Std. 12th

BIOLOGY

PRACTICAL HANDBOOK

Instruction for Students :

1. **Writing all practicals is compulsory.**

2. **Blank Page means Blank page of Biology practical record (to be used for drawing diagrams) and lined page means lined page of practical record (to be used for writing full experiment).**

3. **Blank page of each and every experiment should be written by pencil only. Diagrams should be drawn by pencil only.**

4. **Lined page of each and every experiment should be written by blue/black pen.**

5. **Diagrams should be neatly drawn and should be properly labelled.**

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Experiment No 1

Aim: To dissect out the given flowers and display their various parts.

Requirments: Dissecting microscope, Needle, forceps, razor blade, two needles, slides, watchglasses, flowers such as Hibiscus, Brassica or Catharanthus.

(A) Hibiscus rosa-sinesis (Jaswand)

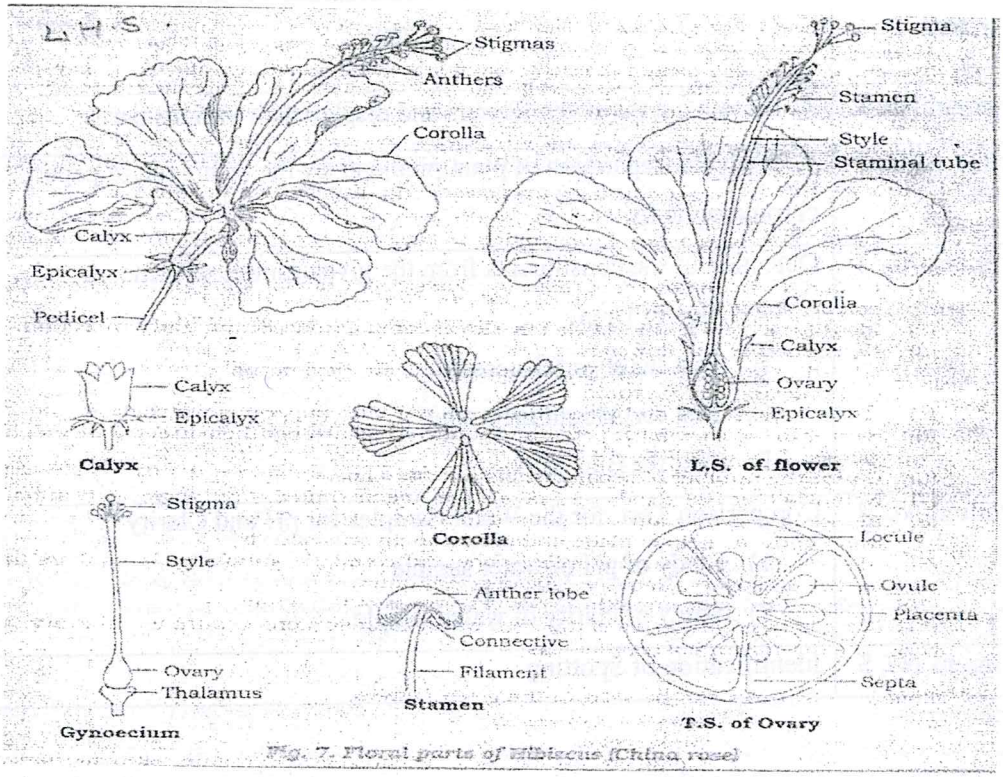

Fig. 7. Floral parts of Hibiscus (China rose)

Experiment No .1

Dissection of the Given Flower and To Display Different Whorls. Dissect Anther and Ovary To Show Number of Chambers

Aim: To dissect out the given flowers and display their various parts.

Requirements: Dissecting microscope, Needle, forceps, razor blade, two needles, slides, watchglasses, flowers such as Hibiscus, Brassica or Catharanthus.

Procedure:

1) Obtain the fresh flowers of Hibiscus Brassica or Catharanthus and observe their colour, shape and size.
2) Identify various floral whorls like calyx, corolla, androecium and gynoecium.
3) Note whether the flower is (a) Pedicellate or Sessile (b) Actinomorphic or Zygomorphic (c) Unisexual or Bisexual.
4) Remove the sepals and place them on a wet filter paper in a watchglass.
5) Similar to sepals, remove petals and stamens and arrange them in separate watch glasses.
6) Count the number of sepals, petals and stamens.
7) Note whether the sepals and petals are free or united. Note their aestivation.
8) Remove the gynoecium and place it in a watch glass. Take a T.S. of anther and ovary with the help of blade and mount them on a slide in a drop of water.
9) Observe under dissecting microscope and count the number of chambers in anther and ovary. Note the type of placentation.
10) Observe and note any other special features of the flowers.
11) Draw labeled diagrams of different whorls and sections of anther and ovary.
12) Note down your observations as –

Observations:

Following features can be seen in the given flowers.

(A) Hibiscus rosa - sinensis (Jaswand):

Family	: Malvaceae
Flower	: Complete, pedicellatebracteate, hermaphrodite, actinomorphic and hypogynous
Epicalyx	: There are 5 - 7 free green bracteoles.
Calyx	: Sepals-5, green, gamosepalous, campanulate, valvate aestivation
Corolla	: Petals-5, polypetalous, large, showy and red coloured, twisted aestivation.
Androecium	: Many stamens, filaments fused, monoadelphous, (filaments fused to form staminal tube and anthers free) , anthers reniform (kidney shaped).
Gynoecium	: Pentacarpellarysyncarpous (5 carpels fused), ovary superior and pentalocularwithaxile placentation, style passes through staminal tube, stigma-5, free capitate.

(B) Brassica juncea (Mustard):

Family	: Brassicaceae
Flower	: Complete, pedicellate, ebractate, hermaphrodite, actinomorphic, tetramerous, hypogynous, cyclic.
Calyx	: Sepals – 4,polysepalous, petaloid, green.
Corolla	: Petals-4, polypetalous, cruciform, valvate aestivation.
Androecium	: Stamens-6 in two whorls (2 + 4), polyandrous, tetradynamous, 2 outer short and 4 inner long dithecous.
Gynoecium	: Bicarpellarysyncarpous, superior ovary with parietal placenatation, bilocularovary, style short, stigma bilobed.

