

Puspa Shrestha

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(Based on Updated Curriculum 2077)

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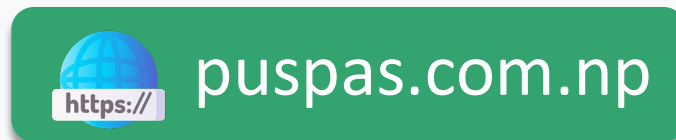


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BOTANY

PRACTICAL NOTEBOOK



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Class 11th Sub. Biology
School Sunil College

Name of the Institute

Laboratory Certificate

This is to certify that Smt./Sri _____
_____ has satisfactorily completed the
course of experiments in practical _____ prescribed
by the _____
_____ course in the Laboratory of this
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BOTANY

Practical NOTEBOOK



NAME Dinesh Shrestha
 CLASS 11 SEC. Germanium
 SUBJECT Biology [Botany]
 SCHOOL Sushma Godawari



Differences between dorsiventral and isobilateral leaf

Dorsiventral Leaf	Isobilateral Leaf
1. Cuticle of upper epidermis than lower epidermis	Cuticle of both epidermal layers are equally thick
2. Stomata are found in lower epidermis only.	Stomata are found on both (upper and lower) epidermal layers equally
3. Mesophyll is differentiated into upper palisade and lower spongy layer	Mesophyll is differentiated into palisade and spongy layer whole mesophyll contains spongy parenchyma of chlorenchymatous cells.
4. Intercellular spaces in between spongy parenchyma cells are larger than isobilateral leaf.	Intercellular spaces between spongy parenchyma cells are smaller than dorsiventral leaf.
5. Vascular bundle has sclerenchymatous cells on upper side only.	Vascular bundle has sclerenchymatous cells on both (upper and lower) sides
6. The Xylem is linear	Xylem is V-shaped

THE PLANT KINGDOM (KINGDOM-PHYTA)

Sub-Kingdom-A THALLOPHYTA (Simple plants)

- Phylum 1 CTANOPHYTA- (Blue - green algae e.g., Oscillatoria, Anabena)
- Phylum 2 EUGLENOPHYTA - Plant having whip like flagellum e.g., Euglena
- Phylum 3 CHLOROPHYTA - Green alga e.g., Spirogyra, Ulothrix
- Phylum 4 CHRYSOPHYTA - Yellow algae e.g., Diatoms
- Phylum 5 PYRROPHYTA - Flame coloured algae e.g., Gymnodinium
- Phylum 6 PHAEOPHYTA - Brown alga e.g., Sargassum
- Phylum 7 RHODOPHYTA - Red alga e.g., Polysiphonia
- Phylum 8 SCHIZOMYCOPHYTA - Bacteria e.g., Bacillus
- Phylum 9 MYXOMYCOPHYTA - The Slime moulds e.g., Physarum
- Phylum 10 EUMYCOPHYTA - True fungi
- Class 1 PHYCOMYCETES - The moulds and mildews e.g., Rhizopus.
- Class 2 ASCOMYCETES - The Sea fungi e.g., Penicillium
- Class 3 BASIDIOMYCETES - The Club fungi e.g., Agaricus

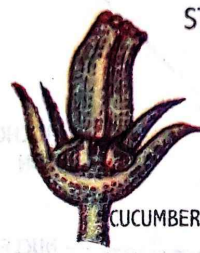
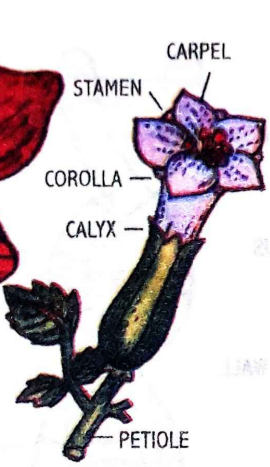
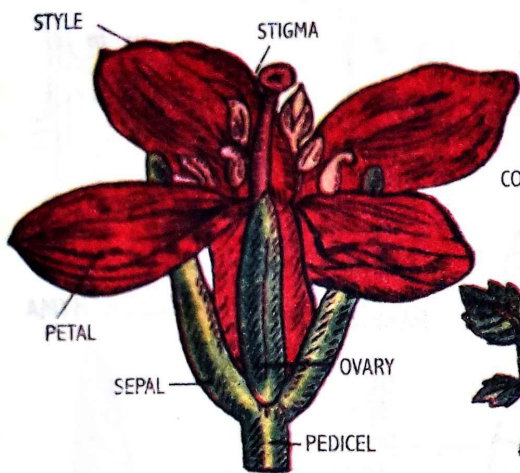
Sub-Kingdom-B EMBRYOPHYTA - Advanced Plants

- Phylum 11 BRYOPHYTA - The liverworts and mosses
- Class A HEPATICAE - The liverworts e.g., Riccia, Marchantia
- Class B MUSCI - The mosses e.g., Funaria
- Phylum 12 TRACHEOPHYTA - The vascular plants
- Sub Phylum A Psidopsida. Have pare aerial stem which comes from under ground rhizomes e.g., anthoceros
- Sub Phylum B LYCOPSIDA - Leaves like hair of wolf e.g., Lycopodium
- Sub Phylum C SPHENOPSISIDA - Horse tail e.g., Selaginella
- Sub Phylum D PTEROPSISIDA - Ferns and seed plants
- Class 1 Filicinae - True ferns e.g., Dryopteris.
- Class 2 Gymnospermae - Seeds are naked or in cone e.g., Cycas, Pinus
- Class 3 Angiospermae - Seeds are enclosed or flowering plants e.g., Brassica

BOTANY

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CONSTRUCTION AND FUNCTIONS OF FLOWERS

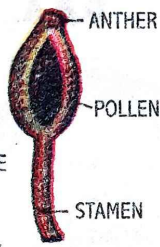
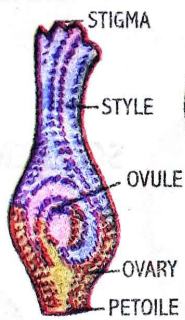
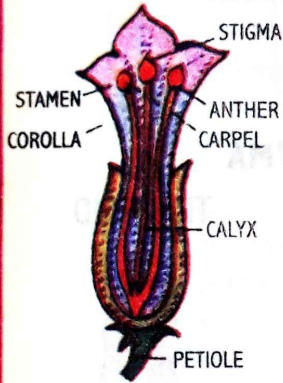


STAMINATE - FLOWER

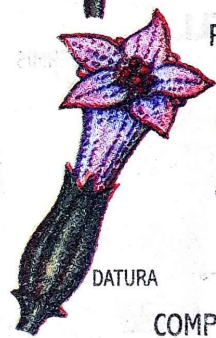
INCOMPLETE FLOWERS



MUSTARD FLOWER

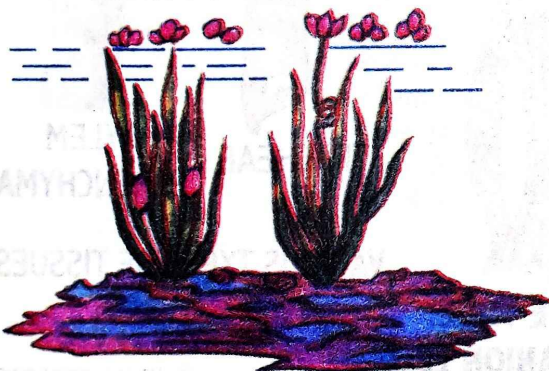


PISLATE - FLOWERS

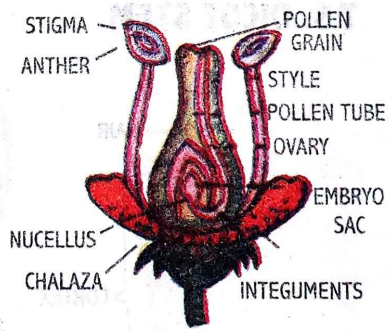


COMPLETE FLOWERS

SECTIONS OF A FLOWER



FERTILISATION

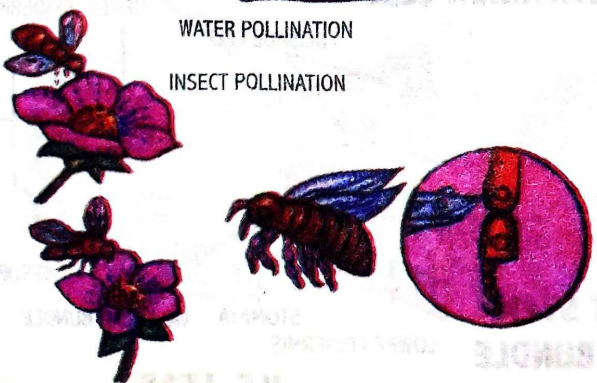


THE FRUIT IS GROWING SLOWLY



WATER POLLINATION

INSECT POLLINATION



CROSS POLLINATION



COTTON-SINGLE

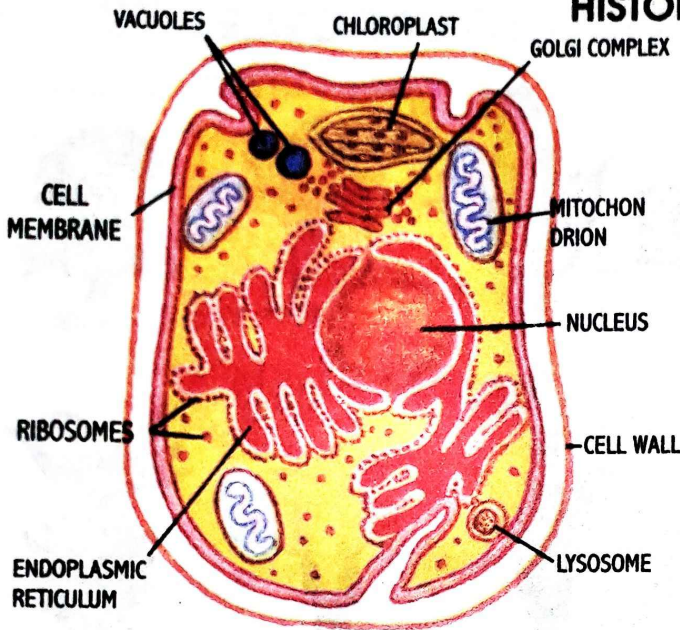


SINGLE AND COMPOUND FLOWER

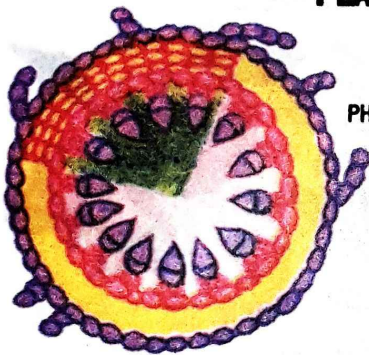
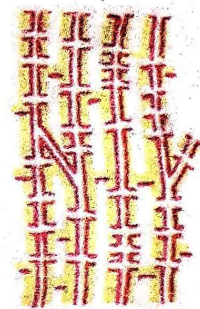
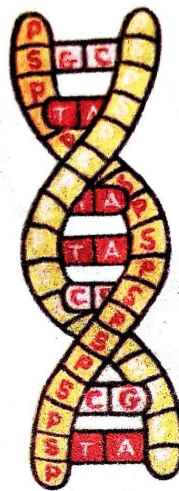


