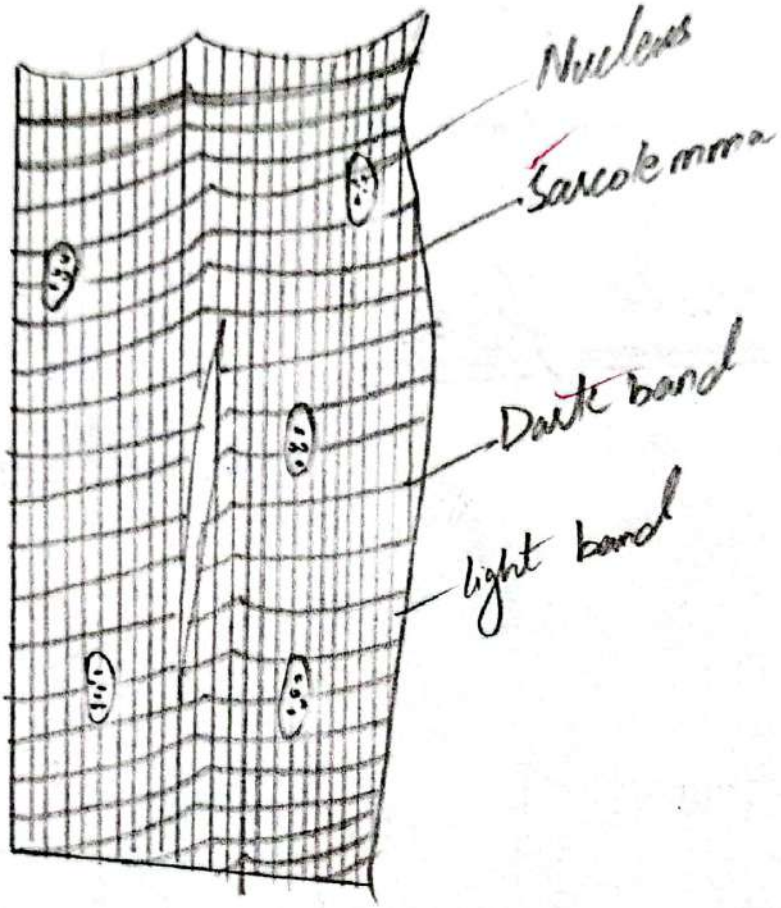
"A striped muscle cell under high power"



"Smooth muscle cells"