(B) Brassica Juncea (Mustard)

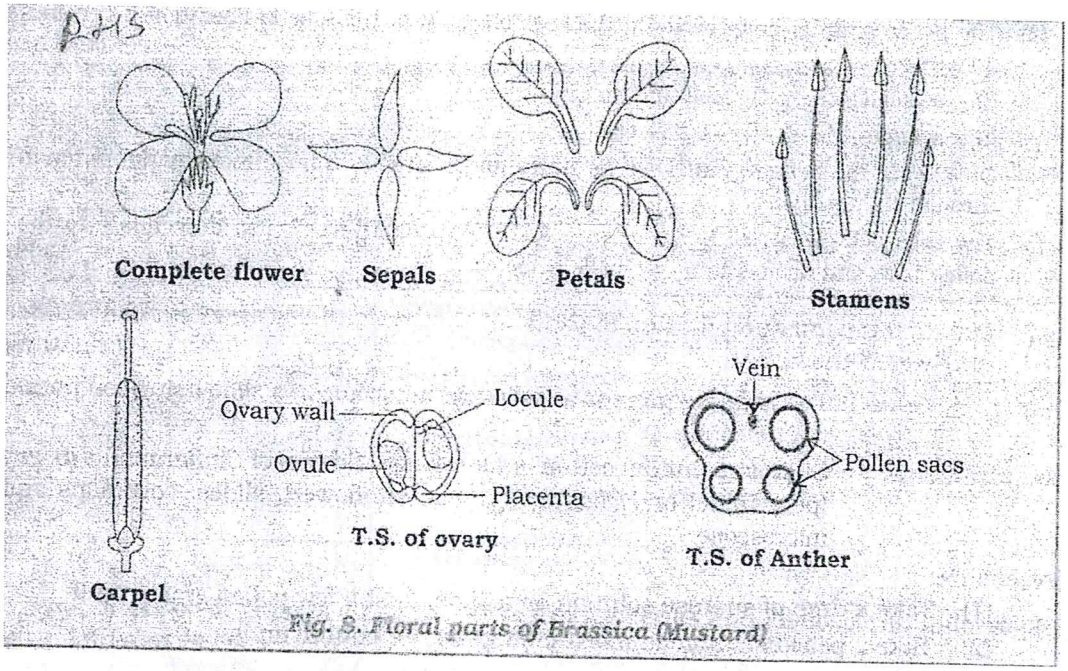

Fig. 8. Floral parts of Brassica (Mustard)

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Experiment No. 2

Aim/ Identification : To study the separation of plant pigments by the technique of paper chromatography.

Diagram:

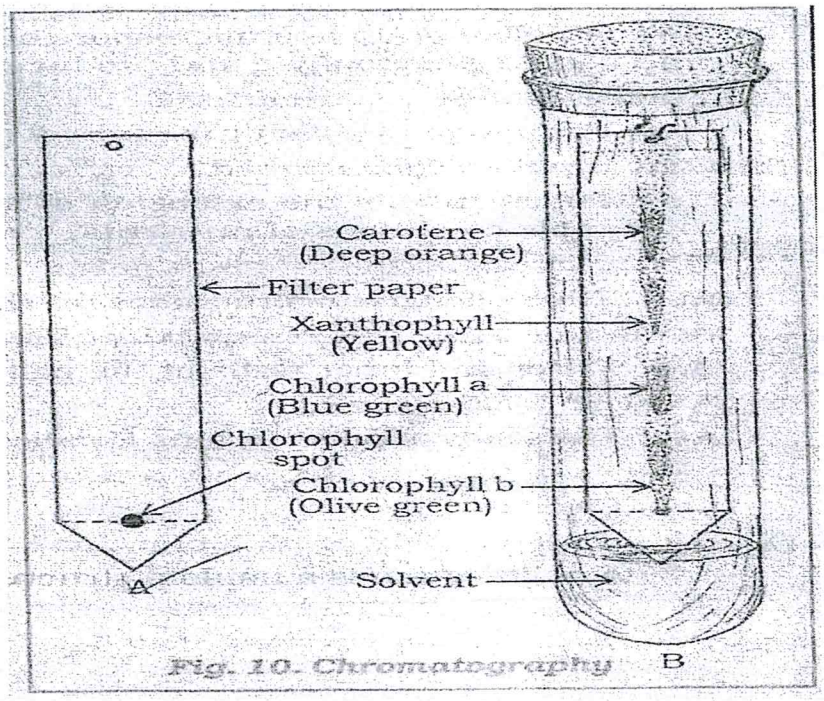

Fig. 10. Chromatography

Conclusion:

(1) Chloroplasts of spinach leaves contain 4 different pigments namely chlorophyll-a, chlorophyll-b, carotenes and xanthophyll.

(2) The pigments travel at different rates along the chromatography paper on the basis of their molecular weight and solubility in the solvent.

(3) The pigments travel in the following order from below:

- (i) Chlorophyll- b, (Olive green/Yellowish green)
- (ii) Chlorophyll - a, (Blue green)
- (iii) Xanthophyll, (Yellow)
- (iv) Carotene, (Orange)

Experiment No. 2

Comment upon the Physiological Experiment set-up

Aim/ Identification : To study the separation of plant pigments by the technique of paper chromatography.

Requirements : Fresh spinach leaves, capillary tube, chromatography (Whatman filter paper No. 1) paper, test tube, 80% acetone. $MgCl_2$, petroleum ether, measuring cylinder, beaker, mortar and pestle, solvent (benzene and petroleum ether in the ratio 3 : 1 V/V)

Procedure:

1) Prepare solvent system as follows: - Take benzene and petroleum ether in the ratio 3 : 1 V/V. Pour it in chromatography chamber (broad test tube) and cover it tightly. Keep it undisturbed for 1 hour for saturation of the solvent system.
2) Grind spinach leaves with acetone and a pinch of $MgCl_2$(as a buffer) and filter through muslin cloth.
3) Take a strip of Whatman filter paper No. 1 and cut it to obtain an arrow-headed strip.
4) Using a capillary tube load the spinach leaf extract on the chromatography paper strip about 1 cm away from its narrow end.
5) Let the spot dry and then apply another spot of the extract over the same. Repeat this 4 - 5 times so as the concentrate the spot with pigment mixture.
6) Pour the chromatography solvent in a broad test tube. This serves as a solvent chamber.
7) Hang the chromatography paper strip with the help of a hook into the solvent chamber such that the point of loading remains above the solvent level.
8) Seal the solvent chamber with a cork and keep it undisturbed for 5 - 10 minutes. Solvent begins to rise along the paper strip.
9) Remove the paper strip from the solvent chamber when the solvent reaches the end of the paper strip.
10) Allow it to dry and observe the separation of photosynthetic pigments in the form of separate bands of different colours.

Observations:

The chromatography paper strip shows four distinct spots of different colours at different positions. They are in the order as below: (1) Olive green (2) Blue green (3) Yellow (4) Orange

Conclusion:

(1) Chloroplasts of spinach leaves contain 4 different pigments namely chlorophyll-a, chlorophyll-b, carotenes and xanthophyll.
(2) The pigments travel at different rates along the chromatography paper on the basis of their molecular weight and solubility in the solvent.
(3) The pigments travel in the following order from below:
    (i) Chlorophyll- b, (Olive green/Yellowish green)
    (ii) Chlorophyll - a, (Blue green)
    (iii) Xanthophyll, (Yellow)
    (iv) Carotene, (Orange)

Experiment No. 3

Detection of the constituents from the given sample of urine.

(A) Test for Urea

Aim : To detect the presence of urea the given sample of urine.