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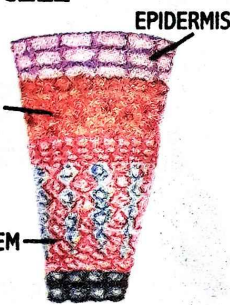
HISTOLOGY



PLANT CELL



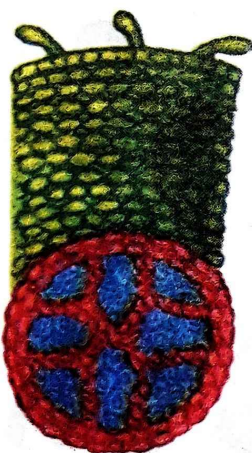
T.S. DICOT STEM



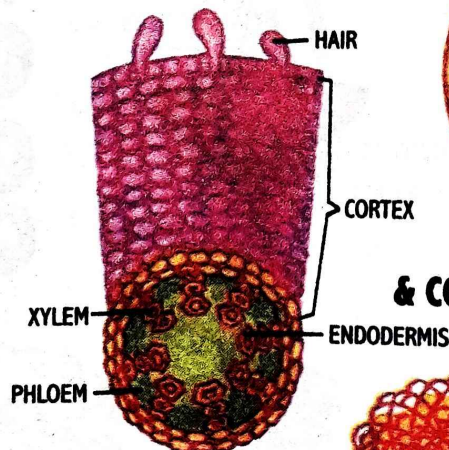
T.S. MONOCOT STEM



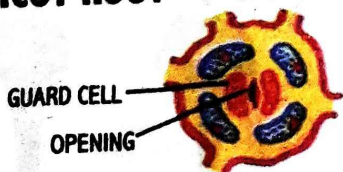
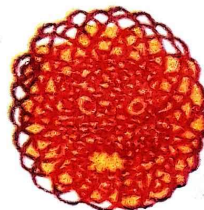
VARIOUS TYPES OF TISSUES



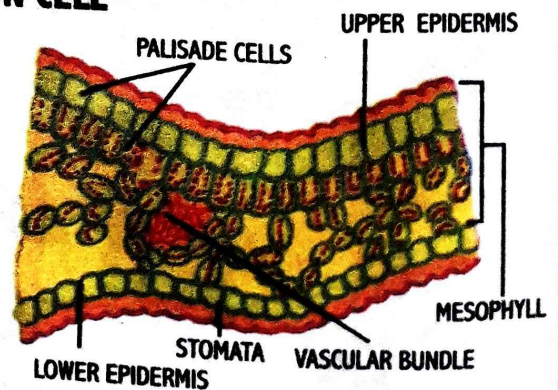
T.S. DICOT ROOT



T.S. MONOCOT ROOT



STOMATA



V.S. LEAF

Botanical Preparations You Do

- 1. Plant Cells** - Peel off outer membrane off fleshy scale leaf of onion. Spread the peeling on slide, stain with iodine solution for 1 to 2 minutes, wash with water and mount in glycerine.
- 2. Starch Grains** - Cut thin sections of potato or pea-cotyledons or sections of endosperms of rice or maize. Put the sections on slide and stain with iodine solution, wash with water and mount in glycerine.
- 3. Aleurone Grains** - Cut thin sections of endosperm of castor seed. Stain section with iodine solution for 1 to 2 minutes, wash with water and mount in glycerine.
- 4. Sphacrophides** - Cut thin sections of Begonia petiole, mount the sections in glycerine.
- 5. Cystoliths** - Cut thin T.S. of peepal or banyan leaf. Stain the section in safranin, wash with water and mount in glycerine.
- 6. Chromoplasts** - Take a small piece of tomato flesh. Tease the piece to separate cells, mount in glycerine.
- 7. Hair Cells of Tradescantia** - Take out 4 to 5 staminal hairs of Tradescantia flower. Mount in glycerine.
- 8. Plastids and movement of cytoplasm** - Mount a few leaves of an aquatic plant called Elodea (Anacharis) in a drop of water. Observe the cells and see how the plastids move with the streaming cytoplasm.

How to Describe a Flower

Entire Flower - It is Pedicellate (stalked). Subsessile or Sessile, Bracteate, or Ebracteate, Complete or incomplete. Unisexual or Hermaphrodite (Bisexual), Regular or irregular, Symmetry i.e. Actinomorphic or Zygomorphic? Insertion of floral whorls, whorls is Hypogynous, Perigynous or Epigynous. Colour White, pink or red etc.

PARTS OF FLOWER

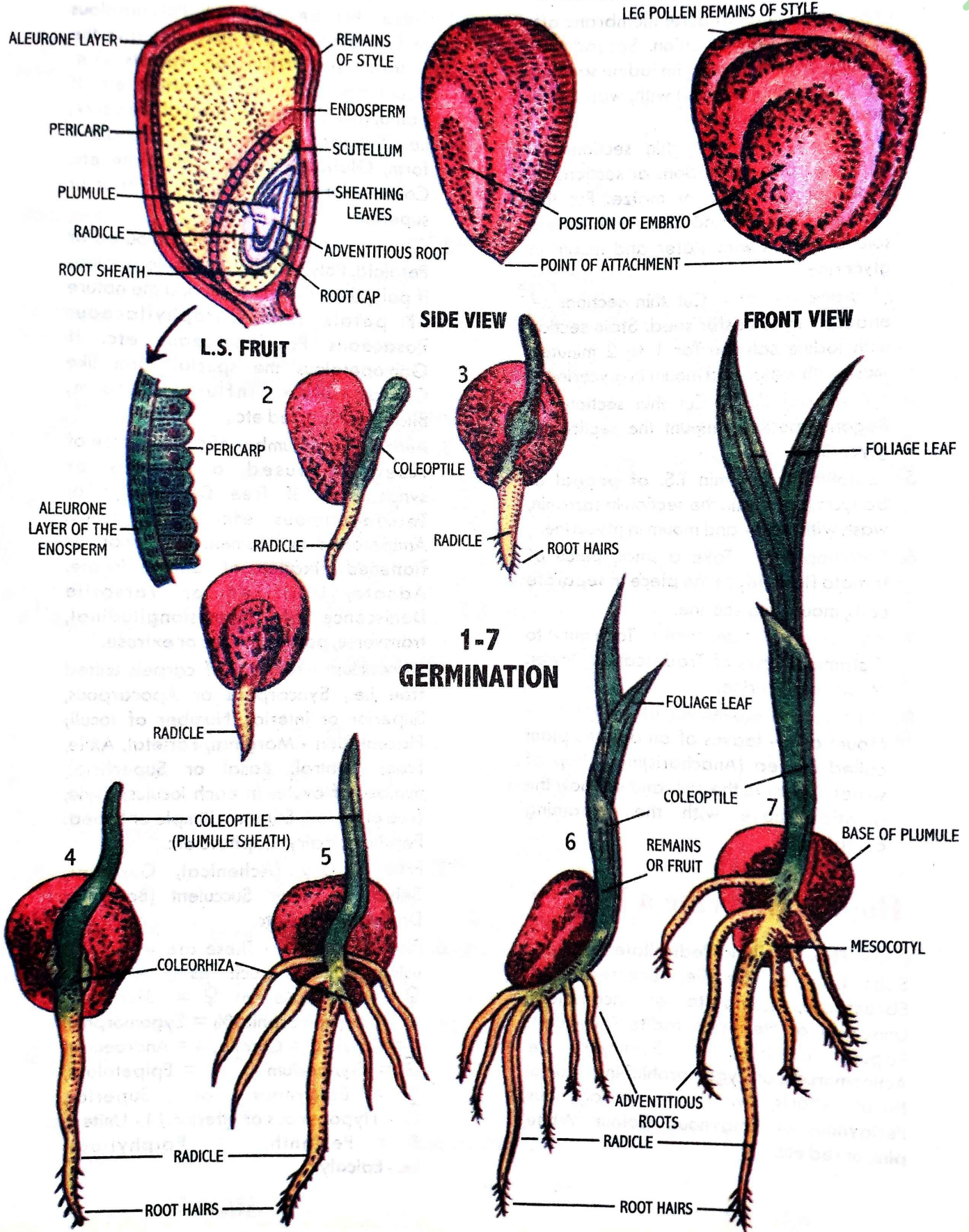
- 1. Calyx** - Number of Sepals, Polysepalous or Gamosepalous. If Poly, describe the nature and form of sepals, i.e. Deciduous, Caducous, Persistent etc. If gamo, give the special form of the calyx, i.e. Tubular, Campanulate, Infundibuliform, Globose, Spurred, Bilabiate etc. Colour - Green or Petaloid, inferior or superior.
- 2. Corolla** - Number of Petals Coloured or Petaloid, Polypetalous or Gamopetalous if poly, describe the form and the nature of petals i.e., Carophyllaceous Rosaceous Papilionaceous etc. If Gamopetalous the special form like Campanulate. Infundibuliform, Bilabiate, Spurred etc.,
- 3. Androecium** - Number of stamens free or fused. If fused adelphous or syngenesious If free Didynamous or Tetradyndamous etc. Epipetalous, Antipetalous or Filament long, short or flattened Fixation of anther-innate, Adnate, Dorifixed or Versatile Dehiscence of anthers longitudinal, transverse, porous, introse or extrose.
- 4. Gynoecium** - Number of carpels united free i.e., Syncarpous or Apocarpous, Superior or Inferior, Number of loculi; Placentation - Marginal, Parietal, Axile, Free; Central, Basal or Superficial, number of ovules in each loculus; Style, free or united, Stigma - Simple or Lobed. Feathery, Hairy, Capitate etc.
- 5. Fruit** - Dry (Achenical, Capsular, Schizocarpic) or Succulent (Berry or Drupe) or Pome etc.
- 6. Floral Formulae** - These are written by using symbols such as ♂ = Male, ♀ = Female or ♀ = Bisexual, ⊕ = Actinomorphic, % = Zygomorphic, **K** = Calyx, **C** = Corolla, **A** = Androecium **G** = Gynaecium **C.A.** = Epipetalous, **G** = Epigynous or Superior, **G** = Hypogynous or Inferior, () - United, **P** = Perianth, **P.A.** Epiphyllous, **EK** - Epicalyx.