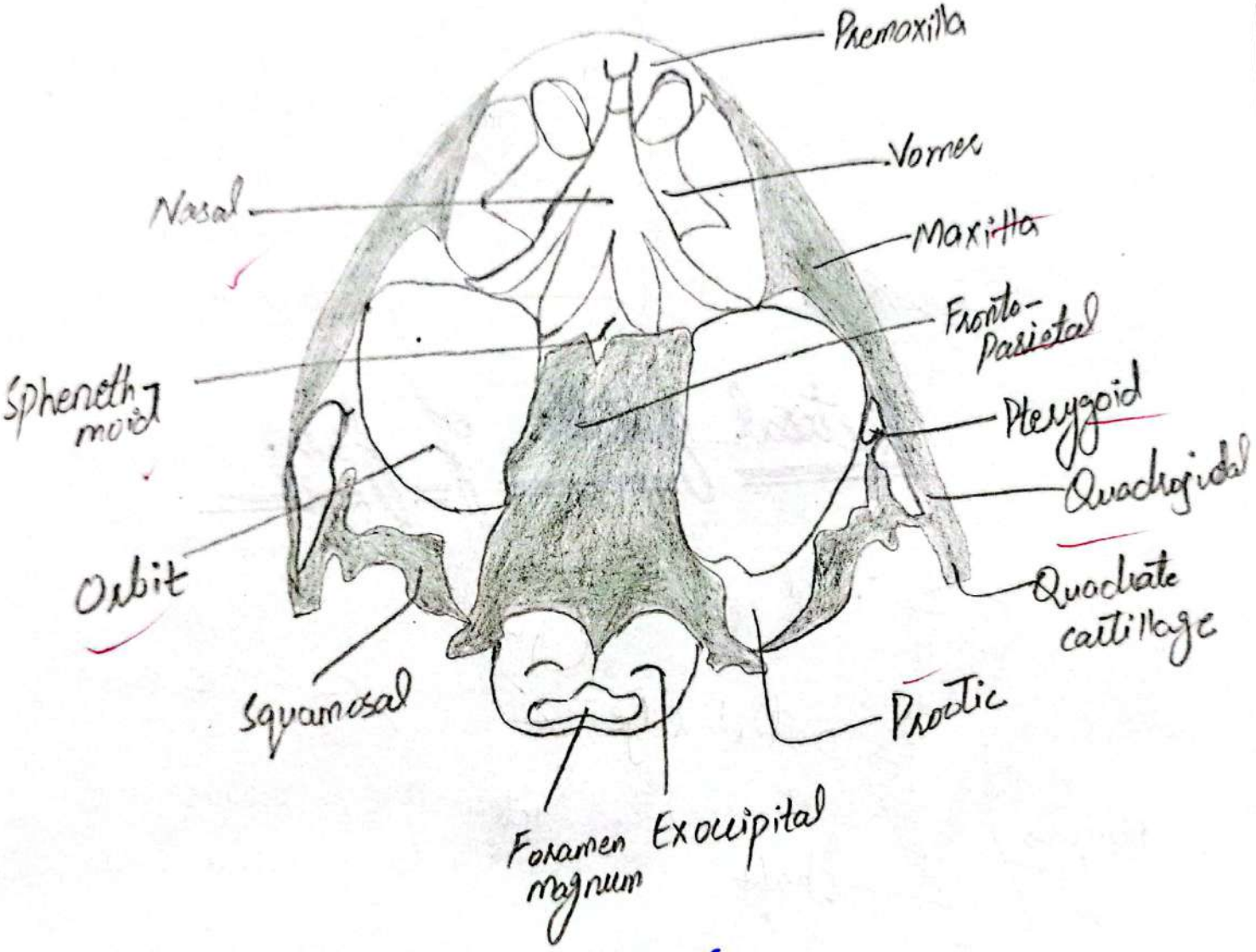
"Cardiac muscle fibres"



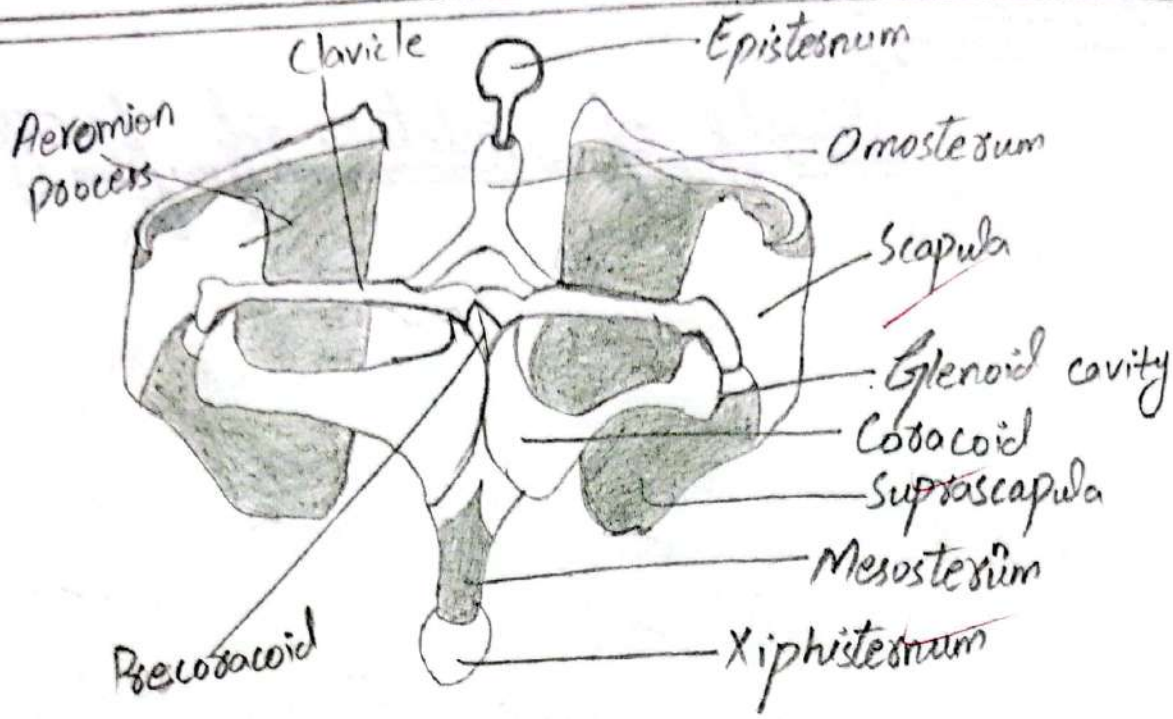
"Striated muscle fibres"

