पुष्पना International School

Shree Swaminarayan Gurukul, Zundal

Class – XI **Subject: Biology** **Experiment (2020_21)**

Exp. No	Aim
	Section – A
1	Study and describe a locally available common flowering plant, from any one family: Solanaceae or Liliaceae (Poaceae, Asteraceae or Brassicaceae can be substituted in case of particular geographical location) including dissection and display of floral whorls, anther and ovary to show number of chambers (floral formulae and floral diagrams).
2	. Study of distribution of stomata in the upper and lower surfaces of leaves
3	Separation of plant pigments through paper chromatography
4	Study of the rate of respiration in flower buds/leaf tissue and germinating seeds
5	Test for presence of sugar in urine
6	Test for presence of albumin in urine
	B. Study/observation of the following (Spotting)
7	Parts of a compound microscope.
8	Specimens/slides/models and identification with reasons - Bacteria, Oscillatoria, Spirogyra, Rhizopus, mushroom, yeast, liverwort, moss, fern, pine, one monocotyledonous plant, one dicotyledonous plant and one lichen.
9	Virtual specimens/slides/models and identifying features of - Amoeba, Hydra, liverfluke, Ascaris, leech, earthworm, prawn, silkworm, honeybee, snail, starfish, shark, rohu, frog, lizard, pigeon and rabbit.
10	Tissues and diversity in shape and size of animal cells (squamous epithelium, smooth, skeletal and cardiac muscle fibers and mammalian blood smear) through temporary/permanent slides
11	Mitosis in onion root tip cells and animal cells (grasshopper) from permanent slides

Experiment 1

Aim Of The Experiment

To study and describe the three locally available common flowering plants one from each of the families Solanaceae, Fabaceae, Liliaceae(Poaceae, Asteraceae or Brassicaceae can be substituted for specific geographical location) along with dissection and exhibition of floral whorls, anther and ovary to show the number of chambers through floral whorls and diagrams, types of roots (tap and adventitious), stem(woods and herbaceous) and leaf(shape, arrangement, venation, compound and shape).

Family – Solanaceae

This family is referred to as the Nightshade family.

Petunia nyctanginifolia

Habitat	Grown an ornamental herb, Annual.
Root	The root is branched. Tap-root system is observed
Stem	Branched, aerial, solid, green, erect, herbaceous, cylindrical, hairy
Leaf	Consecutive in basal part and opposing decussate in the upper part, simple, cauline and Ramal, sessile, stipulate, acute, ovate, hairy, entire, unicostate, reticulate.
Inflorescence	Axillary dichasial cyme, Cymose.
Flower	Hypogynous, pedicellate, bracteate, hermaphrodite, actinomorphic, regular, pentamerous, complete, cyclic, white or light violet in colour.
Calyx	5 sepals, deeply lobes, green, gamosepalous, inferior, hairy, persistent
Corolla	5 petals, white or light violet in colour, infundibuliform, valvate, gamopetalous, induplicate, inferior, pentafid
Gynoecium	2 carpels (bicarpellary), superior, many ovules in each locule, stigma capitate, placenta swollen, syncarpous, bilocular, style long
Androecium	5 stamens, epipetalous, polyandrous, filaments unequal, basifixed, introse
Fruit	Capsule
Floral formula	Br, ⊕♀♂ K(5),C(5A)$\overline{\quad\quad\quad}$5, G(2)

Family – Papilionaceae (Fabaceae) Pea family

Pisum sativum

Habitat	Cultivated, annual herb
Root	Presence of root nodules, branched, tap.
Stem	Smooth, glaucous, cylindrical, weak, herbaceous, branched, climb with the help of leaf tendrils.
Leaf	Compound, Cauline and Ramal, alternate, stipulate, imparipinnate, terminal leaflet forms a tendril, leaflets 4 to 6.
Inflorescence	Solitary arrangement of flowers or axillary racemes, racemose
Flower	White or pink, complete, zygomorphic, irregular, bracteate, pedicellate, hermaphrodite, papilionaceous, hypogynous
Calyx	Imbricate, 5 sepals, campanulate, gamosepalous
Corolla	White/pink, 5 petals (1 standard, 2 wings, 2 keels united, keels shorter than wings), Corolla papilionaceous, enclosed pistil and stamens, imbricate.
Gynoecium	1 carpel, ovary superior, ovules many style bent and long, terminal, ovary hairy, stigma simple, unilocular, marginal placentation
Androecium	10 stamens in 2 bundles (diadelphous–9+1–9 mixed at the base for the formation of a tube around the ovary, 1 is free), basifixed, dehiscence by longitudinal cleave, anthers bilobed
Seeds	Ground, uniform
Fruit	A legume (pod)
Floral formula	% ⊕♀♂ K(5),C1 +2 +(2), A(9) +1, G1

Family – Liliaceae (Lily family)

Allium cepa

Habitat	Cultivated, Herbs.
Root	The root is fibrous.
Stem	The stem is underground. Altered to disc-like and found enclosed by scale leaves to form a bulb.