Requirements : Urine sample, soyabean flour or Tur dal flour, phenolphthalein, Litmus solution, 1% acetic acid, test tubes, test tube holder, water bath, etc.

Principle : Soyabean flour contains the enzyme urease which catalyse urea into ammonia and CO_2. Evolution of ammonia can be detected by an indicator (either litmus or phenolphthalein.) Ammonia being alkaline reacts with the indicator to develop colour.

Result : Urea is present in the given urine sample.

Clinical Significance of Urea:

(1) Increased amount of urea more than normal in blood is called uraemia.
(2) Low level of urea in urine indicates kidney problem or inadequate protein in diet.
(3) High level of urea indicates too much of protein in diet or higher protein breakdown in body.

Experiment No. 3

(A) Test for Urea

Aim : To detect the presence of urea the given sample of urine.

Requirements : Urine sample, soyabean flour or Tur dal flour, phenolphthalein, Litmus solution, 1% acetic acid, test tubes, test tube holder, water bath, etc.

Observation Table:

Sr.No	Procedure	Observation	Inference
(1)	Specific Uease Test: (i) (With phenolphthalein as indicator)- 5 ml urine sample + 2 drops of phenolphthalein + pinch of soyabean flour. Keep the mixture in water bath for 5 minutes.	Mixture turns pink	Urea is present in given urine sample. Soya provides urease which catalyses urea into NH_3 and CO_2. NH_3 being alkaline reacts with phenolphthalein and develops pink colour.
	(ii) (With oxalic acid) Add a drop of oxalic acid into a drop of urine sample on a clean slick or in the test tube.	Clear crystals of urea oxalate are formed	Urea is present in the given sample. Urea reacts with oxalic acid to form oxalate crystals.

Result : Urea is present in the given urine sample.

Clinical Significance of Urea:

(1) Increased amount of urea more than normal in blood is called uraemia.
(2) Low level of urea in urine indicates kidney problem or inadequate protein in diet.
(3) High level of urea indicates too much of protein in diet or higher protein breakdown in body.

Experiment No. 3

(B) Test for sugar (Glucose)

Aim : To detect the presence of sugar in the given sample of urine.

Requirements : Urine sample, Benedict's reagent, Fehling's solution A and B, test-tube, test tube holder, spirit lamp, etc.

Observation Table:

Sr.No	Procedure	Observation	Inference
(1)	Benedict's Test- 2 mL urine sample + 2 mL Benedict's reagent. Boil for 2-3 minutes and cool it under tap water.	Green /yellow/red colouredppt is formed. [Colour changes are observed depending on concentration of sugar. Blue < Green < Yellow < Orange < Brick red]	Sugar is present in the given urine sample as glucose reduces alkaline $CuSO_4$ present in Benedict's reagent to cuprous oxide (Cu_20) giving the brick red ppt.
(2)	Fehling's Test: 3 mL urine sample + 1 mL Fehling's A + 1 mL Fehlings B. Mix and boil mixture on a flame or in H_2O bath for 2 minutes.	Black red ppt. is formed	Sugar (glucose) is present in urine as the ppt of cuprous oxide (Cu_20) is formed because CuSO4 present in Fehling's solution is reduced by glucose.

Result: Given sample of urine contains sugar.

Clinical significance :

(1) Presence of glucose in urine, the disease is called diabetes mellitus.

(2) Glucose is reducing agent. It reduces copper sulphate into cuprous oxide of Benedicts solution. As per the quantity reduced it gives different coloured ppt.

(3) If there is no change in colour and remains blue, then sugar is absent. But if

(i) 0.5 % sugar is present in urine then the colour turns yellow.

(ii) 1% sugar gives orange ppt.

(iii) 1.5% sugar gives brick red ppt.

Experiment No. 3

(B) Test for sugar (Glucose)

Aim : To detect the presence of sugar in the given sample of urine.

Requirments: Urine sample, Benedict's reagent, Fehling's solution A and B, test-tube, test tube holder, spirit lamp, etc.

Principle : All reducing sugars (Glucose, fructose, lactose, pentose) readily reduce copper sulphate in alkaline solution to insoluble yellow to red cuprous oxide. Special tests are required for identification of different sugar occurring in urine.

Result: Given sample of urine contains sugar.

Clinical significance :

(1) Presence of glucose in urine, the disease is called diabetes mellitus.

(2) Glucose is reducing agent. It reduces copper sulphate into cuprous oxide of Benedicts solution. As per the quantity reduced it gives different coloured ppt.

(3) If there is no change in colour and remains blue, then sugar is absent. But if

(i) 0.5 % sugar is present in urine then the colour turns yellow.

(ii) 1% sugar gives orange ppt.

(iii) 1.5% sugar gives brick red ppt.

Experiment No. 3

(C) Test for Albumin (Protein)

Aim : To detect the presence of albumin in the given sample of urine.

Requirments : Urine sample, test tube, test tube holder, conc. Nitric acid (HNO_3), 20% sulphosalicylic acid.

Principle : All methods used for qualitative examination are based on precipitation of proteins by chemical agents. The proteins (albumin, globulin) in urine precipitate i.e. become insoluble due to precipitation (denaturing) agents like sulphosalicylic acid, alcohol etc. Normal urine contains about 0.075 gm of proteins per 24 hours. "The presence of albumin in urine is detected by the formation of ring at the point of contact of the urine and the nitric acid layers".

Result : In the given urine sample albumin is present.

Clinical significance :

(1) Albumin is protein found in blood. As albumin are larger molecules which never get filtered during ultrafilteration. The presence of albumin indicates damage to nephron as nephritis or urinary tracts infection.

(2) The presence of albumin in urine is called aibuminuria or proteinuria.

(3) It results from kidney diseases, high protein diet, urinary tract infection, high fever and heart attacks.

Experiment No. 3

(C) Test for Albumin (Protein)

Aim : To detect the presence of albumin in the given sample of urine.

Requirments : Urine sample, test tube, test tube holder, conc. Nitric acid (HNO_3), 20% sulphosalicylic acid.

Observation Table :

Sr.No	Procedure	Observation	Inference
(1)	Sulphosalicylic Acid Test: 2 mL urine + 2 mL 3% sulphosalicylic acid added drop by drop. Allow the mixture to stand for 5 minutes.	White cloudy ppt. is formed	Albumin is present (Alkaloid reagent in sulphosalicylic acid reacts with albumin to form ppt).
(2)	Nitric Acid Ring Test (Heller' g Test) – 2 mL conc. HNO_3 + 2 mL urine sample added very slowly drop by drop from the sides of test tube.	At the junction of 2 fluids cloudy white ring is formed.	Albumin is present (Albumin reacts with conc. HNO_3 forming a white ppt. in the form of a ring).

Result : In the given urine sample albumin is present.

Clinical significance :

(1) Albumin is protein found in blood. As albumin are larger molecules which never get filtered during ultrafilteration. The presence of albumin indicates damage to nephron as nephritis or urinary tracts infection.

