Date _____

Expt. No. _____ Page No. _____

PRACTICAL RECORDS

[BIOLOGY]

Class – XII Session – .....

Teacher's Signature _____

S. _____ Date _____

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4.	Study of T.S. of Blastula through permanent slide.			
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Date

Experiment No. 01

Experiment Name To study the moisture content of the soil.

Page No. 01

Principles : Moisture content is the quantity of water contained in the soil which depends upon the saturation of soil with water and also on humus. Humus is a colloidal substance which increases cation exchange capacity and hence it has a capacity to store nutrients by chelation. Humus influences the bulk density of soil and contributes to moisture and nutrient retention.

Requirements :

Soil sample, crucible, wire guage, spirit lamp, oven, weighing balance, butter paper etc.

Procedure :

⇒ Small amount of soil from the sample is taken in the dry crucible and weighed.

⇒ It is kept in a hot air oven for half an hour at 105° - 110°C

⇒ Then the crucible with soil is cooled and weighed the dry soil.

⇒ The process is repeated for each soil sample provided.

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Table - 1

S.No	Soil sample	Weight of the soil before heating a gm. Wt ago	Weight of the soil after heating b gm. Final wt.	moisture content (a-b) gm	% of moisture content in soil.
1.	Road-side soil	52 gm	44 gm	8 gm	$\frac{52\text{gm} - 44\text{gm}}{52\text{gm}} \times 100$ $= 15.38\ \%$
2.	Field soil	68 gm	49 gm	19 gm	$\frac{68\text{gm} - 49\text{gm}}{68} \times 100$ $= 27.94\ \%$

Calculation

$$\% \text{ of moisture content} = \frac{a-b}{a} \times 100$$

Observation :

Weight of the soil before and after heating is recorded in the form of the table-1. Greater the difference between initial and final weight of the soil shows higher moisture content in the soil.

Conclusion :

The poor moisture content in the soil sample taken from roadside soil is the characteristic of sandy soil which is not fit for crop cultivation and is deficient in nutrient also.

But the sample taken from crop field has 27.94% of moisture content which is the characteristic of clayey loam soil, having high moisture and nutrient content, suitable for crop cultivation.

Date

Experiment No. 02

Experiment Name To study the pH of different soil samples.

Page No. 03

Principles :

pH of any chemical substance or solution can be the measurement to to specify the acidity or alkalinity of that substance or solution.

pH value below 7 is considered to be acidic while above 7 value specifies the alkalinity.

pH value of soil sample is an important factor that determines the flora and fauna found there and also the variety of microbes present there. The chemical fertilizers farmers usually add to the soil of their crop field, alters the pH value of that soil.

Requirements :

⇒ Soil samples collected from different sites marked as - 'A', 'B' & 'C'

⇒ Distilled water, measuring cylinder (50 ml), dropper, cavity tile, funnel, beaker, funnel stand, narrow and broad range pH paper, Universal pH indicator