Leaf	The leaves are simple.
Inflorescence	leaflets scape or Terminal umbel (The young inflorescence can be surrounded by 2-3 membranous bract)
Flower	White in colour, complete, pedicellate, actinomorphic, bracteate, hermaphrodite, hypogynous
Perianths	Imbricate, gamophyllous, 6 lobed, arranged in 2 whorls of 3 each
Gynoecium	Style short, tricarpellary, axile plantation, Superior ovary, stigma small, trilocular, 2 ovules/locule, syncarpous
Androecium	Polyandrous, anthers, 6 stamens arranged in 2 whorls of 3 each, epiphyllous, long, dorsifixed, introse
Seeds	Seeds are albuminous.
Fruit	Capsule/Berry/
Floral formula	$\oplus ♀♂ P_{3+3}A_{3+3}G(3)$ or P(3+3)

EXPERIMENT 2

Aim

To study the pattern and distribution of stomata in both the upper and lower leaf surfaces.

Theory

Stomata are tiny openings that are located in the young shoots of plants and epidermis of the leaves. They govern the gas exchange process in plants. The structure of the stomata includes a pair of specialized cells that are found girdling around the opening. These cells are termed as guard cells and are responsible to check and regulate the size of the closing and opening of the stomata.

Through the process of transpiration, water escapes from the stomata into the atmosphere in the form of water vapor. Along with this, carbon dioxide and oxygen too are exchanged in the leaf through these openings.

Stomata are distributed differently between dicots and monocots, between the top side and underside of leaves, between different plant species, etc.

Mostly, stomata are found on surfaces of plants that flourish under greater availability of light, lesser carbon dioxide levels in the atmosphere and also in moist environments.

In a dicot leaf, in comparison with the upper surface, the lower surface has a higher distribution of stomata whereas in a monocot leaf, usually, the upper and the lower surfaces usually see an equal distribution of stomata.

Material Required

- Blade
- Forceps
- Dropper
- Glycerine
- Cover slip
- Watch glass
- Glass Slide
- Distilled water
- Needle and brush
- Safranin solution
- Four O'clock plant
- Compound microscope

Procedure

- One fresh leaf from a four-o'clock plant is used in this experiment
- On two watch glasses, add some distilled water
- Slit the leaf in an oblique manner
- With the help of forceps, peel a section from the upper surface of the leaf
- Set this section into one of the watch glass holding water
- With the help of forceps, peel another section from the lower surface of the leaf
- Set this section on another watch glass which is also holding water

- With the help of a dropper, add few drops of safranin solution into both the watch glasses
- Now place cleared glass slides on each of the peels one at a time with the help of a brush
- From each of the peels, cut a square or a rectangular piece with the help of a blade
- With the help of a dropper, add one drop of glycerine on each of the slides
- With the help of a needle, gently place a cover slip on the peel
- Examine each of the glass slides under the microscope
- Notice and count the occurrence of stomata in each of the peels of both the lower and upper epidermis of the four-o'clock leaf.

Observation And Conclusion

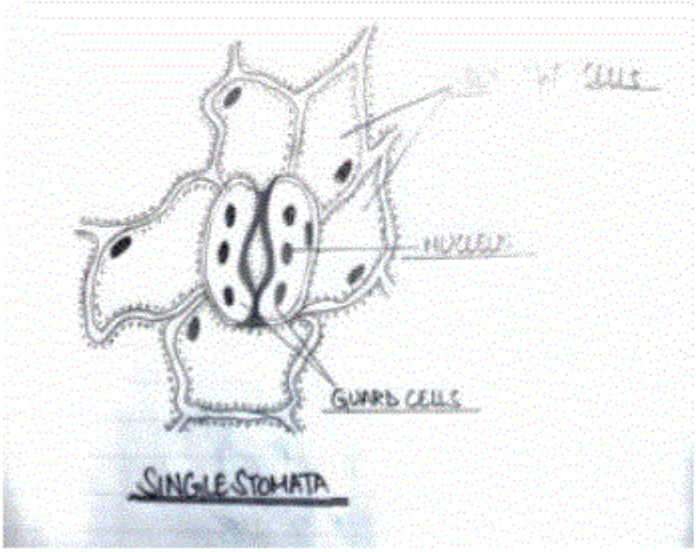
The section of leaf plucked from the four-o'clock plant shows that the number of stomata is much more in the lower epidermis while a few are found in the upper epidermis of the leaf.