(2) The presence of albumin in urine is called aibuminuria or proteinuria.

(3) It results from kidney diseases, high protein diet, urinary tract infection, high fever and heart attacks.

Experiment No. 3

(D) Test for Bile Salts

Aim : To detect the presence of bile salts in the given sample of urine.

Requirements : Urine sample (Bile can be obtained from the gall bladder of any animal), test tube, test tube holder, sulphur powder, cane sugar, conc. H_2SO_4, nitric acid and burner.

Observation Table :

Sr.No	Procedure	Observation	Inference
(1)	Hay's Sulphur powder Test : 5 mL urine + sprinkle little powder of sulphur(sulphur flowers) on the surface	The powder sinks rapidly to the bottom	Bile salts are present in the given urine sample. (Bile salts reduce the surface tension of urine so sulphur flower sink. They float in normal urine.)

Result : Bile salts present in the given sample of urine.

Clinical significance :

(1) The presence of bile salts in urine is due to the condition called jaundice.
(2) There are various causes for jaundice such as hepatitis. blockage of bile duct and inflamation of the liver.
(3) In all the above causes, bile enters into the blood stream and from there into the urine.

Experiment No. 3

(D) Test for Bile Salts

Aim : To detect the presence of bile salts in the given sample of urine.

Requirements : Urine sample (Bile can be obtained from the gall bladder of any animal), test tube, test tube holder, sulphur powder, cane sugar, conc. H_2SO_4, nitric acid and burner.

Principle : Bile is the secretion produced by liver. The presence of bile salts reduce the surface tension of the solution making sulphur powder sink.

Result : Bile salts present in the given sample of urine.

Clinical significance :

(1) The presence of bile salts in urine is due to the condition called jaundice.
(2) There are various causes for jaundice such as hepataties. blockage of bile duct and inflamation of the liver.
(3) In all the above causes, bile enters into the blood stream and from there into the urine.

Experiment No. 4

Comparison Test for the Water Samples for pH and Clarity

(1) Study of PH of water sample

Aim : To study pH of various water samples.

Requirements : Universal indicator or pH paper, water samples from pond, river, lake, well, sea, etc. in separate beakers, test tubes.

Procedure :

(1) Take 10 ml of water sample in a test-tube and put 5 drops of universal indicator in it or dip pH paper in it.
(2) Observe the colour change and match it with the pH colour chart.
(3) Record the observations.
(4) Repeat the experiment with all other water samples given.

Conclusion : pH of water is an indicator of impurities. Pure water has neutral pH i.e. 7, pH less than 7 indicates acidic nature, pH more than 7 indicates alkaline nature.

Experiment No. 4

(1) Study of PH of water sample

Aim : To study pH of various water samples.

Requirements : Universal indicator or pH paper, water samples from pond, river, lake, well, sea, etc. in separate beakers, test tubes.

Observations : Water samples collected from different sources have different pH values.

Sr. No	Water Sample	pH	Nature of water (Acidic /Alkaline / Neutral)
1.	Pond water		
2.	Lake water		
3.	Sea water		
4.	Well water		
5.	River water		

Conclusion :- pH of water is an indicator of impurities. Pure water has neutral pH i.e. 7, pH less than 7 indicates acidic nature, pH more than 7 indicates alkaline nature.

Experiment No. 4

2) Study of clarity of water samples

Aim : To study the clarity of water collected from different water sources.

Requirements : Water samples from lake, pond, swimming pool in separate beakers of 500 ml each, a wooden or a card board box with holes on two opposite surfaces, a torch, etc.

Diagram:

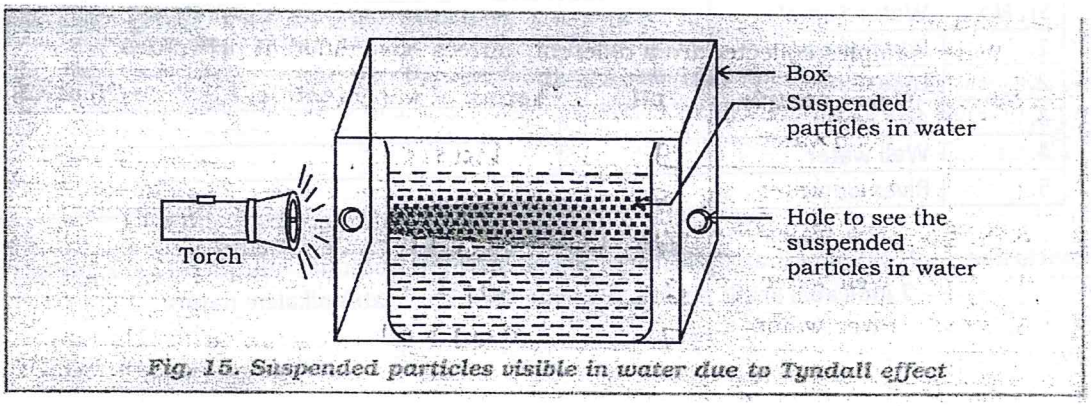

Fig. 15. Suspended particles visible in water due to Tyndall effect

Observation:

Due to Tyndall effect (Scattering of light by particles) the suspended particles in water are visible in presence of light.

Sr. No	Water Sample	Turbidity	Clarity
1	Distilled water	No turbidity	Clear and transparent (standard).
2	Swimming pool	Less turbid	Water is less polluted and more clear.
3	Lake water	Moderately turbid	Water is less polluted and moderately clear.
4	Pond water	Highly turbid	Water is muddy and not clear.

Conclusion : A turbid water sample is less clear and more polluted Hence it is not suitable for consumption without treatment. Thus the clarity of the water sample indicates the degree of pollution in it.

Experiment No. 4

Comparison Test for the Water Samples for pH and Clarity

(2) Study of clarity of water samples

Aim : To study the clarity of water collected from different water sources.

Requirments : Water samples from lake, pond, swimming pool in separate beakers of 500 ml each, a wooden or a card board box with holes on two opposite surfaces, a torch, etc.

Procedure :

(1) Fill the beaker upto 3/4th with the given water sample.
(2) Prepare Tyndall set-up from a card-board box as shown in diagram.
(3) Place the beaker in the box as shown in the figure and close the box.
(4) Switch off the lights in the room and light the torch. Place the torch on one hole and observe through another hole.
(5) Pour distilled water in a clean beaker and use this as standard.
(6) Record your observations for all the three water samples.
(7) Perform the experiment in dark for better results.

Conclusion : A turbid water sample is less clear and more polluted Hence it is not suitable for consumption without treatment. Thus the clarity of the water sample indicates the degree of pollution in it.

Experiment No 5.

Spot (A)

Study of Pollen Grain Germination on Stigma through a Permanent Slide

Aim : To study pollen grain germination on stigma through a permanent slide.

Requirements : Permanent slide showing pollen germination on stigma, microscope.

Procedure :

(1) Observe the permanent slide showing pollen germination on stigma under a microscope.
(2) Draw labelled diagram of what is seen in the microscope.