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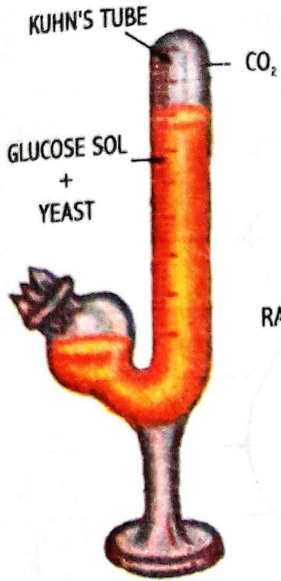
MAIZE

SEED STRUCTURE AND GERMINATION

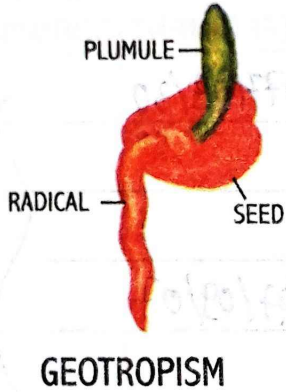


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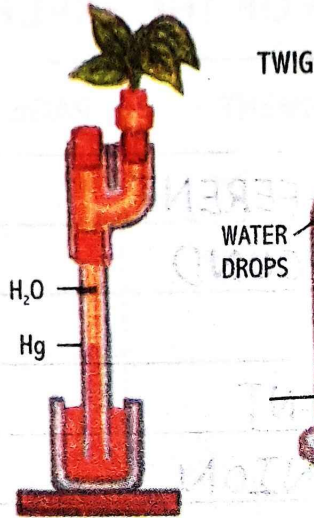
PHYSIOLOGY



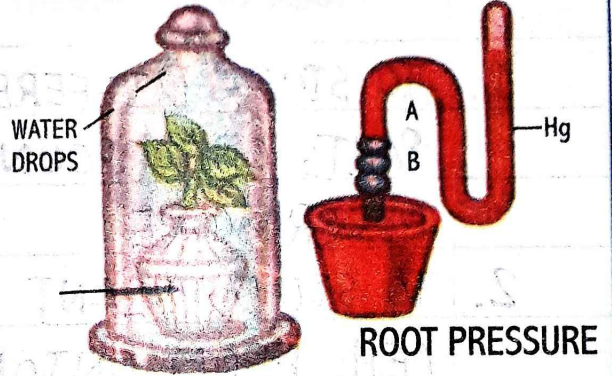
ANAEROBIC RESPIRATION



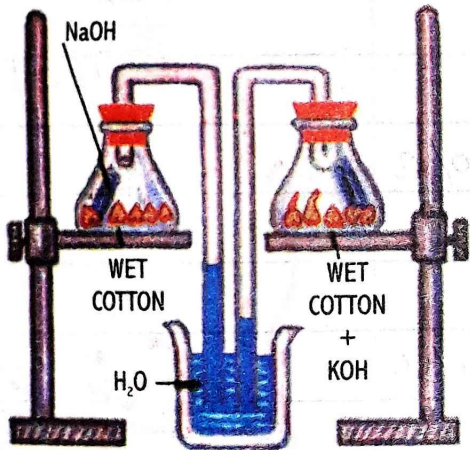
GEOTROPISM



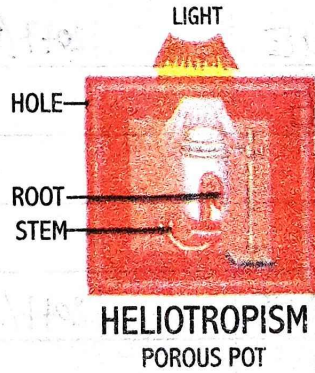
TRANSPIRATION



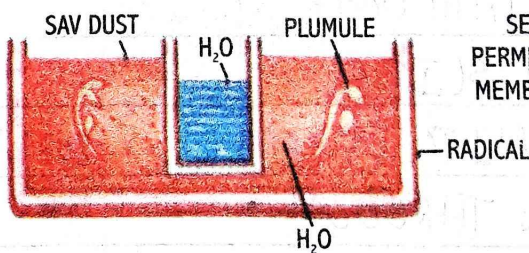
ROOT PRESSURE



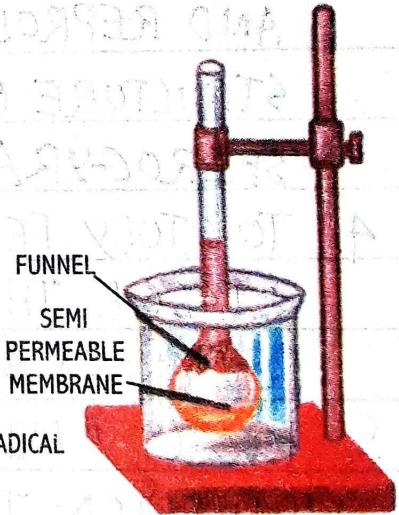
AEROBIC RESPIRATION



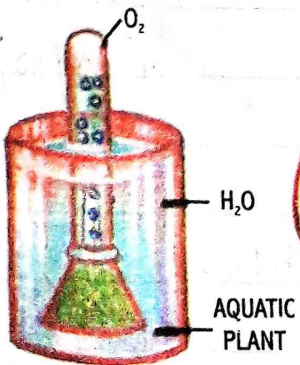
HELIO TROPISM



HYDROTROPISM



OSMOSIS



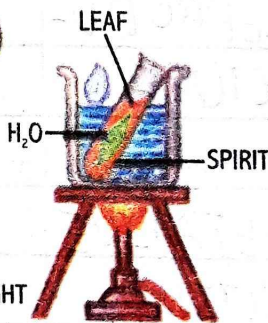
PHOTOSYNTHESIS



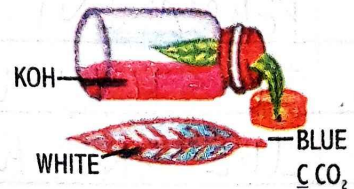
ESSENTIAL FACTORS FOR PHOTOSYNTHESIS



A LIGHT



ETIOLATION



WHITE

BLUE C CO₂



ETIOLATED LEAF



NORMAL LEAF B CHLOROPHYLL

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PARTICULARS OF THE EXPERIMENTS PERFORMED

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3.	TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF SPIROGYRA		2022/09/21	2022/09/28	Solo 2022/09/28
4.	TO STUDY PERMANENT TISSUE THROUGH PERMANENT SLIDE		2022/10/12		
5.	TO STUDY MITOSIS CELL DIVISION THROUGH PERMANENT SLIDE		2022/10/13		<u>Solo</u> 2022/10/20
6.	TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF MUCOR		2022/10/20	2022/10/24	Solo 2022/10/27
7.	TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF DICOT PLANT (MUSTARD PLANT)		2022/11/11	2022/11/18	Solo 2022/11/18

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	1. Marchantia				<u>Sobha</u>
	2. Fern plant				077/12/03
9.	TO STUDY GIVEN PLANT IN SEMI-TECHNICAL TERMS AND IDENTIFICATION OF ITS FAMILY		2077/12/02	2077/12/10	
	- <u>Solanum nigrum</u>				<u>Sobha</u>
					077/12/10
10.	TO STUDY GIVEN ANGIOSPERMIC PLANT IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS FAMILY		2077/12/10	2077/12/24	
					<u>Sobha</u>
					077/12/10
11.	TO STUDY GIVEN ANGIOSPERMIC PLANT IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS FAMILY		2077/12/31	2078/01/07	
					<u>Sobha</u>
					078/01/07

EXPERIMENT NO 1

TO STUDY DIFFERENT PARTS OF COMPOUND MICROSCOPE

INTRODUCTION

A compound microscope is a delicate optical instrument consisting of two lens system [eye piece and objective lens] that magnifies the minute transparent or translucent objects manifold in two steps and enable us to study their minute details. This two fold magnification is the principle behind the working of compound microscope. The compound monocular microscope consists of many parts which are assembled to either mechanical parts or optical parts.

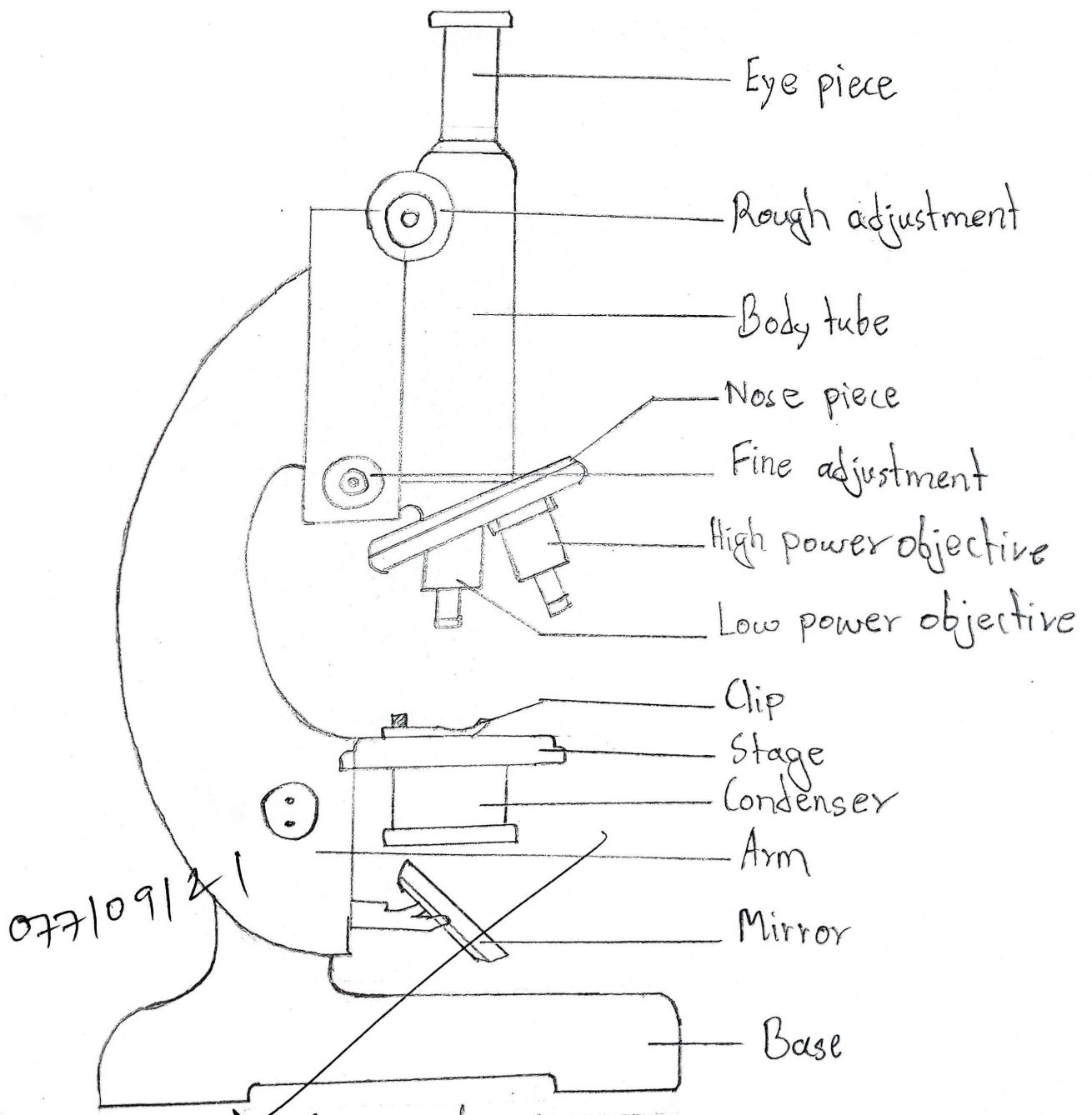
Much of the laboratory works in biology require the help of the microscope. So, it is highly appreciable to get familiar with its construction, use and care as well.

MECHANICAL PARTS OF A COMPOUND MICROSCOPE

- 1) Foot :- It is usually a horse-shoe shaped lowermost part. It supports the weight of the microscope.
- 2) Pillar :- It is a small vertical stand attached to the base. It supports the movable parts.