Experiment

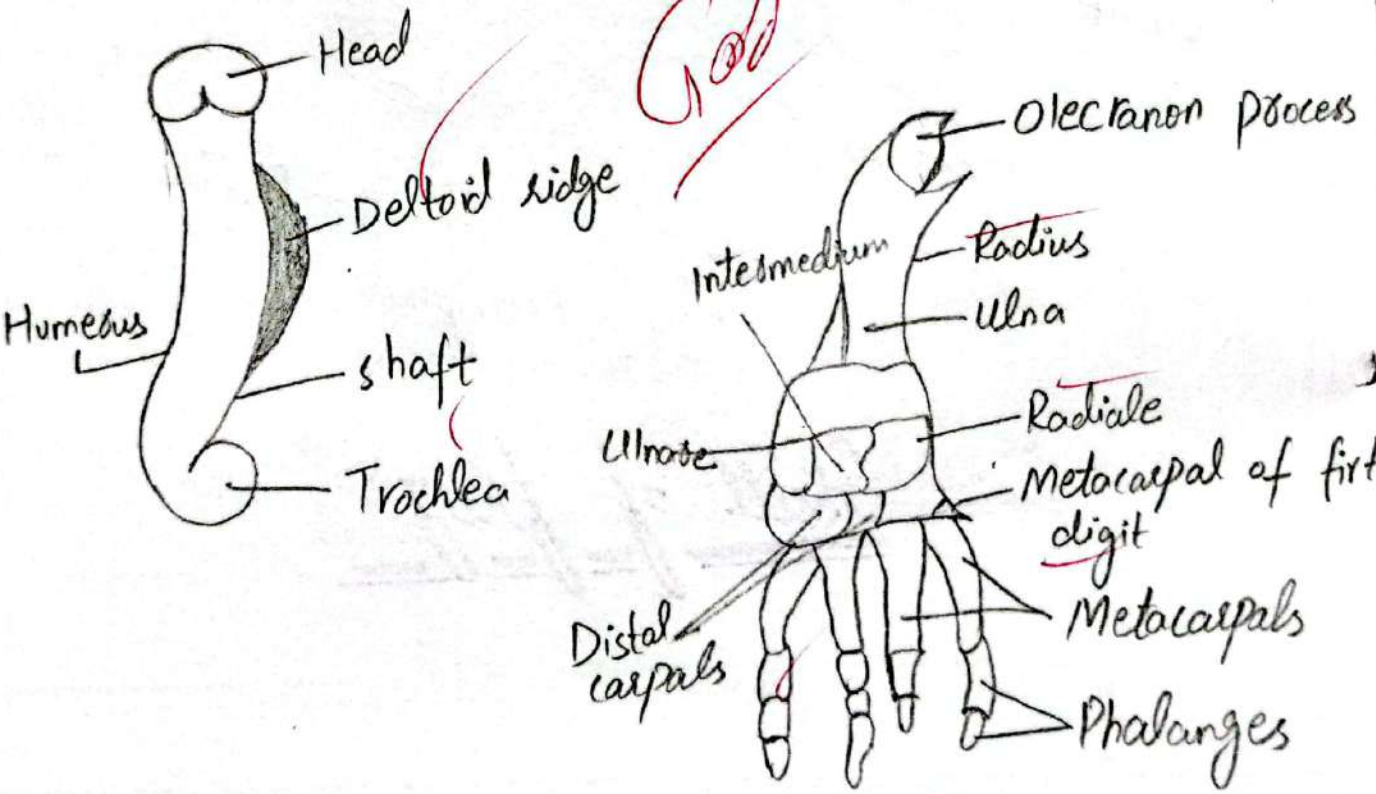
"Study of skeleton of frog"