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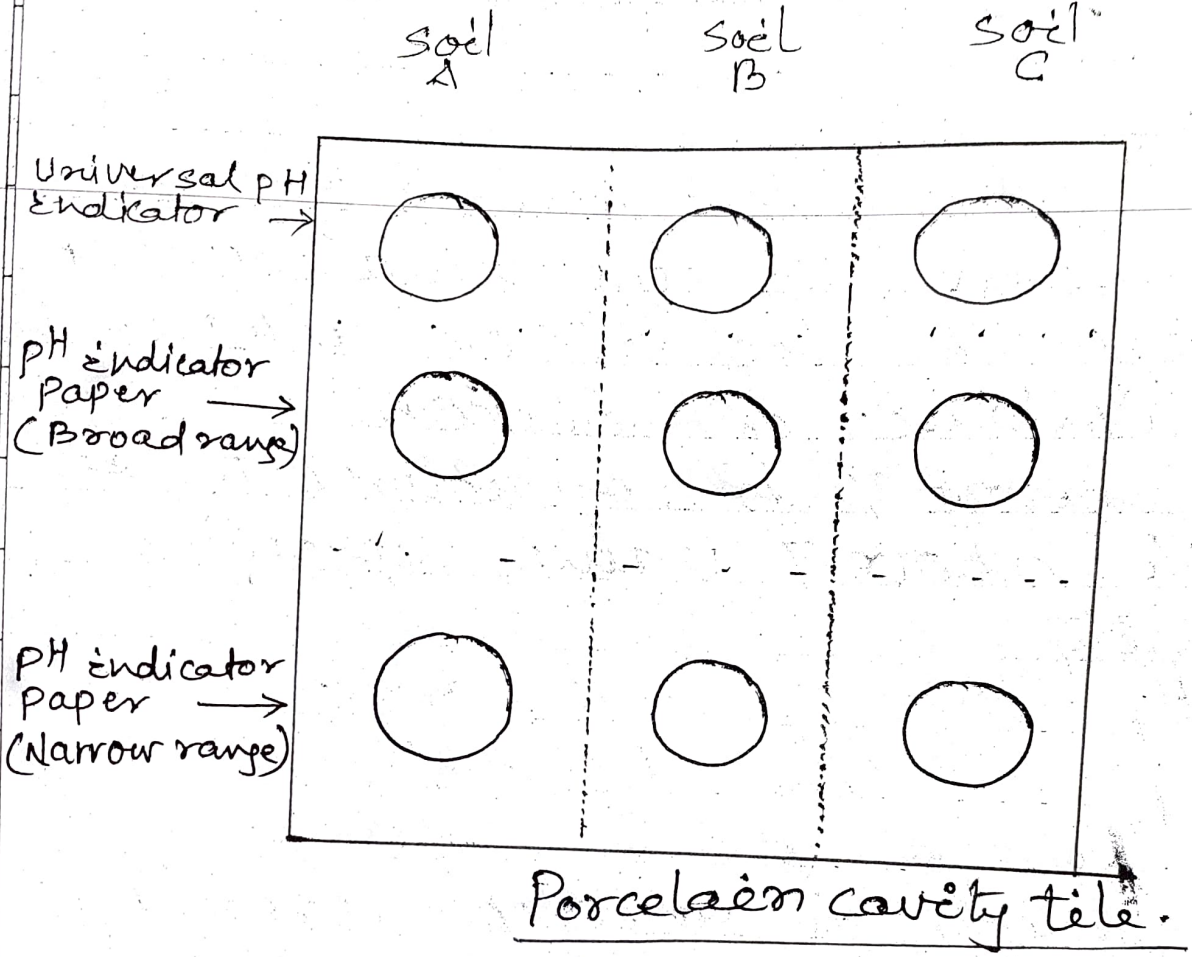
Soil A
Soil B
Soil C
Universal pH indicator
pH indicator Paper (Broad range)
pH indicator Paper (Narrow range)
Porcelain cavity tile.

Fig - 1

weighing balance, filter paper etc.

Procedure :

⇒ 10 gm of soil sample each from 'A', 'B' & 'C' is taken into 3 beakers and adding 50 ml of distilled water in every soil sample, a solution is prepared.

⇒ Each sample solution is filtered through filter paper and collected seperately in three beakers marked 'A', 'B' and 'C'.

⇒ Now the clean, dry, porcelain cavity tile is taken and soil sample (filtered) solution, 5 drops is put into the cavity of porcelain tile as shown in Figure-1.

⇒ Now the 5 drops of universal pH indicator is added to each of the sample solution in the first horizontal row of the cavity of porcelain tile and compared the colourchange by the chart on Universal pH indicator.

⇒ In the second horizontal row of cavities broad range pH paper is put and colour change is observed by Colour chart to judge pH value.

⇒ From the previous step if the pH value is found 8, then narrow range pH paper strip is taken and put into the last ~~horizontal~~ horizontal row of the cavity. The colour change is compared with the colour ~~charg~~ chart to get the nearest value.

Observation :

The above observation is recorded in the table below :

pH value as determined by	Soil samples		
	A	B	C
Universal indicator			
Broad range indicator	8	7	7
Narrow range indicator	7.9	7.2	6.8

Result : pH value finally determined for the given three samples - 'A', 'B' & 'C' are

pH value of A - 7.9
pH value of 'B' - 7.2
pH value of 'C' - 6.8

Date

Experiment No. 03

Experiment Name To study the water holding capacity of the soil

Page No. 06

Principle : Water holding capacity of the soil is referred to as the amount of water retained in the capillary space of the soil. It depends on the capillary pore spaces found in the soil and the type of soil particles found in them.

Requirements :

Soil samples collected from different places (Sandy, clayey and loamy) 250 ml measuring cylinder, crucible, mortar and pestle, sieve, petridish, beaker, microwave oven, glass rod, balance, blotting paper etc.

Procedure :

⇒ Various types of soil from different location is collected.

⇒ Each sample soil is passed through sieve so that the small lumps, decaying leaves and stone pebels could be removed.