TO STUDY DIFFERENT PARTS OF COMPOUND MICROSCOPE

Roll No. : _____
Date : _____



077/09/21

Fig. Compound microscope

- 3) Inclination joint:- It is a pivot between the pillar and the arm. It permits the tilting of the upper part of the compound microscope at various angles.
- 4) Arm:- It is a curved part of a microscope and its lower end is attached to the pillar and the upper end is joined to the body tube. It is used for handling.
- 5) Condenser:- It is a circular chamber with lens system, present below the stage. that can be raised or lowered. It is used to concentrate the light rays.
- 6) Draw tube:- It is a small hollow cylindrical metallic tube that support the eye piece at the top.
- 7) Iris diaphragm:- It is a circular piece with a knob below the condenser. The left and right movements of the knob control the amount of light entering into the microscope on the object.
- 8) Stage: It is usually a rectangular platform having a circular ~~whole~~ hole in the centre to allow the

OPTICAL PARTS OF A COMPOUND MICROSCOPE

- 1) **Mirror:** It is a plano-concave mirror with one side plane and other concave. It is attached to the lower end of the arm. It is used for reflecting light rays into the microscope. The plane mirror is used to reflect the rays of light coming from nearby sources such as a bulb or a tube light, while the concave mirror is used to reflect the rays of light from distant source i.e. the diffused sunlight.
- 2) **Objective lenses:** They are attached to the nose piece. Generally, the lenses with the magnification power of 5X, 10X, 40X and 100X are available. These lenses magnify image of the object by the number written on the lens.
- 3) **Eye piece lens:** It is also called ocular lens and attached to the top of the body tube. It normally ranges in magnification from 5X, 10X and 15X. It is used to magnify the image produced by the objective.

Date: 2027/09/07

EXPERIMENT NO. 2

TO STUDY PLANT CELL FROM ONION SCALE LEAF

REQUIREMENTS

(a) APPARATUS

- 1) Petri dish
- 2) Watch glass
- 3) Slide
- 4) Coverslip
- 5) Needle
- 6) Brush
- 7) Forcep
- 8) Scissor
- 9) Dropper
- 10) Compound microscope

(b) CHEMICALS

- 1) Safranin
- 2) Glycerine
- 3) Water

(c) MATERIAL

- 1) An onion bulb

PROCEDURE

Peel out epidermal layer. Cut it into about 5mm short pieces. Dip the pieces into iodine solution for about 2 to 5 minutes to stain the nucleus. Wash with water. Transfer into a clean dry glass slide. Mount on glycerine. Then cover it with coverslip. Examine the prepared slide under low power magnification to see the mass of cell. Observe single cell under high power magnification and study the parts of cell of each plant in detail.

COMMENTS

1. The onion cells are rectangular in shape. They appear as brick wall under low power.
2. Each cell is bounded by thin non-living cell wall distinctly visible under high power.
3. The cells are filled with transparent faintly granular fluid called cytoplasm. The cytoplasm encloses large and small sized vacuoles. Each vacuole bounded by a thin covering wall, the tonoplast is filled with cell-sap.
4. A large prominent round nucleus lies at the centre or at the side of the cells. Nucleus contains densely viscous fluid called nucleoplasm bounded externally by thin nuclear membrane.
5. Stomata are entirely absent in the cells of onion peel.

TO STUDY PLANT CELL FROM ONION SCALE LEAF

Roll No. : _____
Date : _____

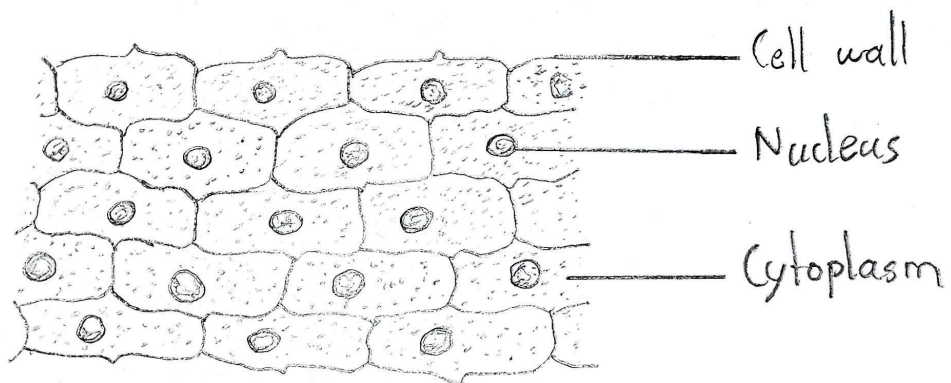
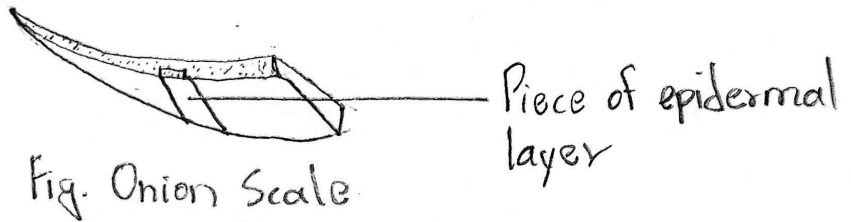


Fig. Onion cell under low power

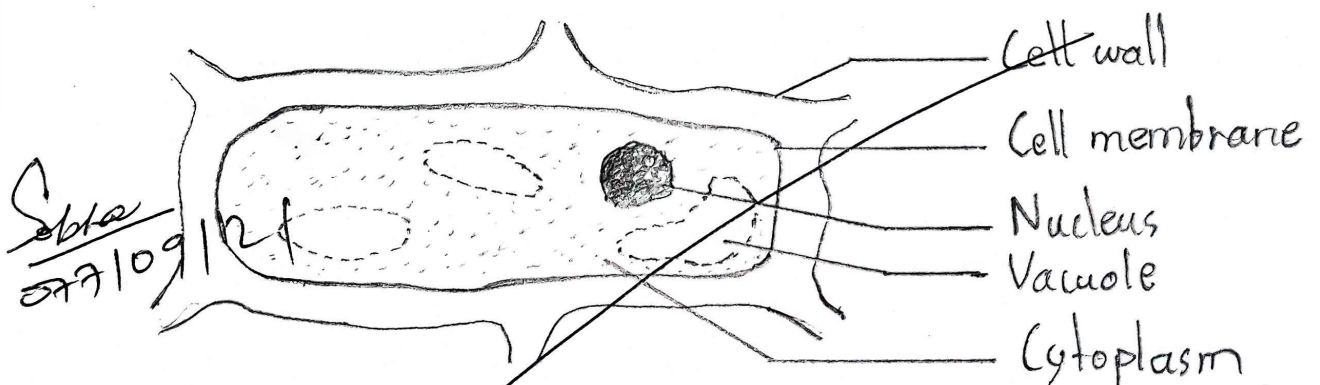


Fig. Single Onion Cell under high power

Date: 20/7/09/21

EXPERIMENT NO: 3

NAME OF EXPERIMENT: TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF SPIROGYRA

REQUIREMENTS

(a) APPARATUS

1. Watch glass
2. Slide
3. Needle
4. Brush
5. Blotting paper
6. Coverslip
7. microscope
8. Permanent slides of scalariform conjugation and lateral conjugation.

(b) MATERIAL

1. Fresh or preserved specimen of Spirogyra.

(c) CHEMICAL

1. Glycerine

LABORATORY WORK

1. Some Spirogyra filament was taken in a watch glass.
2. Few filaments of Spirogyra were mounted on a slide with glycerine and coverslip.
3. The vegetative structure of Spirogyra was observed and studied under low and high power of the compound microscope.

TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF SPIROGYRA

Roll No : _____
Date : _____

Systematic position
 Division - Algae
 Class - Chlorophyceae
 Order - Conjugales
 Family - Zygnemataceae
 Genus - Spirogyra

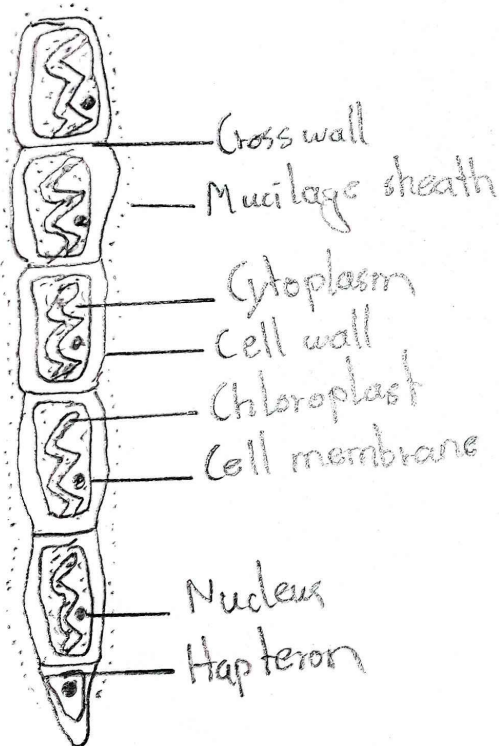


fig. filament in low power

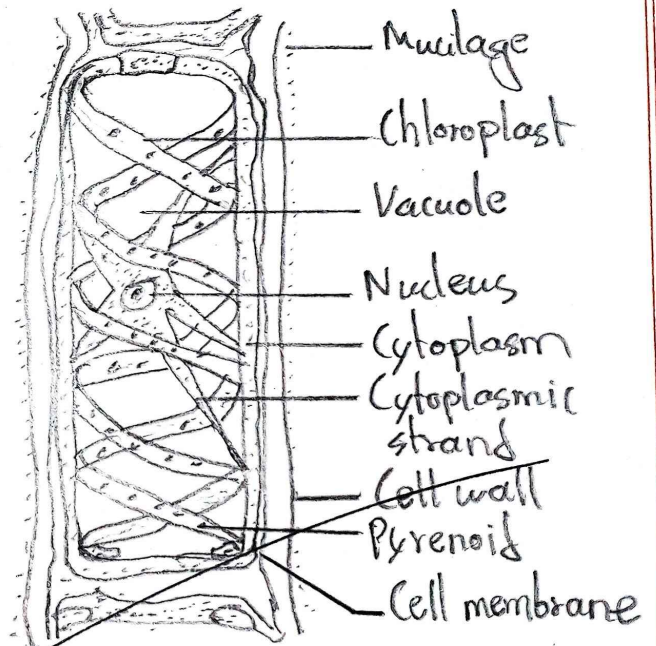


fig. a cell under high power

Good

Sobh
07/09/28

4. A filament of Spirogyra and the enlarged single cell was sketched and labelled the parts.

COMMENTS

1. Spirogyra is a free-floating fresh water algae found in ponds, pools, lakes, etc.
2. It is commonly known as pond scum or water silk.
3. The plant body is multicellular unbranched filamentous type.
4. Each filament is a long unbranched thread having single row of many cylindrical cells joined end to end.
5. All the cells are rectangular in shape and have thick two layered cell wall. The cell wall is made up of cellulose and pectin.
6. The pectin dissolves in water to form a slimy or mucilaginous sheath and gives the filament a slippery touch.
7. Each cell has a single central large vacuole, peripheral layer of cytoplasm and a nucleus.
8. Nucleus is centrally placed and is suspended in position by cytoplasmic strands, which join the peripheral cytoplasm.
9. Each cell contains spirally coiled structures, along the length, are called chloroplast. Chloroplast bears a large number of small rounded pyrenoids. Pyrenoids serve for storage of starch.