Precautions

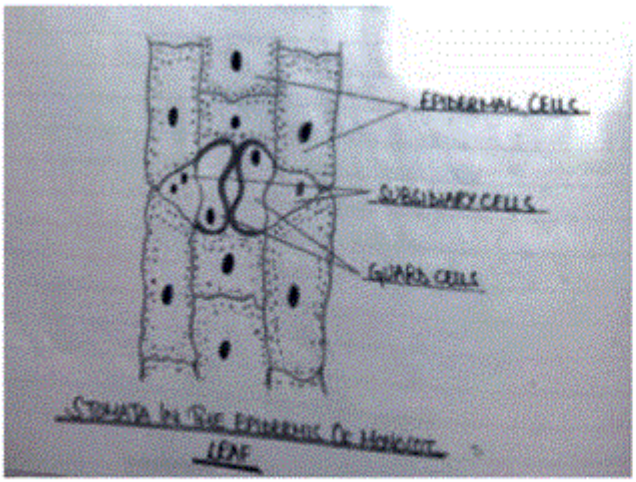
- Avoid leaf curling
- Gently place the cover slip on the slide to avoid air bubbles
- Transferring peel to the slide from the watch glass should always be done using a brush

PRECAUTIONS:

- The cutting of peel should be avoided.
- Always use filter paper to remove the excess of methylene blue.
- Use the brush to transfer the pills from water glass to the slide.
- Air bubbles must be avoided.



Single Stomata



Stomata in the epidermis of monocot leaf.

Experiment 3

Aim

To distinguish and study the various pigments present in plants through the process of paper chromatography.

Theory

Plants carry out the process of photosynthesis, during which light energy from the sun is converted into chemical energy (food). The capturing of light energy is carried out by molecules known as pigments, which are present within the plant cells.

What are Pigments?

Pigments are chemical compounds, which are able to reflect only a particular range of wavelengths of visible light. Leaves of plants primarily contain different types of pigments within their tissues. The four different types of pigments are listed below in a tabular column along with their colours

Pigment	Colour
Chlorophyll A	Dark green
Chlorophyll B	Yellowish-green
Xanthophylls	Yellow
Carotenoids	Orange

In order to view and distinguish the primary four plant pigments, a simple technique known as chromatography can be used

What is Chromatography?

It is a technique that is used to distinguish between different molecules. This differentiation is based on these attributes-shape, size, charge, mass, adsorption and solubility.

Types of chromatography:

- Column chromatography
- Paper chromatography
- Partition chromatography
- Thin-layer chromatography

Mechanism of Paper Chromatography

In this technique, the interaction between three components is involved – solid phase, separation of a mixture and a solvent.

1. At first, the mixture is spotted onto the paper and is dried.
2. The solvent is made to flow through the capillary attraction.
3. While the solvent moves through the paper, the various components of the mixture differentiate into varied coloured spots.
4. Later the paper is allowed to dry and the position of various compounds is viewed.
5. The substance, which is the most soluble moves further on the paper as compared to the other substances that are less soluble.

Material Required

- Chromatography chamber
- Spinach leaves
- Mortar and pestle
- Scissors
- Ether acetone solvent
- Acetone
- Capillary tube
- Pencil
- Spatula
- Scale
- Filter paper strips
- Stapler
- Thread
- Watch glass

Procedure

- In this experiment, spinach leaves are used to separate different pigments.
- Pick a few fresh and green leaves of spinach and wash it.
- Cut out small pieces of spinach using scissors. Add them to the mortar.
- Accurately measure 5ml acetone using a measuring cylinder and add it into the mortar.
- With the help of mortar and pestle, grind the spinach leaves into a smooth paste.
- Shift the prepared paste of spinach into the watch glass with the help of a spatula.
- Place a filter paper strip with a tapering notch towards one ending of the strip.
- Horizontally trace a line with a scale and a pencil that is 2 to 3 cm apart from the notch's tip.
- Using a capillary tube, add 1 drop of the extract of the pigment in the midsection of the line.
- Let the drop dry. Repeat the same process of adding a drop and allowing it to dry for 4-5 times.
- In the chromatographic chamber, pour the ether acetone solvent.
- Make sure to folded and stapled an end side of the paper.
- Suspend the strip in the chamber.
- The loading spot remains about 1 cm above the level of the solvent.
- Let the chamber remain uninterrupted for a while.
- We can notice that the solvent passes along the paper scattering various pigments of the blend to different distances.