⇒ Each sample soil is placed in the microwave oven for drying at 108°c temperature.

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Experiment No.

Experiment Name

Page No. 07

⇒ Each soil sample is ground in pestle and mortar to fine particles.

⇒ A small disc of blotting paper is placed in the base of Gooch crucible and weighed. Weight is recorded as - A gm.

⇒ This crucible is filled with fine soil of a particular type such as sandy, loamy or clayey. With the help of glass rod, the soil is compactly filled and the base of crucible is gently tapped time to time. When crucible is completely filled, it is weighed and recorded as - B gm.

⇒ Now the petridish is filled with water and crucible is placed over the petridish in such a way that the base might keep touching water.

⇒ The whole set up is left undisturbed until water appears on the upper surface of soil in the crucible and the entire surface of the soil wet.

⇒ Crucible is now taken away from petridish so that gravitational water percolates down from the base.

⇒ When water does not percolate down from the base, the base is wiped out to dry out the bottom.

extramarks

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The above process is repeated for Loamy & clayey soil.

Observation : Below is the table to tabulate the result.

	Wt. of Crucible + Filter paper (A) in gm.	Wt. of Crucible + Filterpaper + Soil sample (B) in gm.	Wt. of soil damp i.e. B-A = C in gm.	Wt. of Crucible +Filterpaper +Wet soil D in gm.	Wt. of wet soil D-A= E in gm	Amount of water absorbed. E-C = N gm	% of water holding capacity $\frac{N}{C} \times 100$
(a) Sandy soil	85 gm	165 gm	80 gm	174 gm	89 gm	9 gm	11.25 %
(b) Loamy Soil	87 gm	179 gm	92 gm	201 gm	114 gm	22 gm	23.91 %
(c) Clayey soil	86	186	100 gm	212 gm	126 gm	26 gm	26 %

Date

Experiment No. 04

Experiment Name To study the T.S. of blastula through permanent slide.

Page No. 09

Principle : Sexually reproducing males and females produce haploid gametes which fuse to form zygote. This undergoes repeated division and gradual change in it. In 32-64 celled stage reaches to uterus of female where it gets implanted in the spongy endometrium and starts drawing nutrition from the maternal blood supply. Here the structure that has already implanted develops a new feature due to shifting of cells. The spherical structure has a layer of cells all around and a big mass of cells at a particular site. Above this mass of cells an empty space is formed which is called Blastocoel. The peripheral cells are called Trophoblast and the localised cellular mass is called Blastomere.

Requirement : Permanent slide of T.S. of blastula, compound microscope, lense cleansing fluid, paper, pencil and eraser.

Procedure : A permanent slide of T.S. of blastula is taken and fixed on the stage of

extramarks

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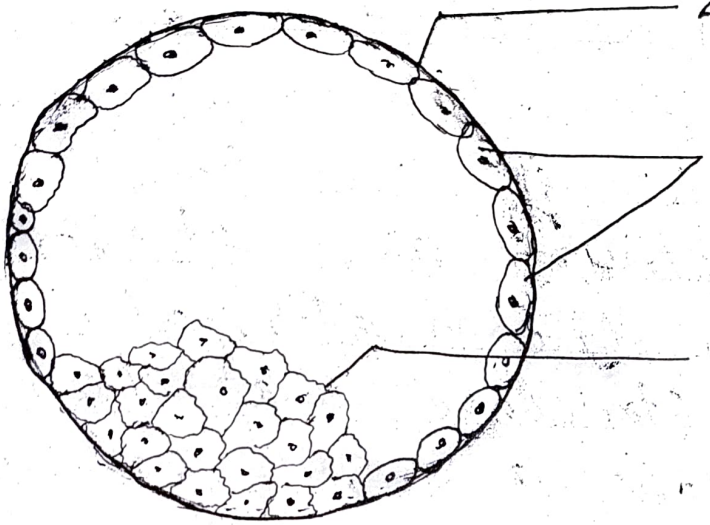

T.S. of Blastula

the microscope.
With the help of coarse adjustment and fine adjustment the slide is taken under sharp focus to be viewed clearly.

Observation : Following are features observed under compound microscope :

⇒ A spherical shaped mass of cells is observed.
⇒ Outermost layer is zona pellucida and below this single layered row of cells called - Trophoblast.
⇒ Below this a fluid filled cavity called blastocoel
⇒ A cellular mass is observed which are blastomeres.

Conclusion : The observed features is the clear cut picture of blastula stage.

Date

Experiment No. 05

Experiment Name Preparation of temporary mount of onion root tip to study mitosis.