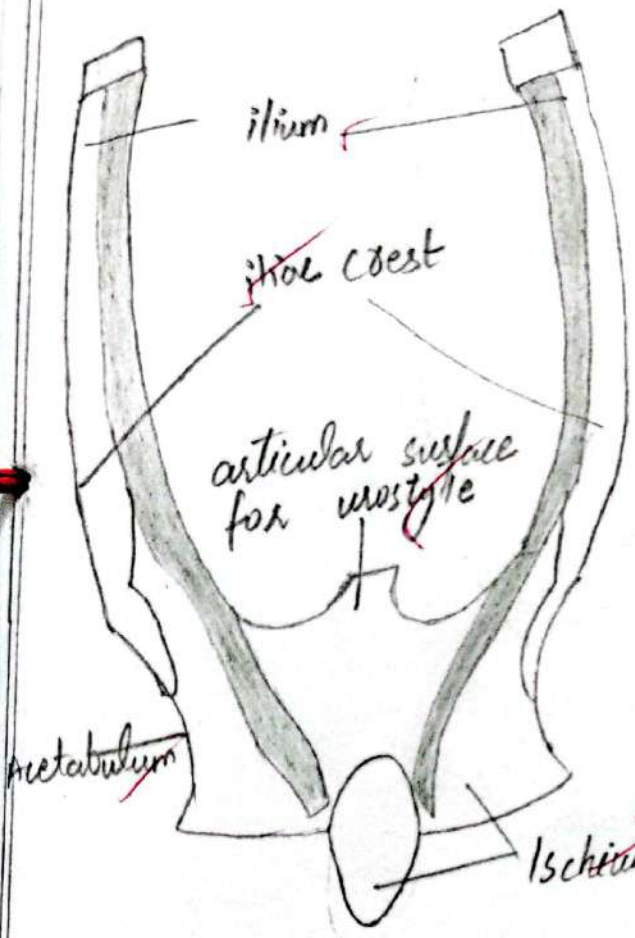
Skull of frog



Pectoral gridle of frog

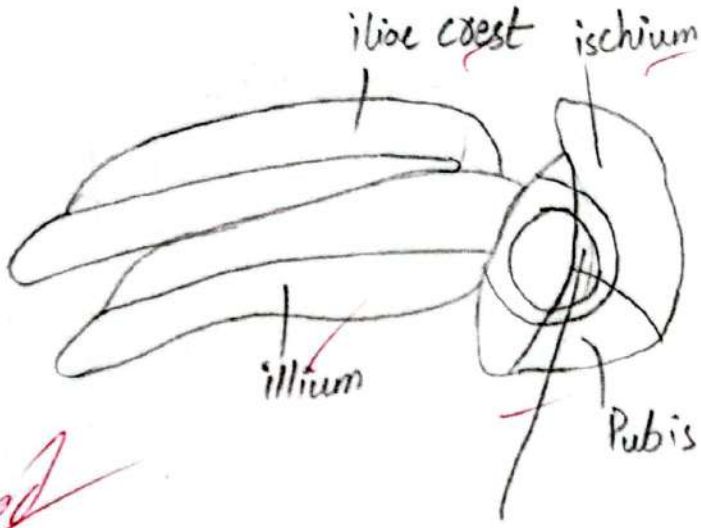


Bones of fore-limb of frog