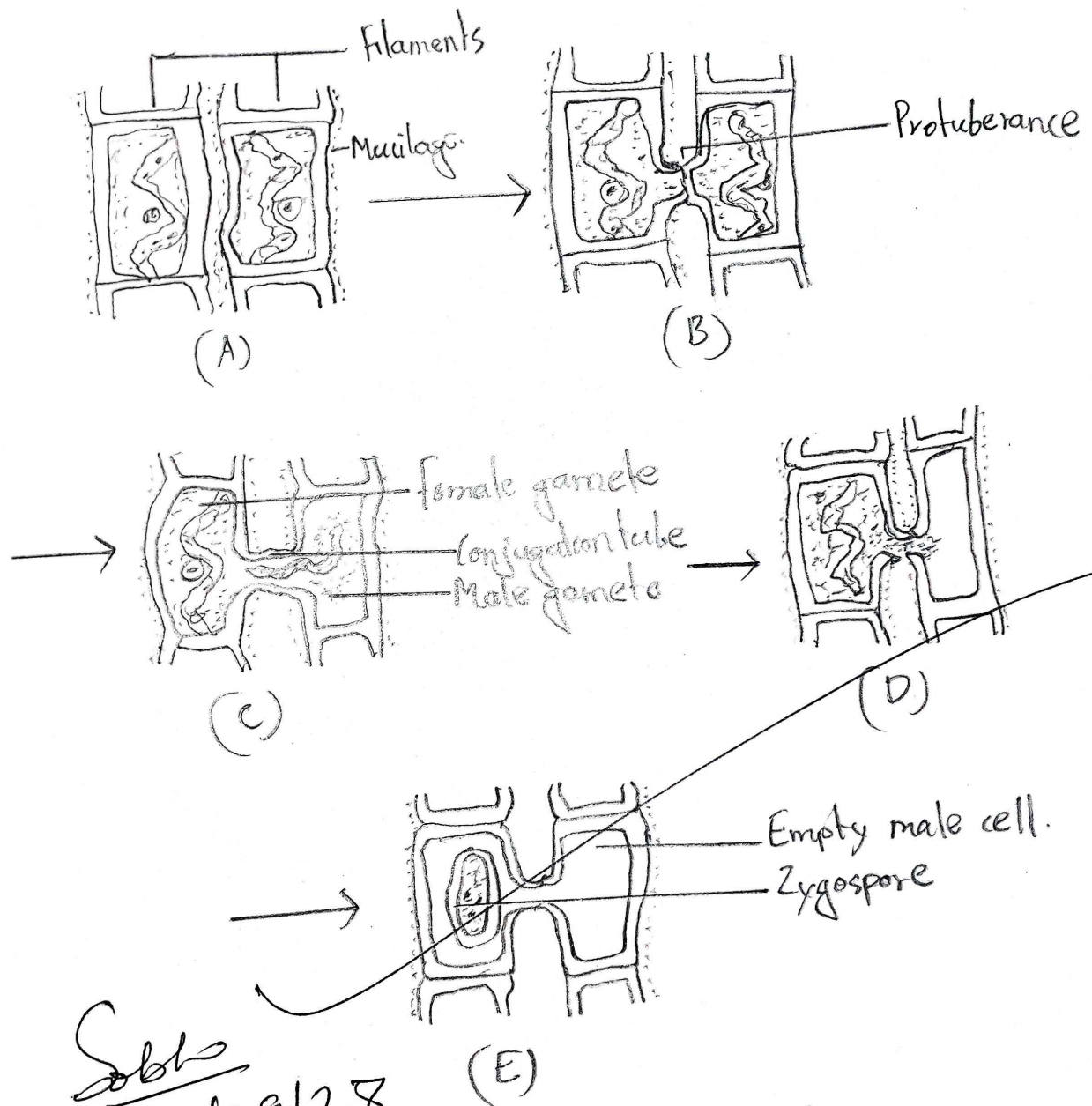
SCALARIFORM CONJUGATION

1. It is the common method of sexual reproduction in which two filaments of Spirogyra come together and line up side-by-side.
2. A small dome-shaped protuberance called transverse tube appears in their longitudinal walls facing each other.
3. The transverse tubes connect the two filaments and appear as a ladder like structure.
4. The contact wall between the two transverse tubes gets dissolved and forming passage called conjugation tube between the cells of two filaments.
5. The cells connected through conjugation tubes are called gametangia. The protoplasm of gametangia loses water and curls up to form the male and female gametes.
6. Both male and female gametes are naked, non-motile and non-ciliated.
7. The male gamete passes through the conjugation tube into the next filament consisting female gametes. Therefore, the opposite cell becomes empty.
8. The male and female gametes are morphologically alike and are called isogametes.
9. The two isogametes fuse to form a zygospore.
10. The conjugation occurs between two opposite cells of the filaments by forming conjugation between their cells. Then, it appears as a ladder like structure.

11. Zygosporangium is circular and dark brown with three concentric layers of cell wall (exine, mesine and Intine).

TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF SPIROGYRA

Roll No. : _____
Date : _____



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fig. Scalariform conjugation

COMMENTS

Date - 20/10/12

Permanent tissues are the group of simple or complex permanent tissues.

I. Simple permanent tissue - contains only one type of cells and is of three types.

i. Parenchymatous tissue - a tissue composed of thin walled spherical, polygonal or isodiametric living cells enclosing intercellular spaces. It is generally found in epidermal, cortical, pith and mesophyll cells. It becomes:

- Chlorenchymatous tissue - if the cells bear green chloroplast pigments or

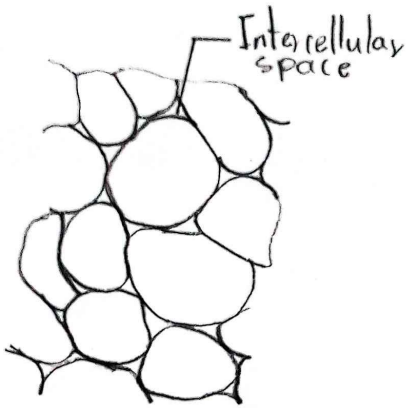
- Aerenchymatous tissue - if the loosely arranged cells enclose large air-cavities.

ii. Collenchymatous tissue - elongated living cells with slightly oblique or rounded ends. T.S. of this tissue shows circular or polygonal cells with thickened intercellular spaces formed by the deposition of cellulose and pectin. The cells may contain chloroplast. It is normally found below the epidermis.

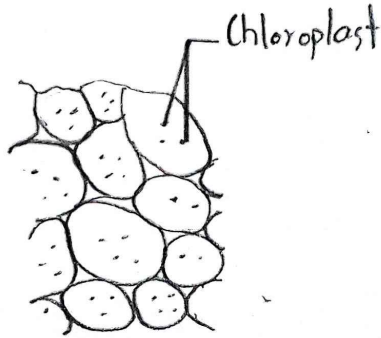
iii. Sclerenchymatous tissue - compactly arranged dead cells without intercellular space. Each cell called fibre, is long and spindle-shaped. The cell is empty with thick lignified walls. They

TO STUDY PERMANENT TISSUE THROUGH PERMANENT SLIDE

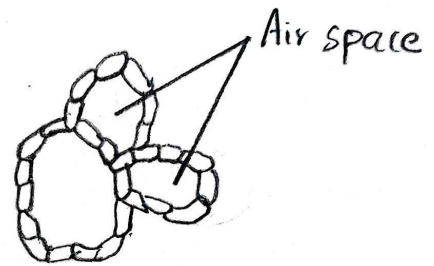
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Date : 20/7/20/22



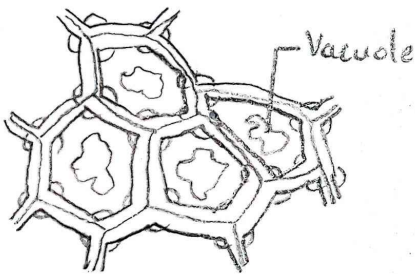
Parenchyma



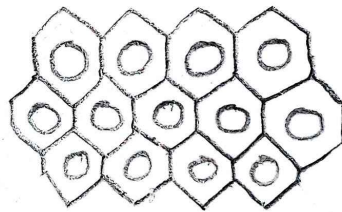
Chlorenchyma



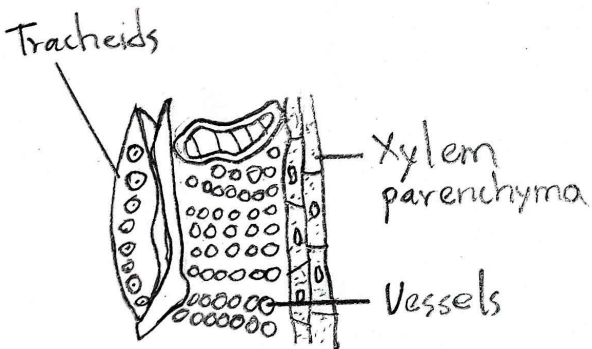
Aerenchyma



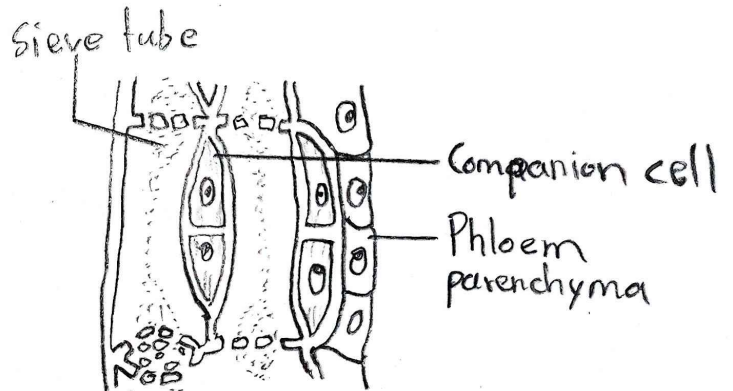
Collenchyma



Sclerenchyma



Xylem tissue



Phloem tissue

are found in patches or in layers in hypodermis, pericycle and xylem. There are special kind of sclerenchyma tissue called ~~Sect~~ Sclereids or the stone cells occurring in the hard parts of plant. They have reduced lumen due to the very thickened walls.

II. Complex permanent tissue - contains \geq more than two types of tissues. Its two types:-

i. Xylem - composed of four elements.

- Tracheids - elongated dead cells with tapering ends and the walls thickened in different patterns, such as annular, spiral, reticulate, scalariform and pitted.
- Vessels - elongated tube like dead cells with thickened walls. They are found in bigger size as metaxylem or smaller size as protoxylem.
- Wood parenchyma - parenchymatous cells associated with other xylem elements.
- Wood fibres - sclerenchymatous cells in woody plants.

ii. Phloem - composed of four elements.

- Sieve tubes - thin walled elongated tube-like cells with perforated end walls called sieve plates.

- puspas.com.my
- Companion cells - elongated thin-walled cells containing dense cytoplasm and a nucleus. They lie with sieve tube as company. In T.S., phloem show rectangular cells adjoining with sieve tubes.
 - Phloem parenchyma - parenchyma cells laying with sieve tube and companion cells.
 - Bast - phloem sclerenchymatous tissue laying with sieve tubes and companion cells in secondary phloem.