Page No. 11

Principle : Body of all the plants and animals grow in size by the increase in number of cells of the body. New cells in the body are produced by the pre-existing cells. In a mitotic division nucleus of the cell divides first followed by the division of cytoplasm and thus a mother cell after division forms two daughter cells. The division of cell in plant body takes place in meristematic zone. Hence to study mitosis onion root tip cells are taken.

Requirement : Onion bulb, wide mouthed bottle, corked tube, petridishes, forcep, scissors, needle, methyl alcohol, Acetic acid, N/10 HCl, acetocarmine, distilled water, spirit lamp, compound microscope, slide glass, cover slip, glycerine, blotting paper etc.

Procedure : Onion bulb kept over water filled wide mouthed bottle is allowed to grow fresh roots.

⇒ 2-3 cm long freshly grown roots are cut two hours after sunrise and kept in the fixative [Glacial acetic acid and ethanol in a ratio 1:3] for 24 hours.

extramarks

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⇒ After 24 hours roots are transferred from fixative to 70% alcohol.

Slide preparation :

⇒ Roots from 70% alcohol is taken out after an hour and washed by clean water thoroughly.

⇒ One or two drops of N/10 HCl is put over the root tip and 2-3 drops of acetocarmine is put on the root tip. Now the material is left as it is for 5-10 minutes.

⇒ Slide is then gently warmed and care is taken that stain might not dry up.

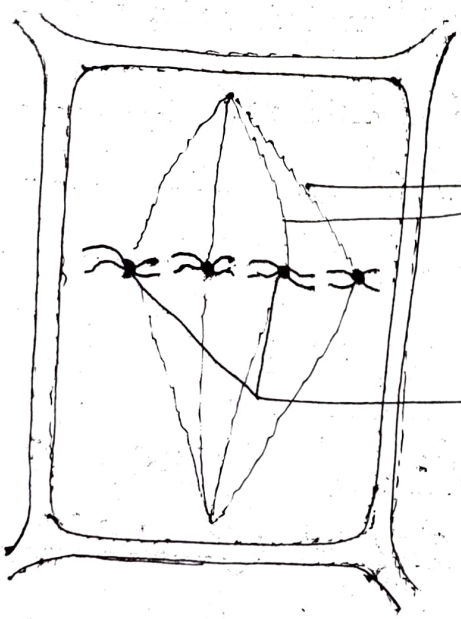
⇒ Excess of stain is soaked by blotting paper.

⇒ Tip of the root is cut and retained on the slide glass and remaining portion is discarded.

⇒ A drop of glycerin is put over the material and carefully covered by cover slip so that no air bubble remains in the cover slip.

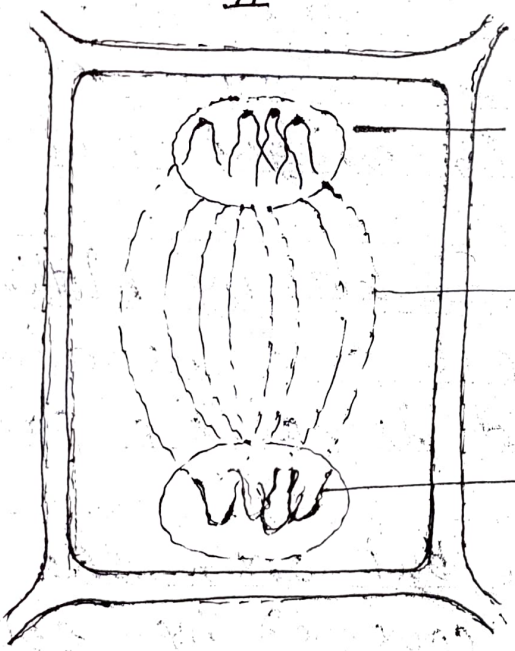
⇒ Using thumb or blunt end of pencil it is tapped and smeared so that a thin layer spreads under cover slip.

I



Metaphase stage

II



Telophase stage

⇒ Slide glass is gently warmed up on the spirit lamp and cover slip is sealed all around its margin by molten wax.

⇒ The material is now ready for microscopic observation.

Observation : I

⇒ No nucleus like structure appears.

⇒ Thick and short chromosomes are distinctly visible, arraged at the equatorial plate.

⇒ Spindle fibres are found attached with the centromere of chromosomes.

⇒ These all features are the clear cut proof that the metaphase stage of mitosis is obviously observed.

II

⇒ Reappearing nuclear membrane at opposite pole inside the cell.