Observations :

(1) The slide shows several germinating pollen grain on the stigmatic region of the carpel.
(2) The pollen grains germinate on stigma.
(3) Some of the pollen grains show pollen tube which is formed by enlargement of tube cell and stretching of the intine. It comes out through the germpore.
(4) The pollen tube penetrates stigmatic tissue and then through the stylar canals reaches to the ovary.
(5) The pollen grains show pollen tubes of varying lengths each containing tube nucleus in the front and two male gametes behind it.

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Experiment No 5.

Spot (A)

Aim : To study pollen grain germination on stigma through a permanent slide.

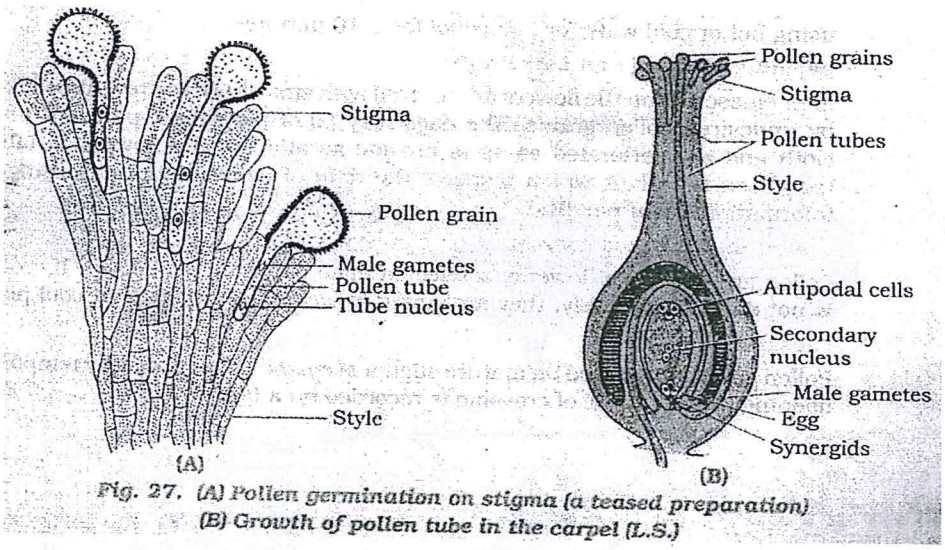

Fig. 27. (A) Pollen germination on stigma (a teased preparation) (B) Growth of pollen tube in the carpel (L.S.)

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Experiment No 5.

Spot (B)

Exercise on Controlled Pollination Emasculation, Tagging and Bagging

Aim : To comment on the exercises of hybridization through models/charts.

Diagram :

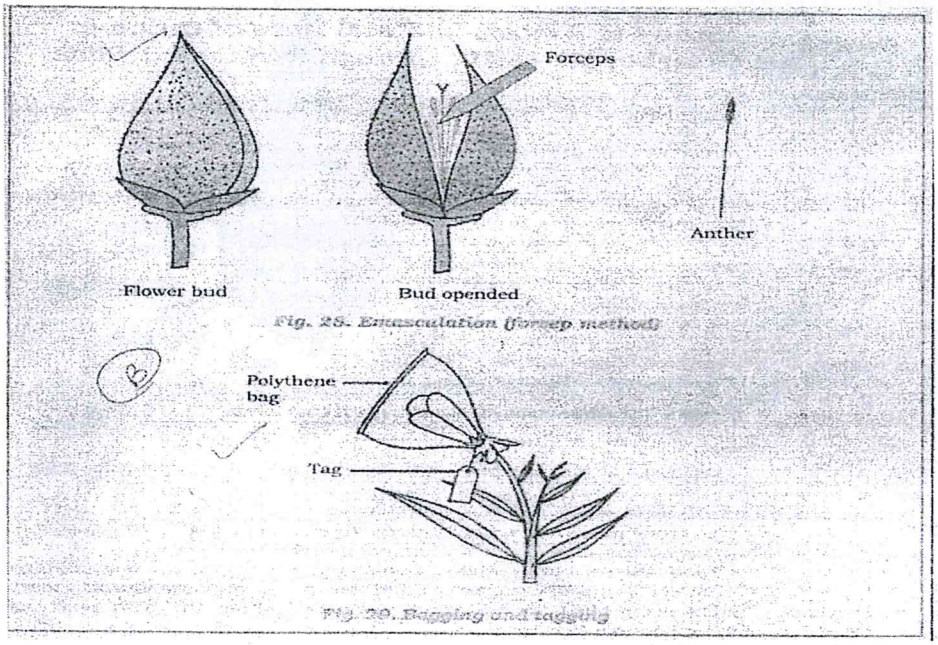

Fig. 28. Emasculation (forcep method)

Fig. 29. Bagging and tagging

Experiment No 5.

Spot (B)

Exercise on Controlled Pollination Emasculation, Tagging and Bagging

Aim : To comment on the exercises of hybridization through models/charts.

Requirement : Chart or picture showing the technique of hybridization.

Procedure :

(1) Emasculation : It is a process of removal of stamens before maturity to avoid self pollination. In large sized flowers it is done with forceps or scissors. In crop plants such as paddy, sorghum etc. which have smaller flowers, emasculation is carried out using hot or cold water or in alcohol for 1-10 minutes.

(2) Bagging, Tagging and Labelling : After emasculation the flowers are covered with small bags to prevent pollination by undesired pollen grains. The bags may be of polythene, paper or muslin cloth and are perforated so as to provide aeration to the flowers. A label is tagged on the plant which displays the date of emasculation, crossing and information about parents.

Experiment No 5.

Spot (C)

Study of Plants found in Xerophytic and Aquatic Conditions with respect to their Morphological Adaptations

(1) Xerophytic Plants

Aim : To study plants found in xerophytic conditions with respect to their morphological adaptations.

Requirements : Plants of Opuntia, Calotropis etc.

Description of Morphological Adaptations

A) Opuntiadillenii (Nagphani) :

(1) It is a succulent, drought resistant xerophyte growing wild in arid areas.
(2) The leaves are modified to spines in order to reduce transpiration.
(3) The stem becomes green, flattened to taken over the function of photosynthesis. It is called phylloclade
(4) Phylloclades are with many nodes (areoles) and internodes. The areoles have one or more spines.

B) CalotropisProcera:

(1) It is a non-succulent xerophytes
(2) it is a drought enduring desert shrub.
(3) the leavers are thick and leathery.
(4) the plant contains latex.

Experiment No 5.

Spot (C)

(1) Xerophytic Plants

Aim : To study plants found in xerophytic conditions with respect to their morphological adaptations.