COMMENTS

Date - 20/10/13

When a vegetative cell divides into two identical daughter cells having a constant number of chromosomes is known as mitotic cell division.

Interphase or resting phase :- It is the phase before cell division and characterised by a dark-enlarged nucleus with chromatin networks, distributed throughout the nucleus and one or more dark nucleoli. The nuclear division or karyokinesis comprises of four following phases.

Prophase

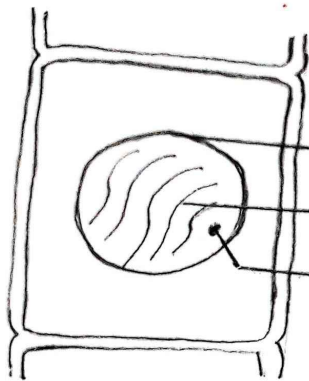
- It is characterised by the presence of nuclear membrane, nucleoli and dark stained long thread like coiled chromosomes.
- The chromosome splits into two chromatids but remain attached at one point by centromere.

Metaphase

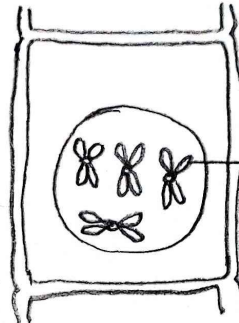
- It is marked by the disappearance of nuclear membrane and nucleoli.
- All the chromosomes come to lie at the equatorial plane.
- The spindle fibres, appearing at two opposite poles touch the centromere of each chromatids.

TO STUDY MITOSIS CELL DIVISION THROUGH PERMANENT SLIDES

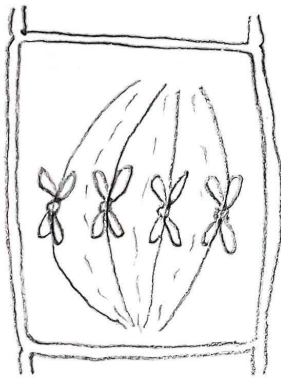
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Date : 20/10/13



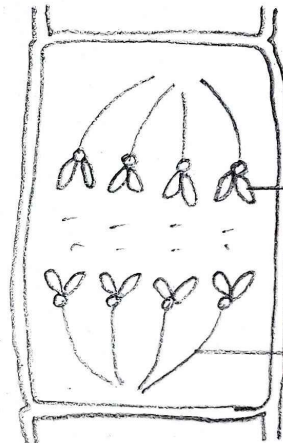
Interphase



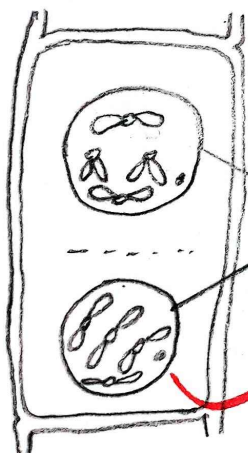
Prophase



Metaphase

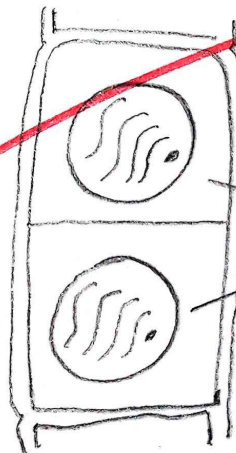


Anaphase



Telophase

daughter nuclei



daughter cells

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Cytokinesis

Anaphase

- Centromere divides longitudinally into two so that each chromatid bears a centromere of its own.
- Two chromatids repel from each other and is drawn to the opposite pole by contraction of the spindle fibres. The chromatids that automatically become chromosomes appear as V with their points towards the pole of the cell.

Early Telophase

- The nuclear membrane and nucleoli reappear, so it resembles with the cell of prophase.
- Chromosomes return to their long slender and coiled form and distribute throughout the nucleus.

Late Telophase

- The cell plate formed at the middle of the cell divides the two newly formed nuclei and cytoplasm into ~~two~~ daughter cells. Division of cytoplasm is known as cytokinesis.

EXPERIMENT NO-6

Date-2077/10/27

AIM: TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF MUCOR.

COMMENTS

Mucor is a saprophytic fungus. The vegetative thallus is a white cottony branched thread like mycelium. The unsepted coenocytic mycelium encloses many small nuclei and vacuoles.

It reproduces asexually by the sporangium formed at the tip of erect aerial hyphae, the sporangiospore. The spherical sporangium is divided into peripheral fertile portion and the central sterile dome like columella. Thus a large number of black small pores surround the columella. The spores are released by the rupture of sporangial wall.

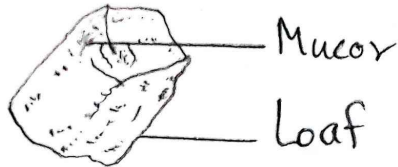
Mucor reproduces sexually by conjugation. Two hyphae of opposite strain come close and produce small outgrowth like progametes facing each other. The contents of each progamete separates into apical multinucleated gametangium and basal suspensor. The progametes elongate to touch each other. The partition walls dissolve allowing the fusion of gametangial contents. The diploid zygospore is formed as the result of gametangial fusion. The zygospore is a large dark, thick-walled warty structure.

TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF MUCOR

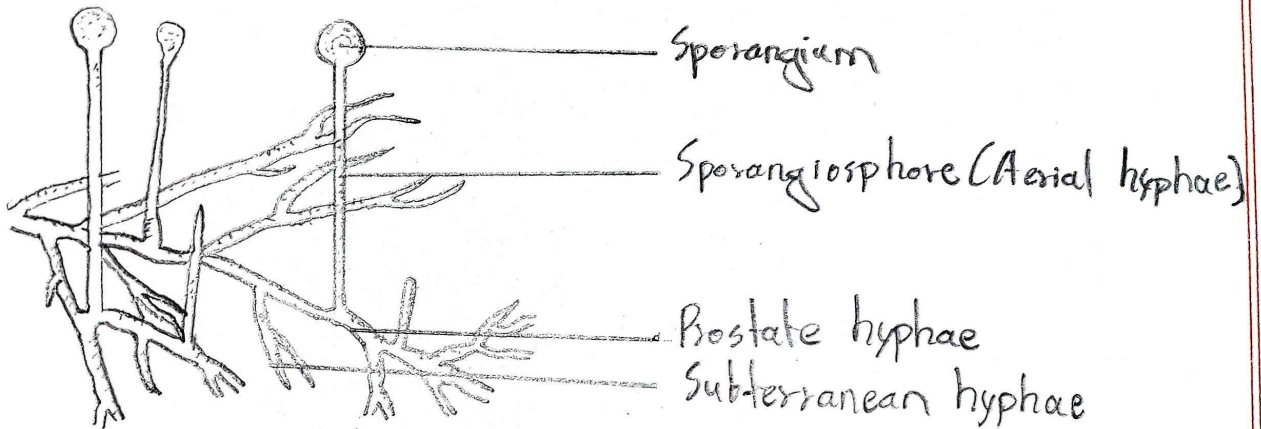
Roll No : 11
Date : 20/10/20

Systematic position

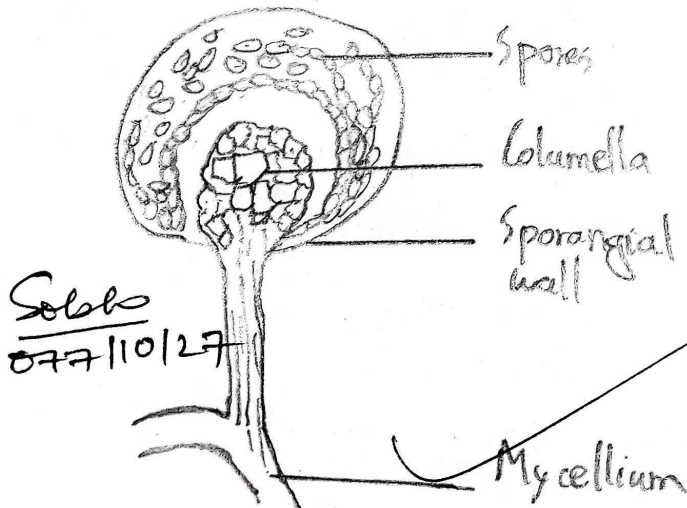
Kingdom	- Mycota
Class	- Phycmycetes
Order	- Mucorales
Family	- Mucoraceae
Genus	- <u>Mucor</u>



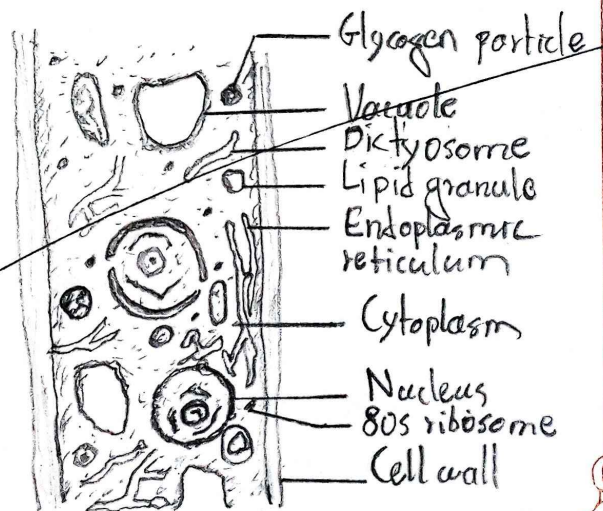
Habit Sketch



Mycelium of Mucor with Sporangium



A magnified Sporangium



Part of hypha showing detailed structure

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EXPERIMENT NO. 7

Date: 20/7/21

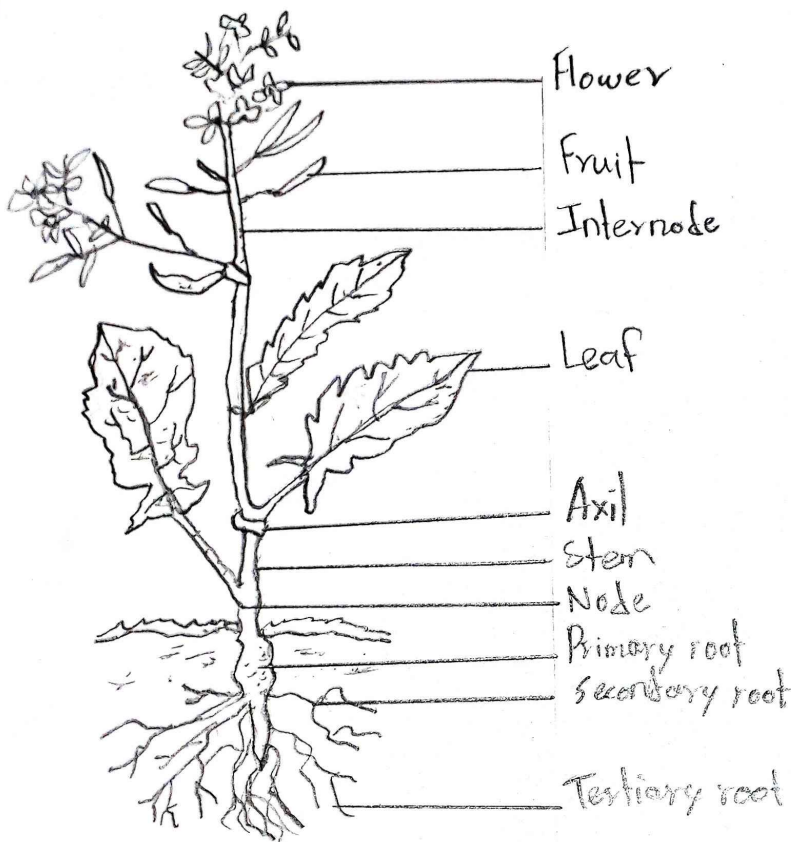
AIM: TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF DICOT PLANT (MUSTARD PLANT)