⇒ Each chromosome split longitudinally into chromatids, shifted to opposite poles and got enclosed within newly formed nuclear membrane.

This view is the is the clear cut indication of Telophase stage of mitosis.

Date

Experiment No. 06

Experiment Name To isolate DNA from the plant cell of Papaya

Page No. 14

Principle : Isolation of DNA requires to to make it available in pure form for the procen of genetic engineering. It is mostly present in the nucleus associated with histone protein in eukaryotic cell. The suitable plant material for isolation of DNA are cauliflower or immature pea seeds where lot of meristematic cells can be found.

Requirements :
Green immature pea seeds, Pestle & mortar, strainer, Beaker, glass rod, liquid detergent common salt, Needle, petridish, Ethanol etc.

Procedure : 60-70 gm of pea seeds are taken in the pestle and crushed finely. With the help of ~~st~~ fine mesh

Procedure :
⇒ With the help of pestle and mortar the pea seeds are finely crush. Little water is added to it and crushing is continued until

extramarks

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it is finely crushed and appears like paste.

⇒ Sufficient quantity of water is added to this paste so that a suspension of pea seed paste and water is obtained.

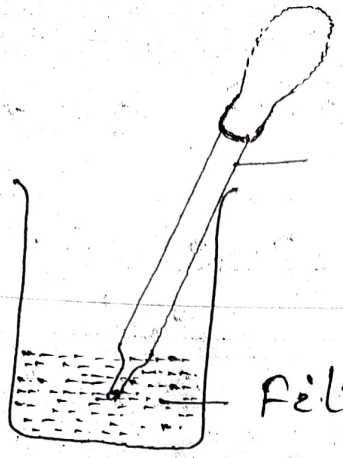
⇒ It is then filtered by fine mesh strainer so that coarse fragments of seed can be removed and filterate obtained is kept for further use.

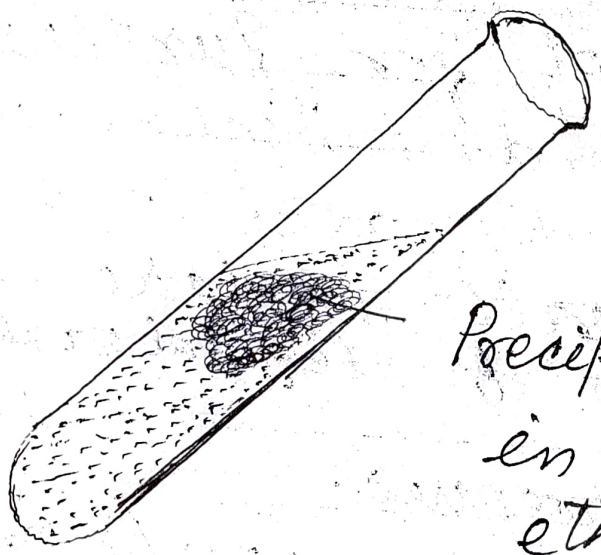
⇒ In a clean dry beaker 3-4 ml of liquid wash and 2-3 spoon of common salt is taken. Adding water a solution of liquid wash and common salt is prepared.

⇒ In a clean beaker nearly 25-30 ml ethanol is taken and placed in a refrigerator for cooling.

⇒ The filterate kept for further use is slowly poor poured into the solution of liquid wash and common salt, ~~continue~~ continuously stirred and gently heated for 5-7 minutes and cooled.

⇒ Lastly the chilled ethanol is added slowly into the it. With the help of


Dropper
Filtrate of plant material


Precipitated DNA
in chilled
ethanol

needle the precipitated DNA pushed towards the precipitated threads of DNA.

Observation : Shiny white DNA can be seen when chilled ethanol is added to the treated plant material. DNA is precipitated due to chemical treatment of plant material.

Result : DNA appears as white precipitate in the form of fine threads.

Precautions :

⇒ Fresh plant material should be used.
⇒ Properly clean and dry glassware should be used.
⇒ Chemicals used for the experiment should be of standard quality.

Date

Experiment No. 07

Experiment Name To study animals and plants found aquatic and xerophytic conditions and their adaptation.

Page No. 17

Principles : Plants and animals exhibit various adaptations to cope with the environmental stress. Adaptations are heritable and useful changes at morphological, anatomical, physiological and behavioural level.

Requirement :

Aquatic plant – Eichhornia crassipes

Aquatic animal – Labeo rohita

Eichhornia crassipes [Water hyacinth]

Habit

⇒ It is an aquatic perennial flowering plant.