Diagram :

A) Opuntiadillenii (Nagphani)

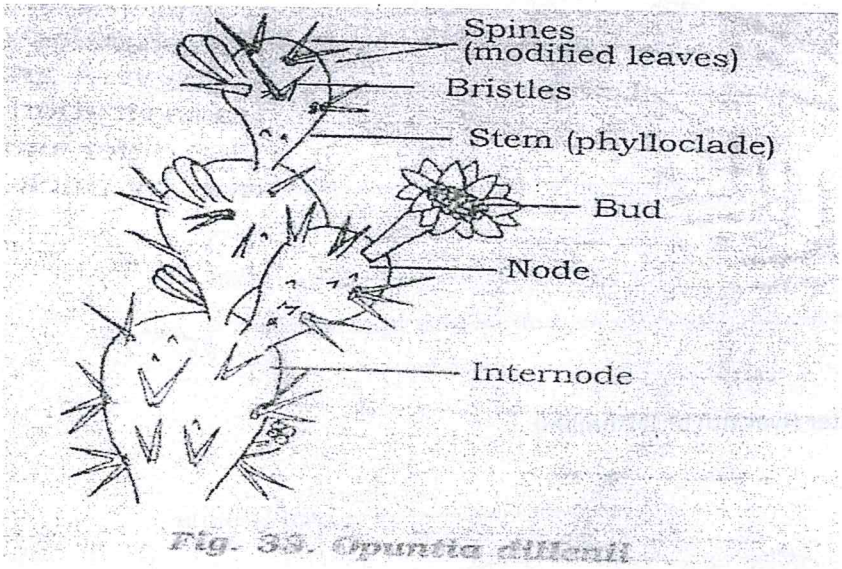

Fig. 33. Opuntia dillenii

B) Calotropisprocera

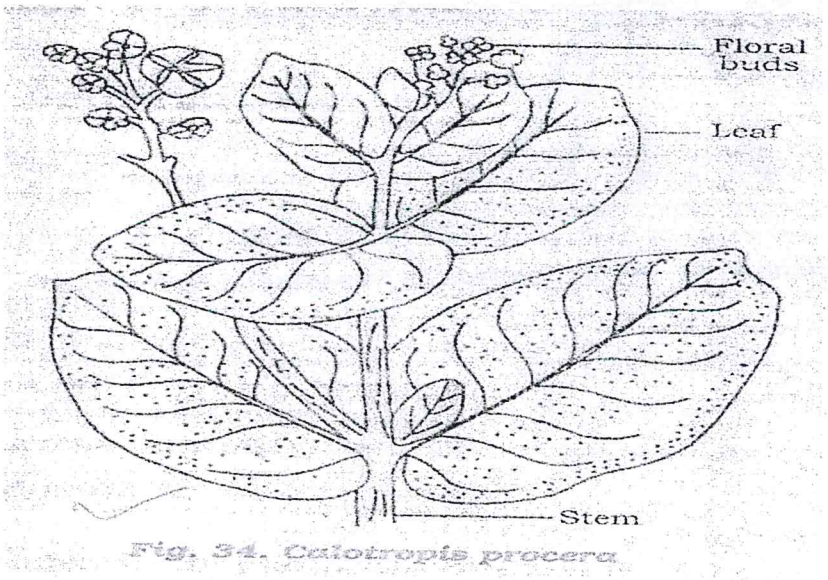

Fig. 34. Calotropis procera

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Experiment No 5.

Spot (C)

2) Aquatic Plants

Aim : To study plants found in aquatic condition with respect to their morphological adaptions.

A) Hydrilla

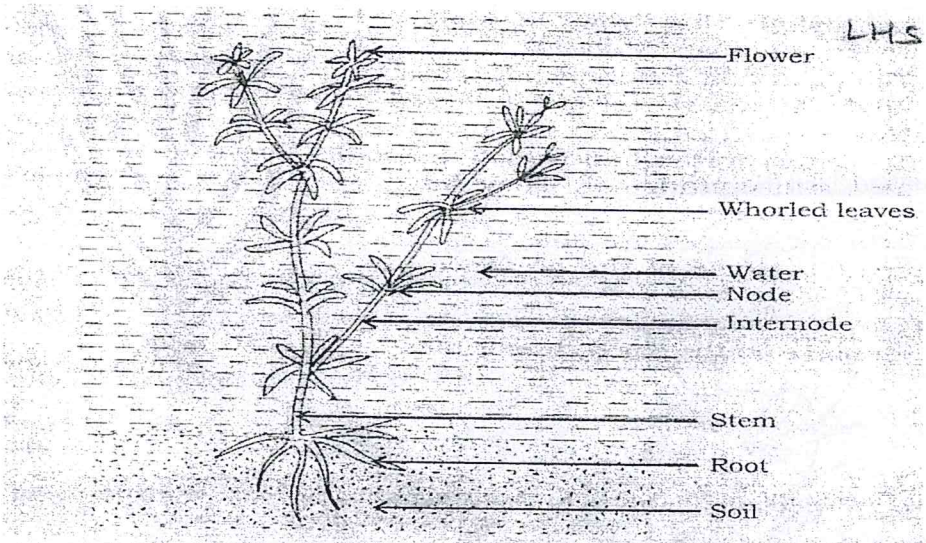

Fig. 36. Hydrilla (a submerged hydrophyte)

B) Eichhornia (Water Hyacinth or Jalkumbhi)

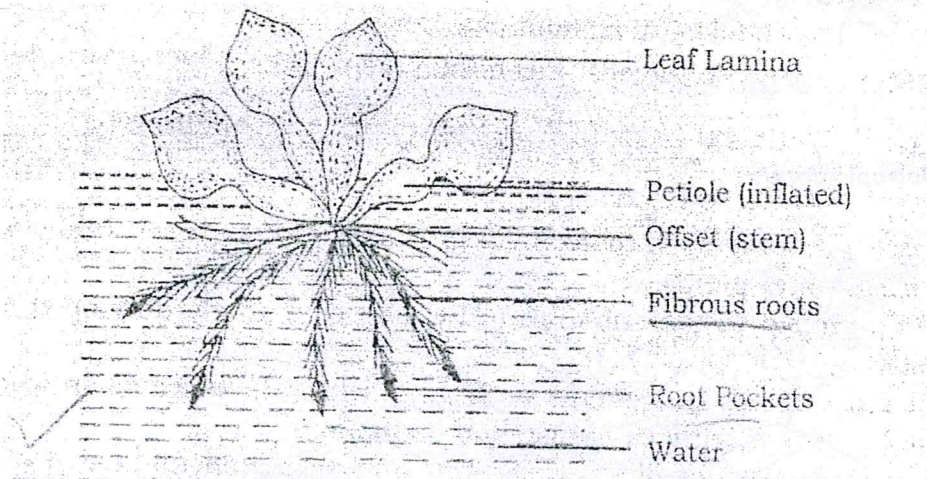

Fig. 37. Eichhornia - Water hyacinth (a free-floating hydrophyte)

Experiment No 5.

Spot (C)

2) Aquatic Plants

Aim : To study plants found in aquatic condition with respect to their morphological adaptions.