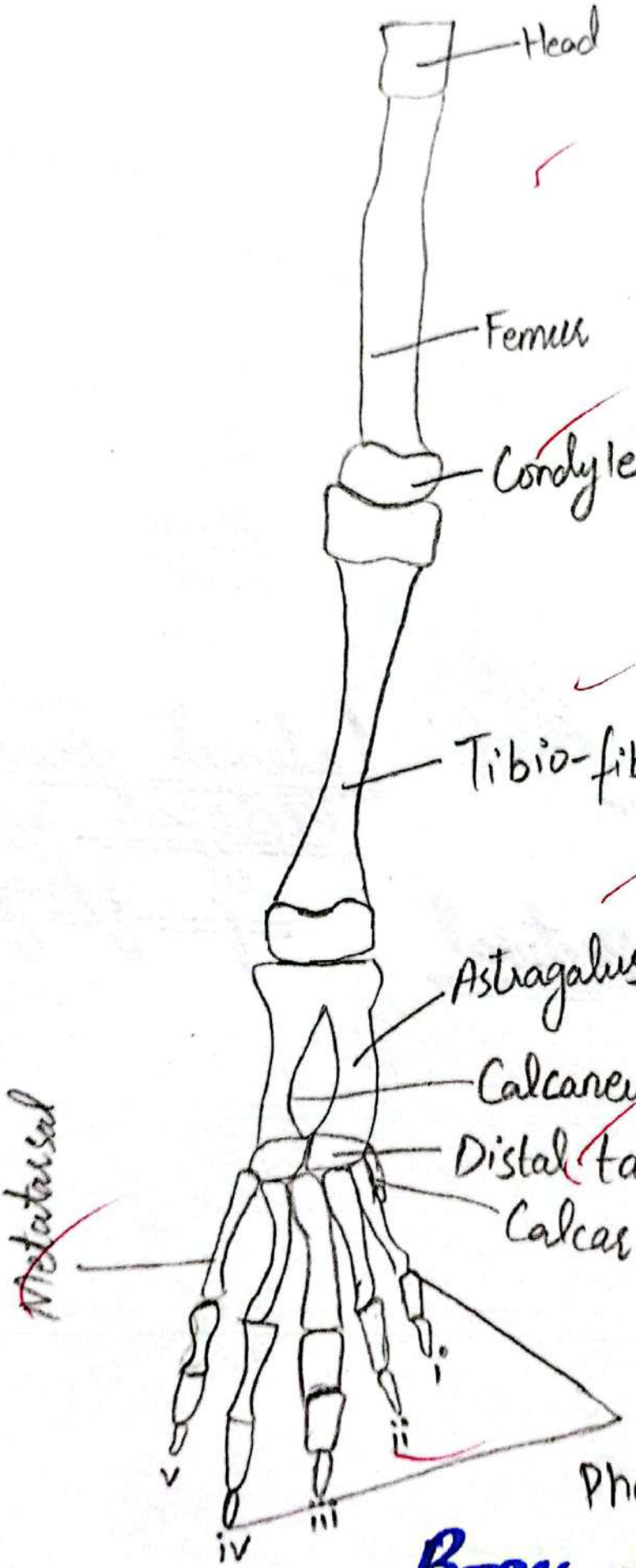


Good

Dorsal view of Pectoral gridle of frog



Lateral view of Pectoral gridle of frog



21-SQ-1vL3

Bones of hind-limb