⇒ Grows in freshwater ponds, rivers and ditches.

Characteristics :

⇒ Stem is offset, spongy and store air.

⇒ Leaves are covered with water proof waxy coating

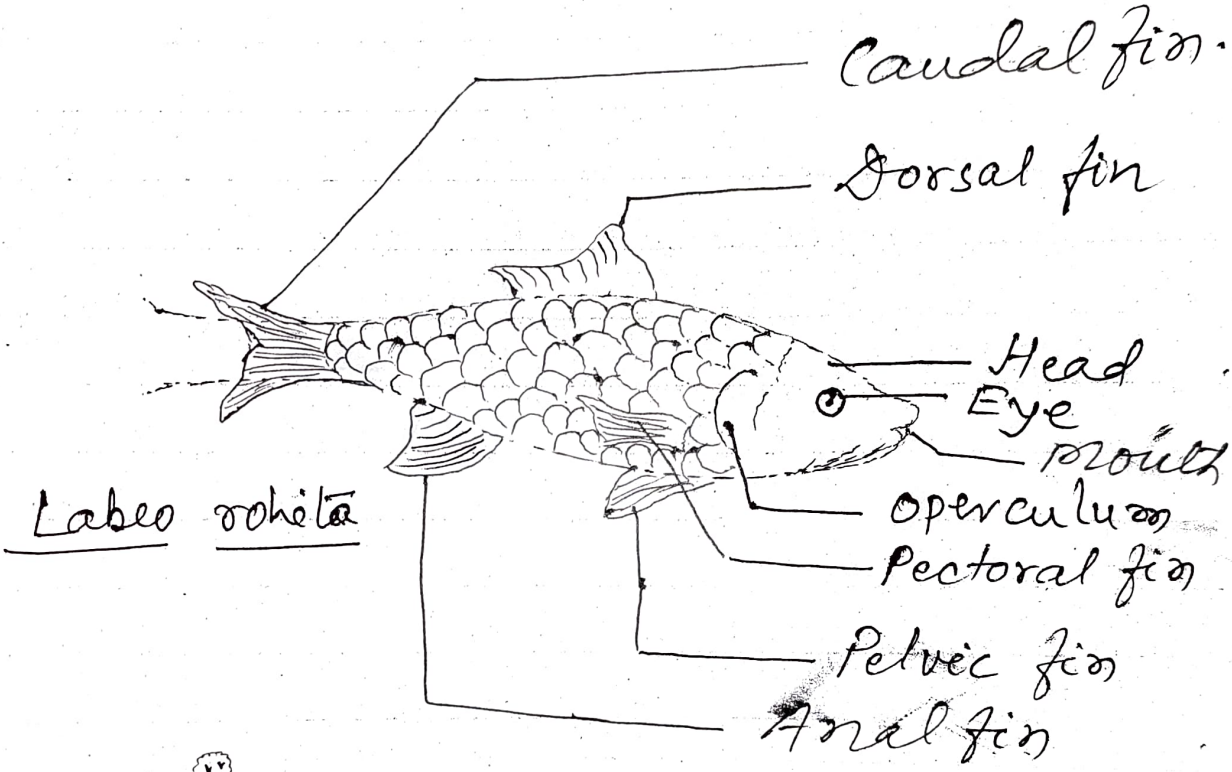
⇒ Petiole is spongy and modified to store air.

extramarks

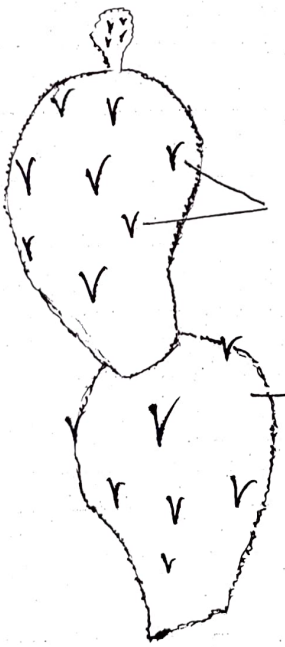
Teacher's Signature:

Eichhornia Plant

⇒ Root system is poorly developed to keep the plant free floating.



Labeo rohita



Opuntia dillenii

Date _____

Expt. No. _____

- Labeo rohita

Characteristics

⇒ Streamlined, laterally pressed body with fins that allow them to swim and change direction in water.

⇒ Gills are essential organs facilitating them to breath inside water.