Requirments : Plants ofhydrilla , Eicchorniaetc

A) Hydrilla:

1. Hydrilla is submerged rooted hydrophyte i.e grows entirely under water, found in fresh water ponds.
2. The stem is soft and slender with thin membranous leaves in whorls of 3-8
3. Mechanical tissues like collenchymas and sclerenchyma are absent.
4. Conducting tissues are poorly developed.

B) Eichhornia (Water Hyacinth or Jalkumbhi)

1. Eichhornia is a free floating hydrophyte that grows in fresh water bodies.
2. The lamina has water proof, coating of cuticle
3. Adventitious roots are also produced in clusters at nodes, they acts as balancers.
4. They have root pockets. Root hairs are absent.

Experiment No 5.

Spot (D)

Study of any one of the permanent slide (T.S of Testis, T.S of Ovary, V.S of Blastula)

Aim : To study and identify the stages of gamete development from T.S. of testis and T.S of ovary through permanent slide.

Requirements: Permanent slide of T.S. of testis and T.S. of ovary, V.S. of blastula, microscope, etc.

Procedure : Fix the slide under the microscope. Initially adjust under the low power then under high power.

Observations :

(1) Stages of Spermatogenesis (Male gamete development) from T.S of Mannalian Testis

1. Testis is externally covered by a thick fibrous, tissue called tunica albuginea.
2. Testis show a large number of long convoluted seminiferous tubules.
3. Various stages in the development of sperms like -spermatogonia,
4. Large and prominent Sefton cells are present between the tubules
5. All stages of spermatogenesis can be seen at any time in a seminiferous tubule.

(2) Stages of Oogenesis (Female gamet development) From T .S of Mammalian Ovary

1. A mammalian ovary is a solid structure bounded by germinal epithelium.
2. The ovary consist of outer cortex and inner medulla region.
3. The cortex contains many rounded or oval bodies called ovarian or graafian follicles in various stages of development like primary oocyte, secondary oocvte and a mature graafian follicle.
4. Medulla region consists of stroma made up of connective tissue, blood vessels and nerve fibers.
5. The cortex contains young and mature follicles.
6. As a primary follicle continues to grow, the theca folliculi differentiates into –
   (i) Theca interna - a highly vascularised internal layer of secretory cells.
   (ii) Theca externa - an outer layer of connective tissue cells.

Experiment No 5.

Spot (D)

Aim : To study and identify the stages of gamete development from T.S. of testis and T.S of ovary through permanent slide.

Diagram :

(1) Stages of Spermatogenesis (Male gamete development) from T.S of Mannalian Testis

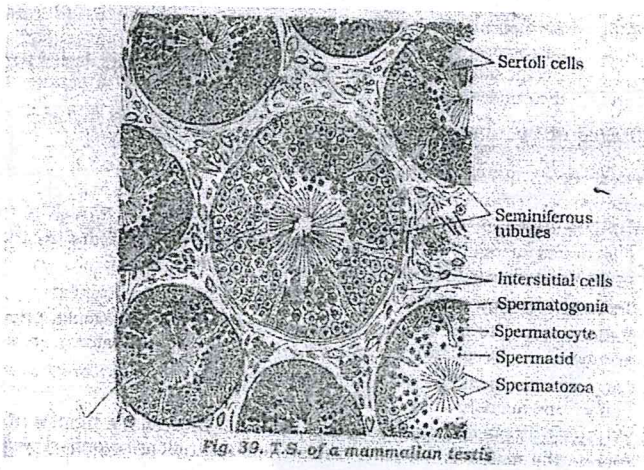

Fig. 39. T.S. of a mammalian testis

(2) Stages of Oogenesis (Female gamet development) From T .S of Mammalian Ovary

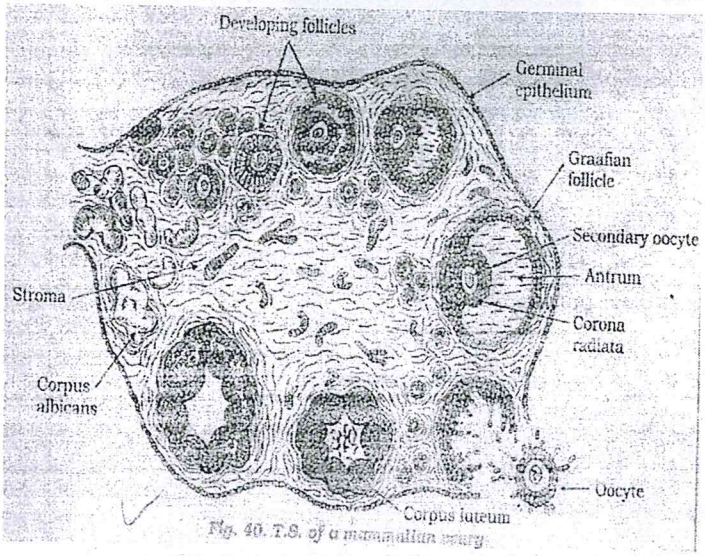

Fig. 40. T.S. of a mammalian ovary

Experiment No 5.

Spot (E)

1) Rolling of Tongue (Autosomal dominant)

Aim : Study and analyse the given pedigree chart for the genetic trait of tongue rolling.

Diagram :

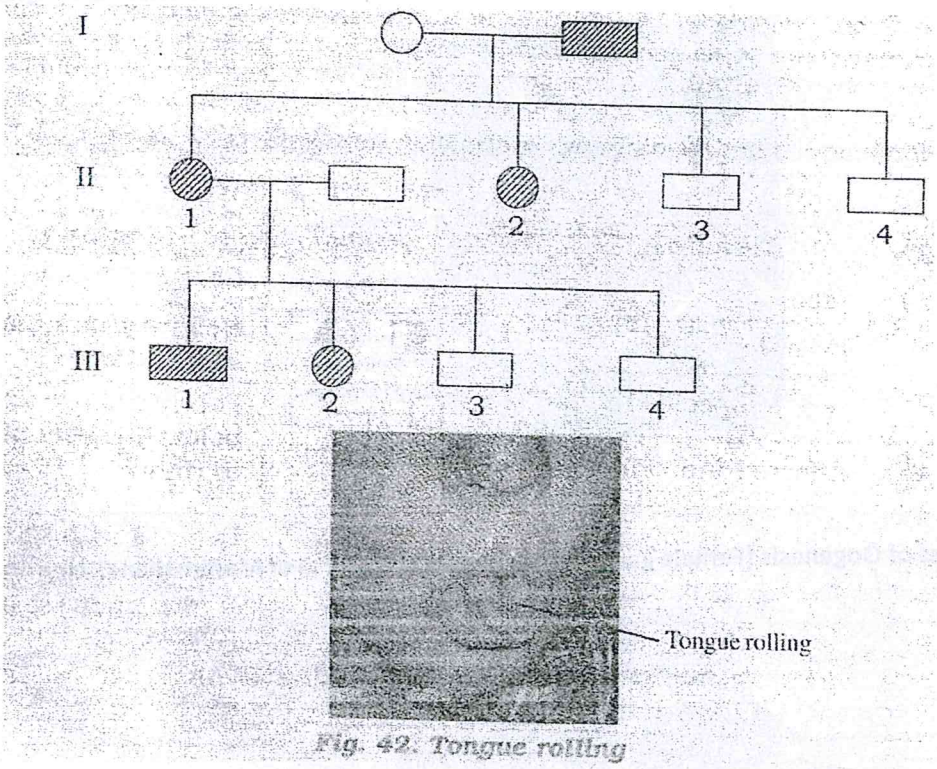

Fig. 42. Tongue rolling

Experiment No 5.