COMMENTS

1. Mustard is a dicotyledonous plant that grows in the soil having sufficient water, minerals and air.
2. It is an annual herb cultivated for vegetable and oil.
3. It bears well developed tap root system.
4. Stem is green, herbaceous, erect, slender, branched and consists of nodes and internodes.
5. Stem tip ends at terminal bud and the branches arise from axillary buds.
6. The leaves are green, petiolate, exstipulate, lyrate, alternately arranged on the stem. The leaf blade bears unicosate reticulate venation.
7. The inflorescence of the mustard is typical raceme.
8. The flowers are small, ebracteate, yellow coloured and developed from the floral buds.
9. The mustard flower consists of a short stalk called pedicel and a set of all floral whorls such as calyx, corolla, androecium and gynoecium.
10. Calyx is the outermost whorl of the flower that consists of four green leaves like sepals.
11. The ~~corolla~~ corolla is the second whorl of the flower that consists of four free petals. Each petals has a narrow lower part the claw and broad part upper part called limb.
12. The third whorl of flower is called androecium that consists

TO STUDY VEGETATIVE AND REPRODUCTIVE STRUCTURE OF DICOT PLANT (MUSTARD PLANT)

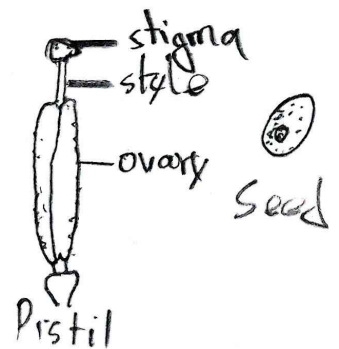
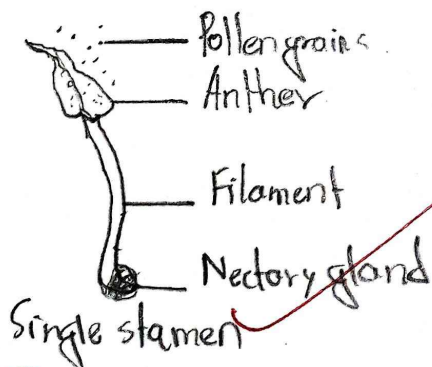
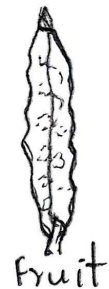
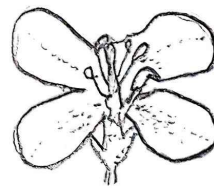
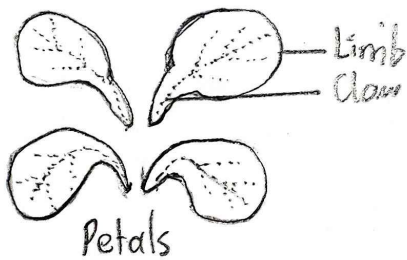
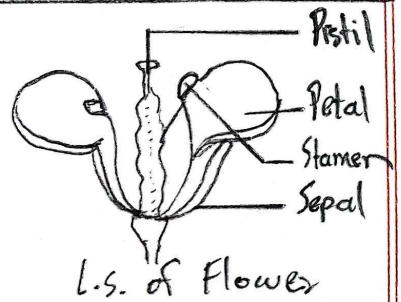
Roll No : 11
Date : 20/11/18



A whole Mustard Plant

Classification

Kingdom	- Plantae
Division	- Tracheophyta
Sub-division	- Spermatophyta
Class	- Angiospermae
Sub-class	- Dicotyledonae
Family	- Brassicaceae
Genus	- <u>Brassica</u>
Species	- <u>campestris</u>
Common name	- Mustard



Sobha
8/11/18

of six free stamens. Out of six stamens two outer stamens are short while the four inner are long. The stamens constitute the male reproductive part of a flower. Each stamen consists of a long filament and a sac-like anther at tip.

13. Gynoecium constitutes the female reproductive organ. Pistil consists of two carpels and is divided into three parts: basal swollen ovary, an erect style and bilobed stigma.
14. The fruit is silique type which appears cylindrical and elongated.

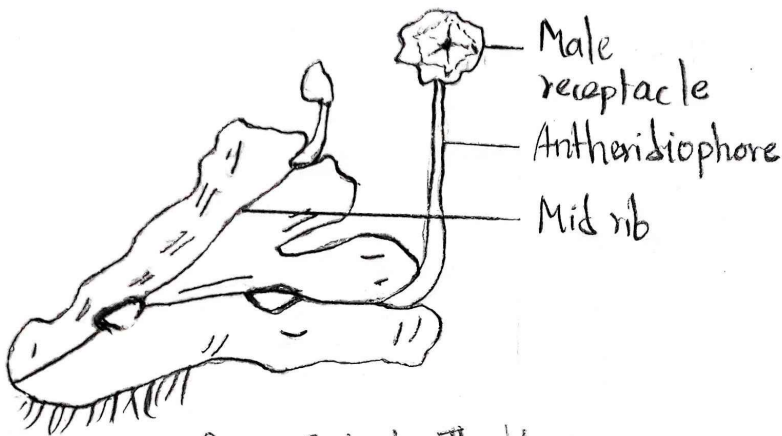
AIM: TO STUDY THE MUSEUM SPECIMENCOMMENTS ON MARCHANTIA

1. Marchantia is a common liverwort that mostly grows in moist and shady places, near the bank of streams and rivers, moist walls, logs of wood, tree trunks, rocks and crevices.
2. The plant body is gametophytic thallus.
3. The thallus is dark green, dorsoventrally flattened and dichotomously branched with an apical notch at the tip.
4. The dorsal surface of thallus contains distinct mid rib, conspicuous air chambers and small cup like structures called Gemma cups along the mid rib.
5. The ventral surface of thallus bears rhizoids and scales on either sides of thallus the mid rib.
6. The rhizoids are unicellular hair like structures that function as roots. They are of two types: smooth walled and tuberculated rhizoids.
7. The smooth walled rhizoids are larger in diameter with smooth walls while tuberculated rhizoids are smaller in diameter with peg like projections in their inner walls.
8. The scales are violet-colored multicellular and one cell in thickness which protect the growing plant. They are two types: ligulate (small and without appendage) and appendiculate (larger with an appendage) scales.

TO STUDY THE MUSEUM SPECIMEN

Roll No.: 11

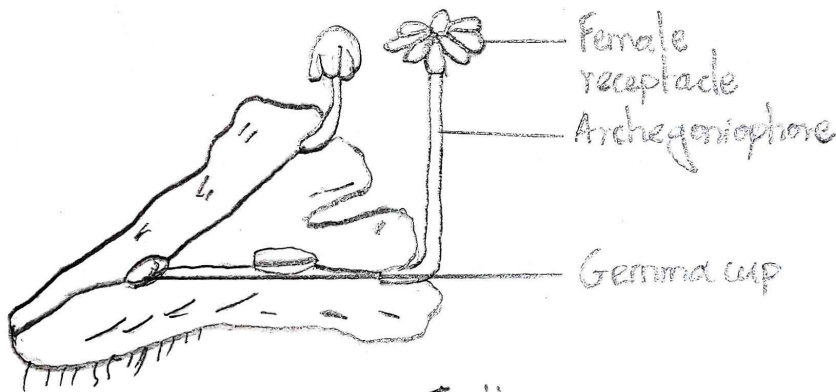
Date: 7/11/25



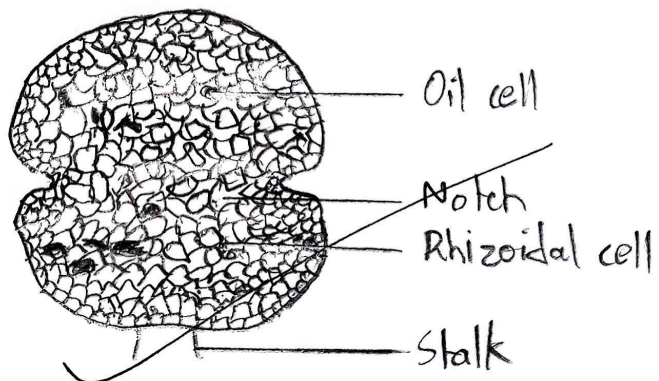
Dorsal Surface of Male Thallus

Systematic Position

Division	- Bryophyta
Class	- Hepaticopsida
Order	- Marchantiales
Family	- Marchantiaceae
Genus	- <u>Marchantia</u>



Dorsal Surface of Female Thallus



Single Gemma

Fig. Marchantia

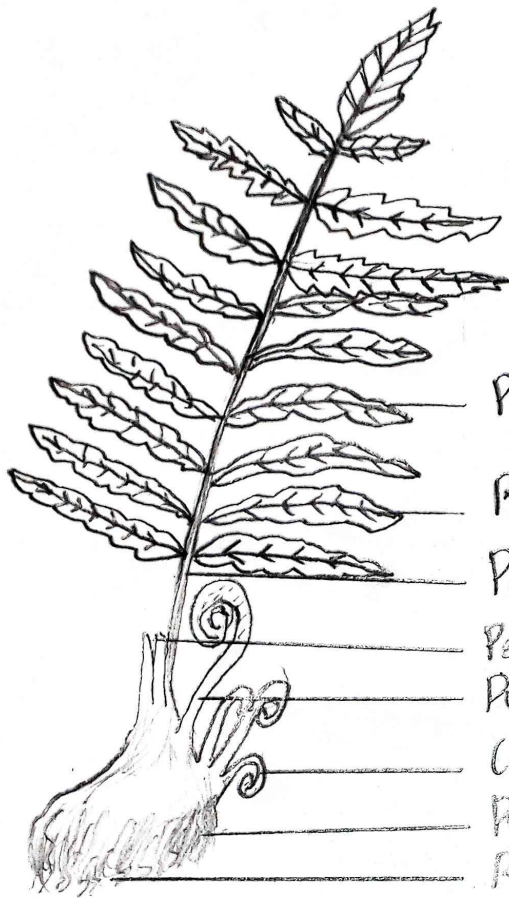
Sobh
7/11/25

COMMENTS ON FERN PLANT

1. Fern mostly grows in moist, cool and shady places.
2. The plant body is sporophytic and differentiated into root, stem and leaf.
3. The roots are adventitious and arise from the underside of rhizome.
4. The stem is underground, horizontal rhizome.
5. The leaf is the only aerial part of plant, which is megaphyll type.
6. The leaf is usually called frond, which is pinnately compound.
7. The rachis gives out lateral leaflets or pinnae. Each pinna again gives divides into smaller circinate.
8. The young leaves are circinate.
9. The young leaves and rhizome are covered with brownish hairs calledramenta.
10. Fern reproduces asexually and sexually.
11. Fern reproduces asexually by means of spores.
12. The spores are borne in sporangia which are grouped in sori.
13. The sori are developed on the lower surface of pinnules. They are enclosed with a membrane called indusium.
14. At the maturity of spores, the capsule wall bursts at the stomium and release spores.