⇒ Impermeable scales cover the whole body

Opuntia dillenii

Characteristics

⇒ Stem is modified into thick, succulent green phylloclade having water storage tissue and perform photosynthesis.
[This indicates a xerophytic adaptation]

⇒ Leaves are modified into spines to reduce transpiration. [Way to conserve water]

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Expt. No. 08 Date

Page No. 20

Study of Pollen germination in the laboratory.

Principles: Pollens germinate on the stigma of the pistil but in a laboratory pollen grains can germinate in a chemical medium also.

Material required: Mature anther of the flower, sugar, distilled water, Boric acid, Slide, Cover glass, Microscope, Séfranin etc.

Procedure ⇒ 15% sugar solution can be prepared in distilled water by adding 15 gm of sugar in 85 gram distilled water.

⇒ A pinch of Boric acid is added to this solution.

⇒ Anthers are burshed and pollen grain is dusted on the slide glass duly adding Sefranin

⇒ One or two drop of solution previously prepared is put over the slide glass.

⇒ Pollen grains are allowed to germinate on the pollen slide glass which left undisturbed for 15 – 20 minutes.

⇒ Cover slip is put over the drop where pollen grains is floating over it.

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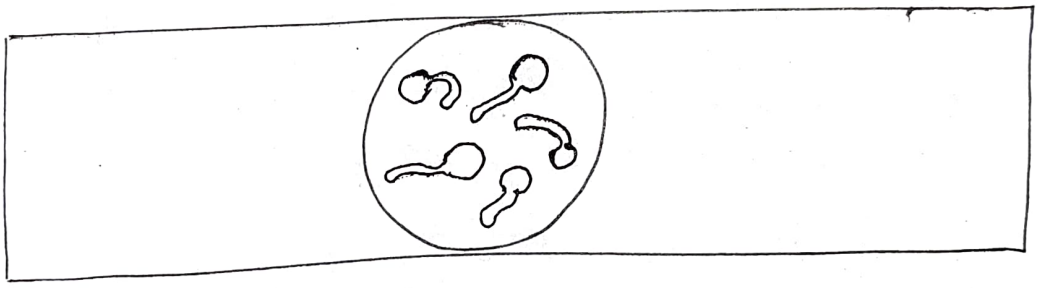

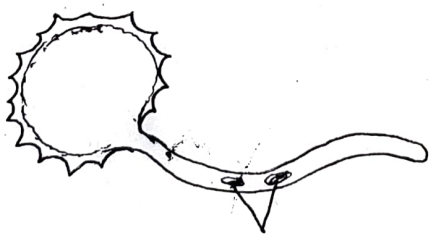

Male gamete
inside the pollen tube

⇒ Now the slide is put on the stage of microscope.

OBSERVATION:

⇒ Many pollen grains on the slide glass are seen to have produced the tube like structure under microscopic observation.

Teacher's Signature

Date _____

Expt. No. _____ Page No. _____

RSM Public School, Supaul

Project Work

Name of the Student

Roll No .....

Session - .....

Field investigatory
Report on —

"INDUSTRIAL MICROBIOLOGY"

Guide Teacher

Signature of Head of
the institution.

Teacher's Signature _____

Date

Expt. No. _____ Page No. 1

Speciality of Microbes :

⇒ Microbes possess a wide variety of enzymes to make a large array of chemical conversion possible.

⇒ They have a very high metabolic rate and hence a large number of chemical conversion at a very quick rate is made possible.

⇒ They possess a large surface area for quick absorption of required chemicals and release of end products.

⇒ They multiply at a high rate and shortly form a very big ~~colog~~ colony.

⇒ They can be easily cultivated and have genetic stability due to infrequent mutation.

⇒ They can be grown without incurring high cost as they use many industrial by products as their metabolic substrate.

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Microbes	Industrial chemicals they produce.
Saccharomyces cerevisiae	— Ethanol.
Clostridium acetobutylicum	— Acetone / Butanol.
Aspergillus niger	— Citric acid.

Enzymes

Aspergillus oryzae	— Amylase
" niger	— Glucoamylase
Trichoderma reesei	— Cellulase
Saccharomyces cerevisiae	— Invertase.
Saccharomyces lipolytica	— Lipase.
Aspergillus	— Pectinase & Protease
Mucor pussilus	— Microbial rennet.

Vitamins

Ashbya gossypi	— Riboflavin
Pseudomonas denitrificans	— Vit B_{12}
Propionibacterium shermanii	— Vit B_{12}

Teacher's Signature

Date

Expt. No.