- Once the solvent reaches 3/4th of the strip, carefully take the strip off.
- Allow the strip to dry.

Observation

The dried paper strip displays four different bands. Discrete pigments can be distinguished with the help of colours.

Conclusion

1. The Carotene pigment is observed at the topmost as an orange-yellow band of pigments distinctively.
2. Just below this band, a yellowish band appears which indicates the pigment xanthophyll.
3. The third band appearing dark green indicates chlorophyll-a pigment.
4. The yellowish-green band present at the bottom is the chlorophyll b pigment.

Precautions

- The leaves that are selected should be green and fresh spinach leaves
- From the tip of the notch, the loading spot needs to be 2 to 3 cm apart
- While suspending the filter paper strips in the chamber, one need to ensure that the loading spot needs to be set up above 1 cm from the level of solvent.

EXPERIMENT 4

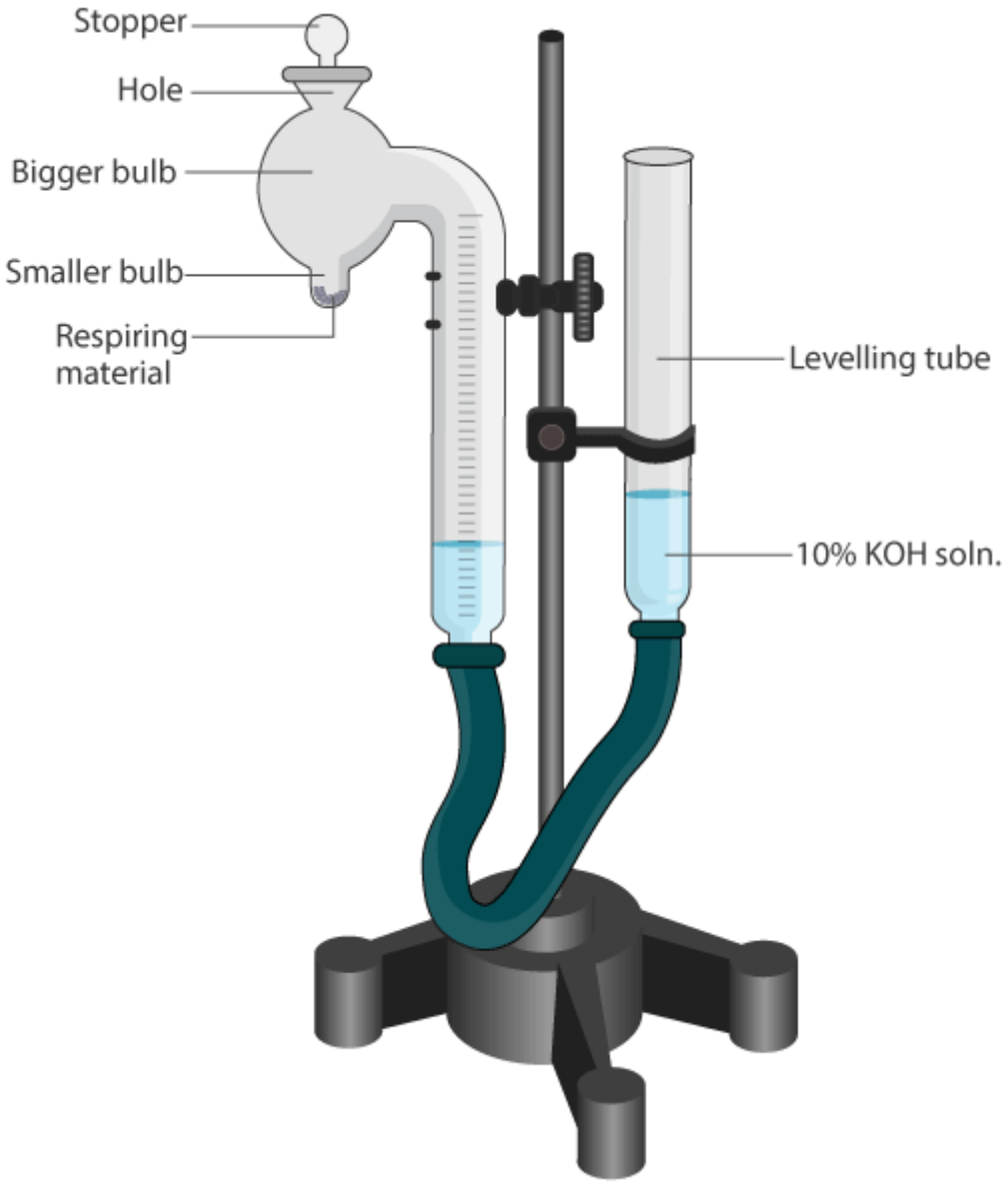
Aim

To study and demonstrate the rate at which respiration takes place in flowering buds or in leaf tissue or in germinating seeds.