TO STUDY THE MUSEUM SPECIMEN

Rolle No.: 10
Date: 27/11/25



Pinna

Rachis

Petiole

Persistent leaf base

Pinnule

Cirinate leaf

Rhizome

Root

Systematic position

Division - Pteridophyta
Class - Pteridopsida
Order - Filicales
Family - Polypodiaceae
Genus - Dryopteris

A sporophyte of Dryopteris

Sobha

077/12/03

EXPERIMENT NO. 9

AIM: TO STUDY GIVEN PLANT IN SEMI-TECHNICAL TERMS AND IDENTIFICATION OF ITS FAMILY

Solanum nigrum

Habitat: Wild plant

Habit: Annual, herb

Roots: Tap root

Stem: Erect, branched, herbaceous, solid, glabrous, green, cylindrical

Leaf: cauline and ramal, alternate, ex-stipulate, petiolate, simple, ovate, dentate, glabrous, acute, green, foliage, unicostate reticulate venation.

Inflorescence: cymose (uniparous)

Flower: ebracteate, pedicellate, complete, bisexual, actinomorphic, hypogynous

Calyx: 5 sepals, gamosepalous, inferior, valvate, green

Corolla: 5 petals, gamopetalous, inferior, valvate, white, rotate, small

Androecium: 5 stamens, epipetalous, inferior, diadelphous, basifixed, yellow, short filament

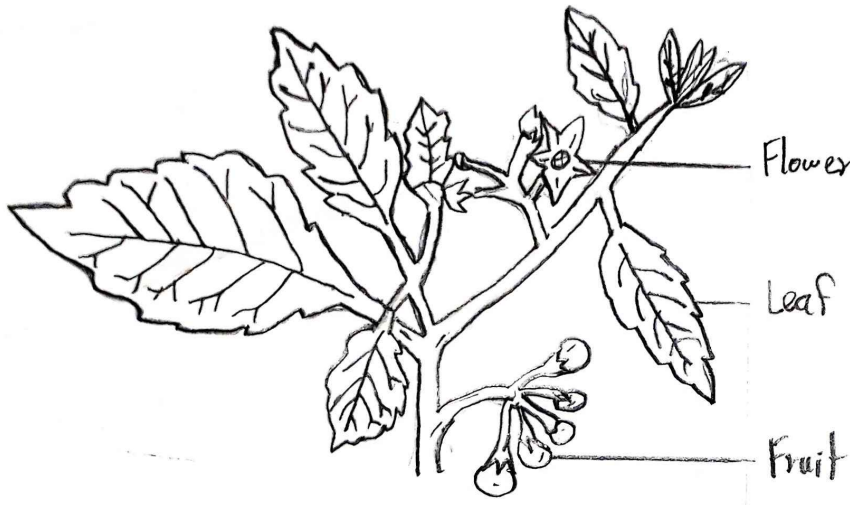
Gynoecium: bicarpellary, syncarpous, superior ovary, bilocular, axile placentation, short style, lobed stigma.

Fruit: simple, fleshy, berry

Floral formula: Ebr. \oplus \rightarrow $\text{K}(5)$ (5) A_5 $G_{(2)}$

TO STUDY GIVEN PLANT IN SEMI-TECHNICAL TERMS AND IDENTIFICATION OF ITS FAMILY

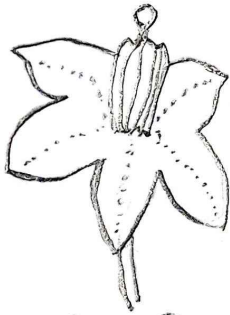
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Date: 20/7/12/02



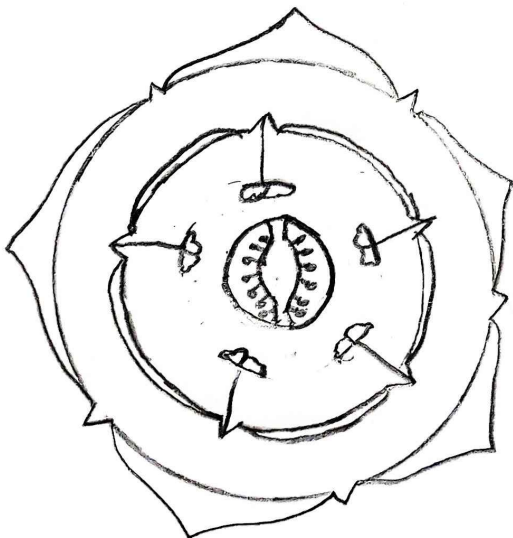
Flowering branch

Classification

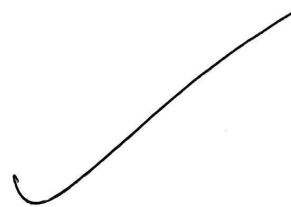
Subkingdom	- Phanerogame
Division	- Angiospermae
Class	- Dicotyledonae
Sub class	- Gamopetale
Series	- Bicarpellate
Order	- Polymoniales
Family	- Solanaceae
Genus	- <u>Solanum</u>
Species	- <u>nigrum</u>
Common name	- Black night shade



An entire flower



Floral Diagram



Sobh
077/12/10

EXPERIMENT NO. 10

AIM: TO STUDY GIVEN ANGIOSPERMIC PLANT IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS FAMILY.

Habitat: terrestrial, mesophyte, cultivated for vegetables and pulses.

Habit: annual herb

Root: Tap root, root nodules are present having Rhizobium bacteria

Stem: Weak, Climber, Herbaceous, cylindrical, pubescent, green, solid

Leaf: cauline and ramal, compound (palmate trifoliage), stipulate, alternate, petiolate

Inflorescence: racemose, compound raceme

Flower: ebracteate, sub-sessile, complete, bisexual, hypogynous, zygomorphic, pentamerous, white

Calyx: 5 sepals, gamosepalous, inferior, valvate aestivation, sepaloid.

Corolla: 5 petals, polypetalous, papilionaceous (one large standard petals, two side wings petal and two fused innermost petal called keel or carina), inferior, vexillary aestivation, white, small

Androecium: 10 stamens, diadelphous, inferior, ditheous, basifixed, yellow, introrse.

Gynoecium: monocarpellary, superior ovary, unilocular with many ovules, marginal placentation, style long, stigma simple.

Fruit: simple fruit

Floral formula: $\text{Br. } \frac{1}{2} \text{ } \overline{\text{K}}(5) \text{ } \text{C}_{1+2+2} \text{ } \text{A}_{1+(9)} \text{ } \underline{\text{G}}_1$

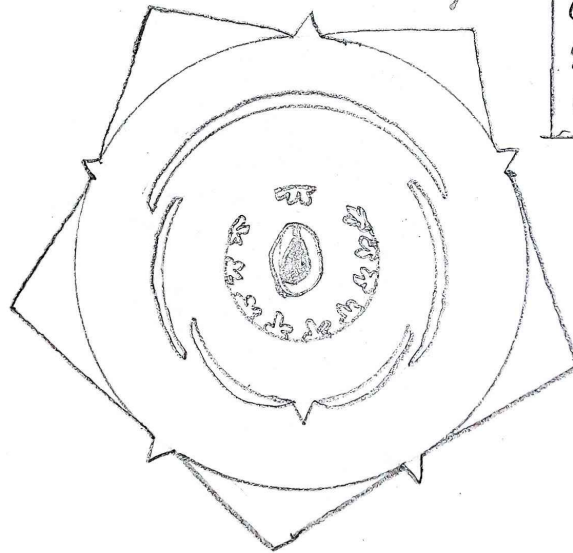
TO STUDY GIVEN ANGIOSPERMIC PLANT IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS FAMILY

Roll No: 31

Date: 2017/12/10

Classification

Sub kingdom	- Phanerogamae
Division	- Angiospermae
Class	- Dicotyledonae
Sub class	- Polypetalae
Series	- Calyciflorae
Order	- Rosales
Family	- Leguminosae
Sub family	- Papilionoideae
Genus	- <u>Pisum</u>
Species	- <u>sativum</u>
Common name	- pea



Floral diagram

Fig. Sub-family: Papilionaceae - Pisum sativum

Sobho
077/12/17

EXPERIMENT NO. 11

AIM: TO STUDY GIVEN ANGIOSPERMIC PLANT
IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS
FAMILY

Habitat: cultivated for vegetables.

Habit: annual herb

Root: Fibrous root

Stem: bulb (underground stem), unbranched,
erect, herbaceous, colourless

Leaf: radical, alternate, ex-stipulate, simple,
tubular, multicostate, parallel venation,

Inflorescence green colour

Inflorescence: racemose umbel

Flower: bracteate, pedicellate, incomplete,
actinomorphic, bisexual, trimerous,
hypogynous

Perianth: 6 tepals, gamophyllous, petaloid, imbricate

Androecium: 6 stamens, polyandrous, epiphyllous,
basifixed, dithecous

Gynoecium: tricarpellary, syncarpous, ovary
superior, trinocular, axile placentation,
simple stigma

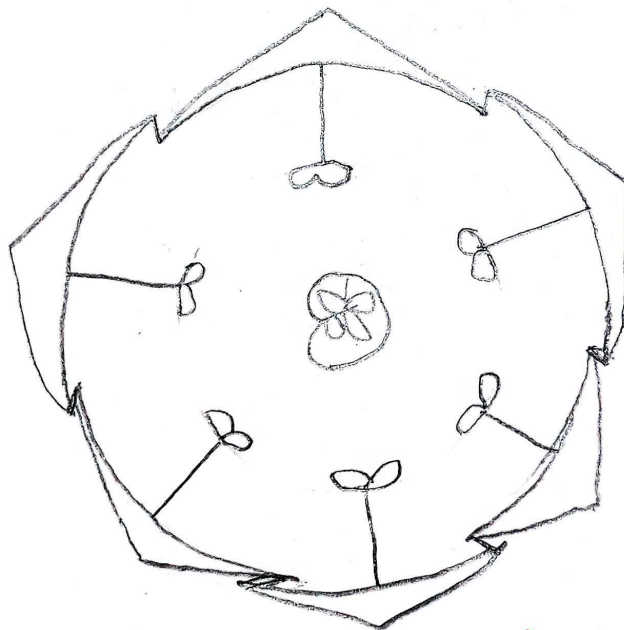
Fruit: capsule

Floral formula: $\text{Br. } \oplus \text{ } \ominus \text{ } \overbrace{\text{P}(3+3)} \text{ } \text{A}_{3+3}$
 $\underline{\text{G}(3)}$

TO STUDY GIVEN ANGIOSPERMIC PLANT IN SEMI-TECHNICAL TERMS AND TO IDENTIFY ITS FAMILY

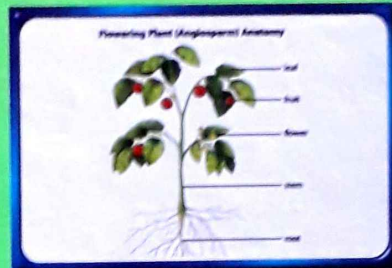
Roll No. : 11

Date : 2022/12/31



Floral diagram
Fig. Family = ~~Liliaceae~~

Sobho
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