Pharmaceuticals

Penicillium chrysogenum	— Penicillin
Cephalosporium acremonium	— Cephalosporin.
Streptomyces	— Amphotericin
"	— Neomycin
"	— streptomycin
"	— Tetracyclin & others
E. Coli	— Insulin, Human growth hormone, somatostatin, Interferon (Using recombinant DNA technology.)
Rhizopus nigricans, Arthrobacter simplex, mycobacterium.	— steroid transformation.
Bacillus brevis	— Gramicidin S
B. subtilis	— Bacitracin
B. Polymyxa	— Polymyxin B.

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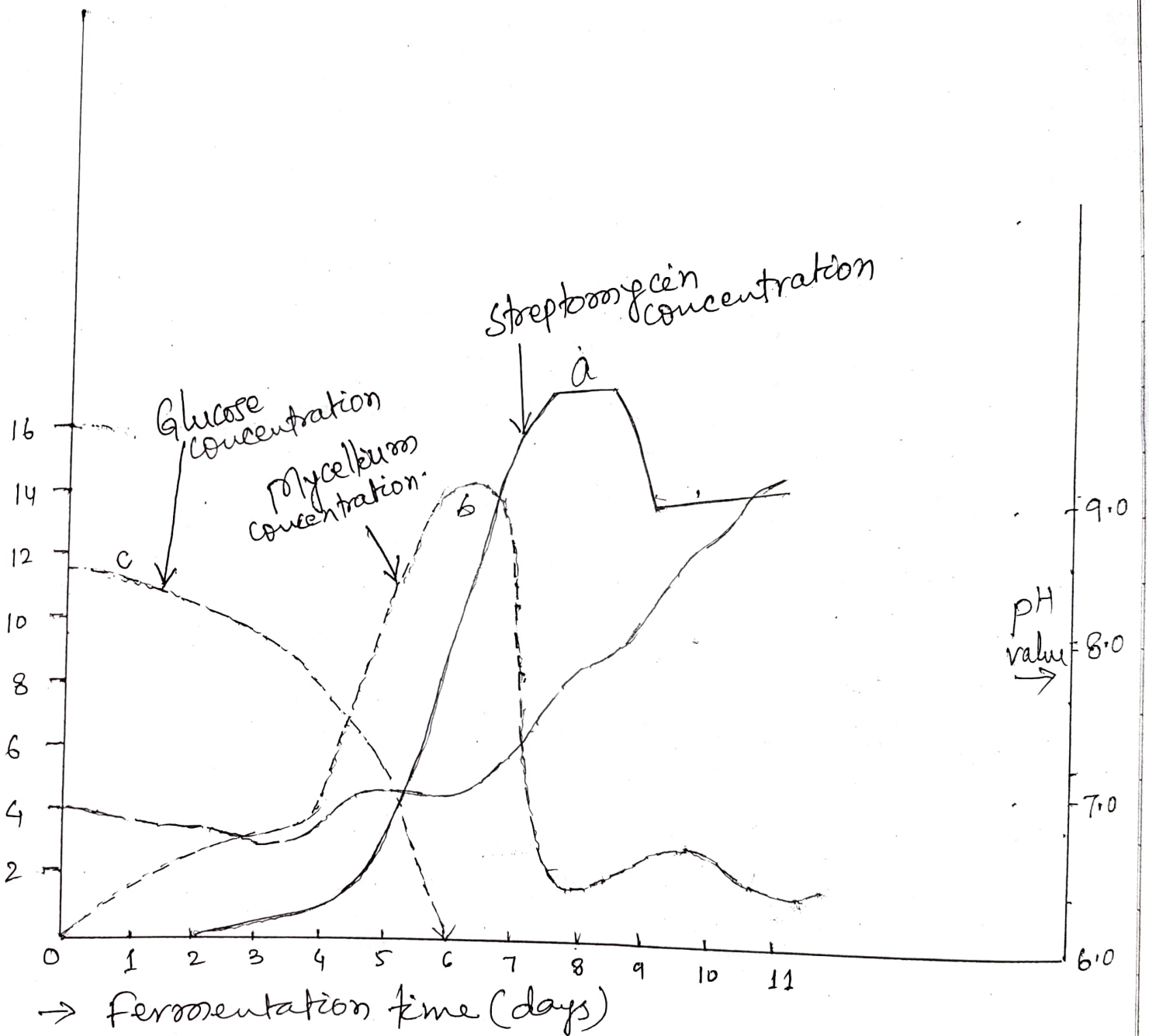

Graphical representation of streptomycin production process.