Theory

The rate of respiration can be estimated with the help of a Ganong's respirometer as shown in the figure.

Diagram



Apparatus

The apparatus comprises three levelling parts of the tube:

- For the respiring material, there is a bulb that terminates in a 10% KOH win small bulb at the base. The big bulb has a stopper with a lateral hole in it. It is through this hole that the atmospheric association is made through stopper regulation.
- Graduated manometer embedded with the bulb.
- A levelling tube fastened to the manometer using a rubber tubing. The complete set-up is secured on a stand.

Materials Required

- 10% KOH solution.
- Ganong's respirometer.
- Germinating seeds or Flower petals or a Leaf Tissue.

Procedure

- Measure 2ml of respiring material such as flower petals or germinating seeds and place it into the big bulb of the respirometer.
- Into the manometer tube, add 10% KOH solution.
- Initially, through regulation of the bulb stopper, atmospheric air around the respiring material is moved to the atmospheric pressure. The regulation continues till the neck of the bulb and the hole are coinciding.
- The reservoir tube which is placed on the right is levelled in a way that the KOH solution inside the tube reaches the mark of 100ml at the base of the manometer.
- Now the respiring material is enclosed by a setup of 100ml air.
- To start the experiment, turn the glass stopper located at the top. This causes the atmospheric air to be cut off.
- Observe the changes taking place.

Observation

- The changes taking place within the apparatus are noted.
- The solution within the manometer tube is observed to be rising eventually. This is because respiration occurs inside the closed apparatus.
- Readings for the experiment should be taken up till 80ml mark, i.e., Volume: 20ml(as aerial oxygen is 20%). The readings should be taken at an interlude of 10 minutes.
- Every time the liquid needs to be brought to the same mark in both the tubes, i.e., the liquid within the closed tube is made to come under the atmospheric pressure.
- The outcome can be measured as the amount of carbon dioxide that evolves in millimetre which comes out of the respiring material that is used.

Inference

- When the liberated carbon dioxide comes in contact with the KOH solution, it is consumed by it. Oxygen is absorbed hence the KOH solution raises in the manometer tube.
- The rate at which the KOH solution rises is estimated from the rate at which aerobic respiration takes place, measured in terms of consumption of oxygen volume per unit time per 2ml of the respiring material.
- 1/5th of the volume of the atmospheric air is oxygen. Therefore out of 100ml of the contained air inside the respirometer, 20ml of it is oxygen.
- This is why readings are taken up to 20ml rise in the volume of the KOH solution. Post this anaerobic respiration is initiated.

Experiment

Aim

To compare the rate of respiration in various parts of the plants.

Procedure

- Different parts of the plant such as roots, flower buds, and leaves of appropriate herbaceous plants are selected.
- Take 2ml of plant part. It can be measured using the water displacement method.
- Place the sample in bulbs of 3 separate Ganong's respirometers.
- The rate at which respiration takes place is demonstrated using the above-mentioned experiment.

Observation

- In an interlude of 10minutes, the volume of carbon dioxide that is liberated is noted in each scenario.
- Rate of respiration is plotted geographically for every sample taken from different parts of the plant. Comparison is made.

Inference

- The respiration rate is higher always in younger and actively growing meristematic tissues in comparison with the mature and older parts of the plant.
- Protoplasm quantity and respiration rate are directly related. The higher the amount of protoplasm, the more is the rate of respiration.
- Young cells always have a greater quantity of respiratory enzymes and hydration of protoplasm in comparison with vacuolated and mature cells. This is the reason why the rate of respiration is always greater in younger cells that are protoplasm-rich.
- If the space around root hair and roots is supplied with adequate oxygen supply, respiration takes place actively.
- Maximum respiration rate is observed when the experiment is carried out with flower buds as compared to leaves and roots.

EXPERIMENT 5

Aim
To perform a test detecting the presence of sugar in the given sample of urine.

Theory

Urine is an excretory liquid waste, produced by a pair of a kidney, which needs to be eliminated from our body. Through the process of urination, urine is excreted from the urethra. In humans, urine is a pale yellowish liquid containing water and several other chemical components such as uric acid, urea, traces of enzymes, hormones, and carbohydrates.

Properties Of Urine

- It has a characteristic pale yellow colour.
- The yellow colour is imparted by the yellow pigment known as urochrome.
- The urine pH ranges from 4.6 to 8.
- More than 95% of urine constitutes water.
- Organic substances of nitrogenous origins found in urine are creatine, uric acid, urea.
- Other organic matter in urine are lactic acid, oxalic acid.
- Inorganic constituents are potassium chloride, sodium chloride, phosphates, and sulphates.
- Urine abnormally can contain other constituents such as ketone bodies, sugar(glucose), protein, bile and blood.
- Glucose is usually not found in urine. It appears when in blood, the glucose levels exceed the renal threshold of glucose i.e., 160 to 180 mg/dl.
- When glucose is present in urine it is termed as glucosuria. It indicates diabetes mellitus.

Experiment 5

Aim

Sugar presence in a sample of urine can be detected by performing the following two tests:

1. Benedict's test
2. Fehling's test

What is Benedict's Test?

A Benedict's solution serves as a reagent in this test. The reagent is a blend of copper, sodium citrate and sodium carbonate and copper II sulphate pentahydrate ($CuSO_4.5H_2O$)

What is Fehling's test?

In this test, the two different types of Fehling's solution are used:

1. Fehling's solution – A: Aqueous solution of copper II sulphate – Blue colour solution.
2. Fehling's solution – B: Aqueous solution of sodium potassium tartrate – Clear and Colourless solution.

When the urine sample is boiled with the two different reagents, the $CuSO_4$ found in Benedict's and Fehling's solution is reduced by the reducing agent, glucose for the formation of a coloured cuprous oxide precipitate. Depending on the glucose concentration, a yellow, green and brick-red formation of precipitates of oxides take place.

The table below depicts the colour sequence on the basis of glucose level concentration.

Precipitate colour	Sugar level (Percentage)
Blue	Absence of sugar
Green	0.5%-1%
Yellow	1%-2%
Brick red	2% or higher

1. Benedict's Test

Material Required

- Burner.
- Test tube.
- Urine sample.
- Test tube holder.
- Benedict's solution.
- Measuring cylinders.

Procedure

- Take a clean and dried test tube.
- Using the measuring cylinder, accurately measure 2ml of the given urine sample.
- Pour the measured urine sample into the test tube.
- Add accurately 5ml of Benedict's reagent into the test tube containing the urine sample.
- Now fix the test tube holder, bring the test tube near the bunsen burner and allow it to heat for 2 minutes.
- While it is heating, keep stirring the tube continuously.
- Observe the changes.

Observation And Conclusion

Upon heating the sample, gradually, a yellow precipitate is formed in the test tube, which indicates the presence of sugar in the given urine sample. Different precipitates are formed depending upon the sugar concentration in urine, which can be yellow, green, or brick red.

2. Fehling's Test

Material Required

- Burner.
- Test tube.
- Urine sample.
- Test tube holder.
- Measuring cylinder.
- Fehling's solution A.
- Fehling's solution B.

Procedure

- Take a clean and dried test tube.
- Using the measuring cylinder, accurately measure 2ml of the given urine sample.
- Pour the measured urine sample into the test tube.
- Add accurately 2ml of Fehling's solution A into the tube containing urine sample and shake well.
- Add accurately 2ml of Fehling's solution B into the same test tube and mix all the solution slowly.
- Now fix the test tube holder, bring the test tube near the bunsen burner and allow it to heat for 2 minutes.
- While it is heating, keep stirring the tube continuously
- Notice the changes

Observation And Conclusion

Upon heating the sample, gradually, a green precipitate is formed in the test tube, which indicates the presence of sugar in the given urine sample. Different precipitates are formed depending upon the sugar concentration in urine which can be yellow, green, brick red.

Experiment 6

Aim

To perform a test detecting the presence of albumin in the given sample of urine.

Theory

What is albumin?

Albumin is a protein that is produced by the liver. It is a typical constituent of blood that is filtered by the kidney.

What is the significance of albumin?

- It maintains the intravascular oncotic pressure thereby checking the stability of the fluid pressure inside the blood vessels.
- It acts as a carrier proteins for fatty acids, thyroid hormones, steroids in the blood

About Albuminuria

A normally functioning kidney has very less to no traces of albumin in the urine, about 250mg in normal urine in a day. Any damage to the kidney causes an unusual range of albumin, way above the normal level to enter into the urine. This condition is known as albuminuria. If the albumin level is very little and persists to stay abnormal, then the condition is referred to as microalbuminuria.

Causes:

- Can be caused due to the kidney damage from the condition of diabetes
- Albuminuria can also be caused by kidney damage caused by heart failure, high blood pressure, lupus and cirrhosis

Tests that can be carried out to detect the presence of albumin in urine are:

- Heller's Test – A white ring is caused due to albumin precipitation
- Sulphosalicylic acid Test – Coagulation resulting in white cloudiness in the solution

1. Heller's Test

Material Required

- Concentrated nitric acid
- Urine sample
- Test tube
- Measuring cylinder
- Dropper
- Test tube holder

Procedure

- From the reagent bottle, add 5ml concentrated nitric acid accurately using a measuring cylinder, pour it into a test tube
- From the sample urine bottle, add some drops of the urine sample with the help of a dropper

- Pour some sample of urine along the inner side of the test tube with the help of a dropper and by inclining the tube.
- The above step is performed so as to form a covering on the nitric acid
- Notice the changes taking place in the test tube.

Observation And Conclusion

The changes taking place in the test tube is observed. At the intersection of the two layers, a white ring appears which indicates that albumin is present in the given sample of urine.

2. Sulphosalicylic Acid Test

Material Required

- 30% Sulphosalicylic acid
- Urine sample
- Measuring cylinder
- Burner
- Test tube
- Test tube holder
- Dropper

Procedure

- From the sample urine bottle, add 2ml sample of the urine accurately using a measuring cylinder, pour it into a test tube
- Add some drops of the sulphosalicylic acid with the help of a dropper into the tube holding the urine sample
- The solution in the tube turns into a white color
- Securely hold the tube with the help of a holder to heat upon the burner gently.
- Make note of the changes observed

Observation And Conclusion

The given sample of urine appears as a cloudy turbid solution or whitish which indicates that albumin is present in the sample.

B Study / observation of the following (spotting)

Aim

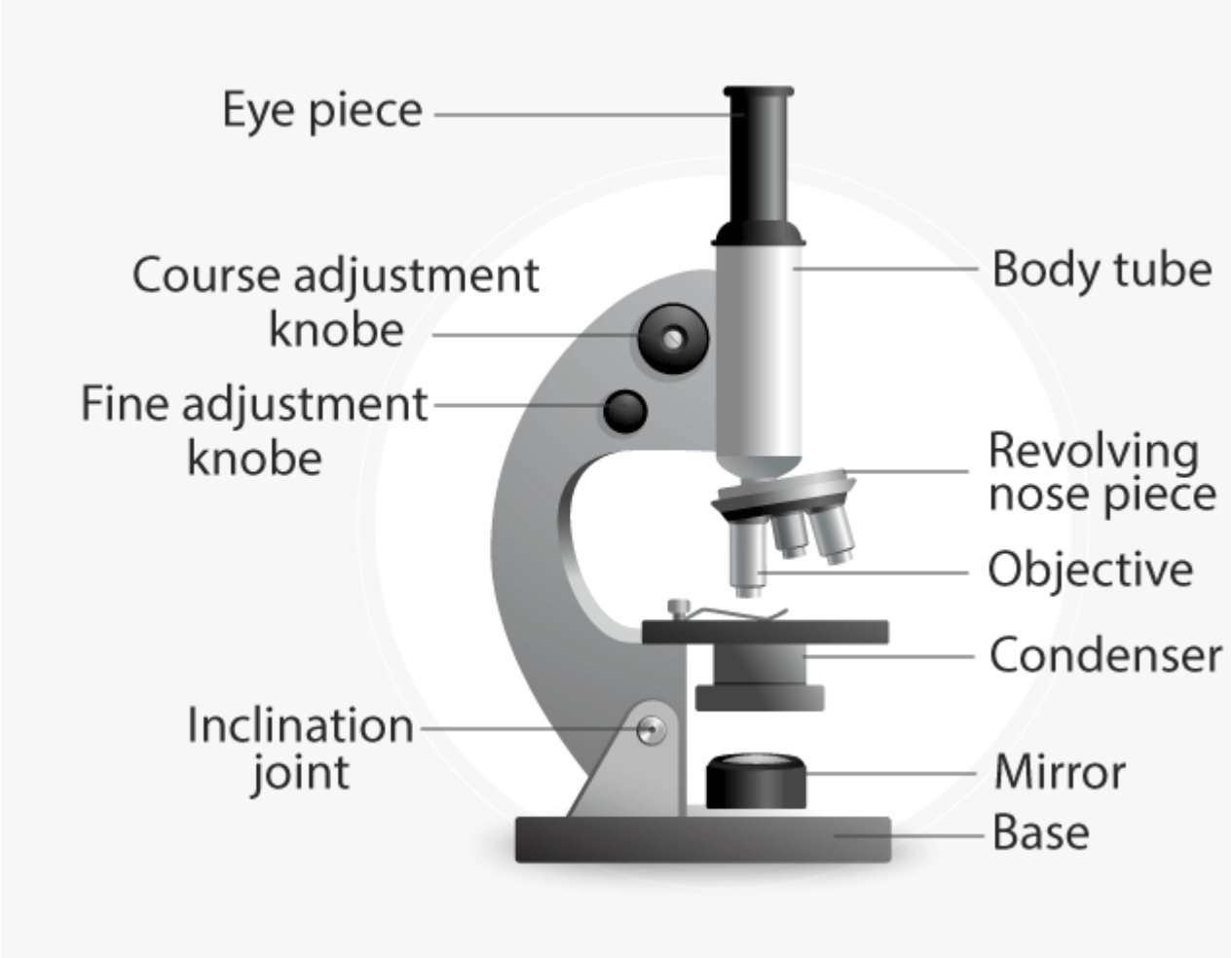
To study different parts of a compound microscope.

Theory

What is a compound microscope?

Real and magnified images of minuscule particles or objects can be achieved using a combination of lenses. A compound microscope is an intricate gathering of a combination of lenses that renders a highly maximized and magnified image of microscopic living entities and other complex details or tissues and cells.

Diagram



Parts of the Compound Microscope

Parts Of Compound Microscope

The parts of the compound microscope can be categorized into:

- Mechanical parts

- Optical parts

(A) Mechanical Parts of a Compound Microscope

1. Foot or base

It is a U-shaped structure and supports the entire weight of the compound microscope.

2. Pillar

It is a vertical projection. This stands by resting on the base and supports the stage.

3. Arm

The entire microscope is handled by a strong and curved structure known as the arm.

4. Stage

The flat and rectangular plate that is connected to the arm's lower end is called the stage. The specimen is placed on the stage for studying and examining the various features. The centre of the stage has a hole through which light can pass.

5. Inclination joint

It is a joint, wherein the arm is fastened to the compound microscope's pillar. The microscope can be tilted using the inclination joint.

6. Clips

The upper part of the stage is connected to two clips. The slide can be held in its position with the help of the clips.

7. Diaphragm

The diaphragm is fastened below the stage. It controls and adjusts the intensity of light that passes into the microscope. The diaphragm can be of two types:

- Disc diaphragm
- Iris diaphragm

8. Nose piece

The nose piece is circular and a rotating metal part that is connected to the body tube's lower end. The nose piece has three holes wherein the objective lenses are embedded.

9. Body tube

The upper part of the arm of the microscope comprises a hollow and tubular structure known as the body tube. The body tube can be shifted down and up using the adjustment knobs.

10. Fine adjustment knob

It is the smaller knob, which is used for sharp and fine focusing of the object. For accurate and sharp focusing, this knob can be used.

11. Coarse adjustment knob

It is a large knob that is used for moving the body tube down and up for bringing the object to be examined under exact focus.

(B) Optical Parts of Compound Microscope

1. Eyepiece lens or Ocular

At the top of the body tube, a lens is planted which is known as the eyepiece. On the rim of the eyepiece, there are certain markings such as 5X, 10X, 15X, etc. Which indicates the magnification power. The object's magnified image can be observed with the help of an eyepiece.

2. Mirror

A mirror is found attached wither to the pillar or the lower end of the arm. It consists of a concave mirror on one side and a plain mirror on the other side. It can be used for reflection of light rays into the microscope.

3. Objective lenses

At the bottom of the body tube, there are two objective lenses, which are connected to the revolving nose piece. The three objective lenses are as follows:

- Oil immersion objective – 100X
- High power objective – 45X
- Low power objective – 10X

Working Mechanism Of The Compound Microscope

- View into the eyepiece. Rearrange the mirror such that adequate light passes into the microscope
- The mirror, lenses, stage, and slides should be cleared of dust and be clean.
- Place the slide in the middle of the stage
- Firmly secure the slide with clips at two edges of the slide to ensure that the slide cannot move
- The nose piece is adjusted in such a way that the low power objective is aligned with the object of focus placed on the slide.
- The coarse adjustment knob can be shifted upwards or downwards such that the slide is well under focus
- Turn the fine adjustment knob by moving upwards or downwards to get a clear and sharp image of the object under focus.
- All minute details of the object are observed under low power objective. Necessary diagrams are sketched.
- The nose piece is now turned to bring the high power objective aligning with the object. The fine adjustment knob is tuned as much as possible to get a bright and precise view of the object.
- In high power, the details of the object are observed. Draw the necessary diagrams. The coarse adjustment knob should not be used when the object is being examined in high power as it can crush the slide.