Spot (E)

Comment on the Prepared Pedigree Charts of Genetic Traits such as Rolling Tongue, Blood Groups, Widow's Peak, Colour Blindness.

1) Rolling of Tongue (Autosomal dominant)

Aim : Study and analyze the given pedigree chart for the genetic trait of tongue rolling.

Observations :

1. Pedigree chart is a record of occurrence of a trait in several generations of a human family. In this case tongue rolling (R, r) is a given genetic trait
2. Solid symbol represents the tongue roller and open symbols denote normal or non-roller individual.
3. Marriage between roller daughter with non-roller male produces three sons and one daughter of which two off springs are tongue roller.

Conclusions :

1. Male parent as tongue roller is heterozygous (R, r)
2. Female parent cannot roll her tongue.

Experiment No 5.

Spot (E)

(2) Widow's Peak (Autosomal dominant)

Aim : Study and analyze the given pedigree chart for the genetic trait of Widow's peak.

Observations :

1. Pedigree chart is a record of occurrence of a trait in several generations of a human family. In this case Widow's peak (W. w) is a given genetic trait
2. Solid symbol represents the widow's peak trait and open symbols denote straight hair line individuals.
3. The given pedigree chart shows that a female parent with widow's peak hair trait marries with a straight hairline male.
4. Marriage between widow's peak hairline son with straight hairline female produces three daughters and one son of which two offsprings are with widow's peak hairline.
5. Widow's peak hairline is not related to gender.

Conclusion : Female parent with widow peak hairline is heterozygous (W, w).

Experiment No. 5

Spot (E)

(2) Widow's Peak (Autosomal dominant)

Aim : Study and analyse the given pedigree chart for the genetic trait of Widow's peak.

Diagram :

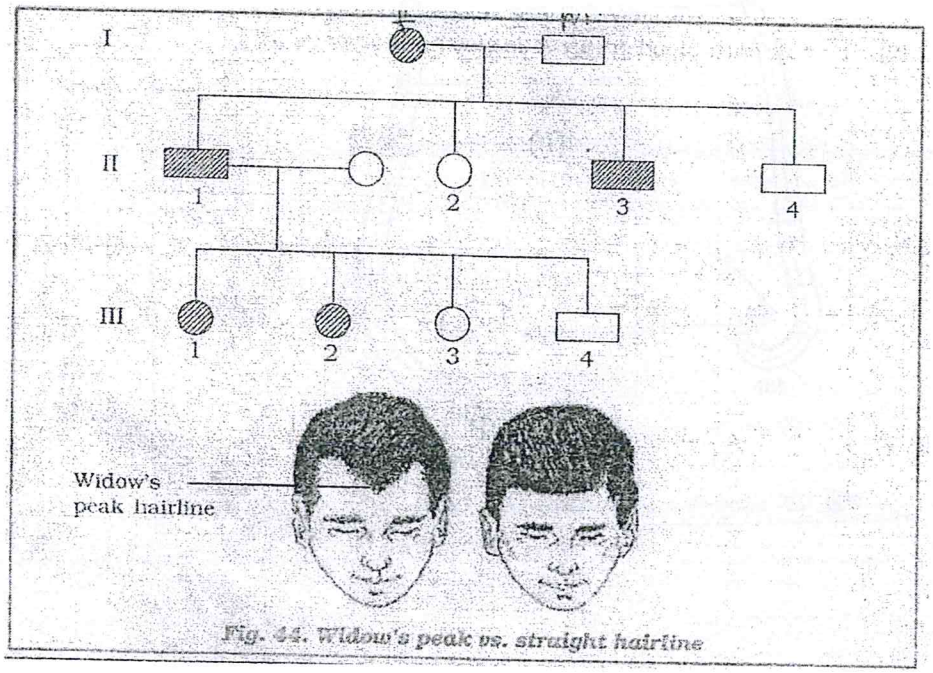

Fig. 44. Widow's peak vs. straight hairline

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Experiment No 5.

Spot (F-A)

(A) Ascaris: Ascaris lumbricoides (Roundworm)

Diagram :

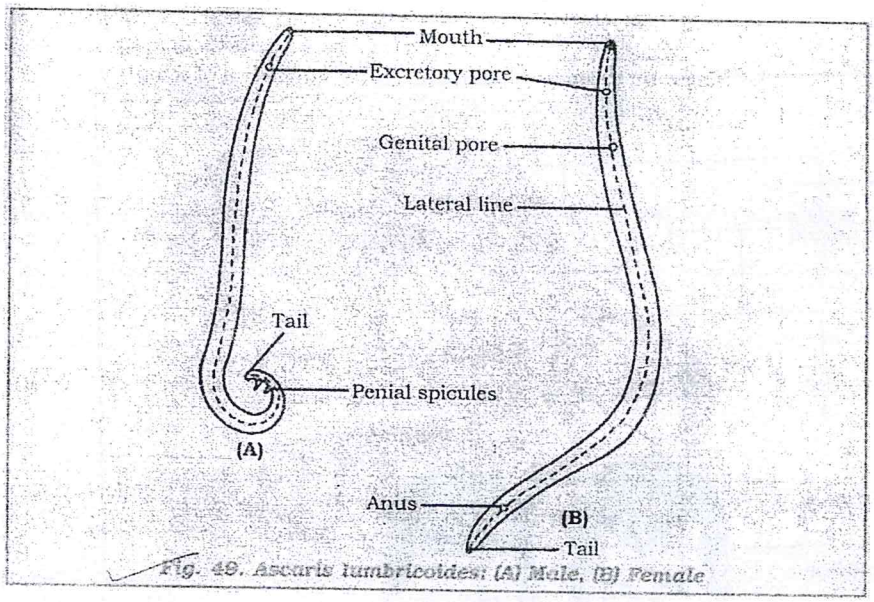

Fig. 48. Ascaris lumbricoides: (A) Male, (B) Female

Experiment No 5.

Spot (F - A)

(A) Ascaris : Ascarislumbricoides (Roundworm)

Salient Features :

(1) Habit and Habitat :

i. Ascaris is a large roundworm that lives as an endoparasite inside the small intestine of human beings and other animals

(2) Physical appearance :

i. The body is pale white unsegmented and cylindrical with tapering ends,

(3) Sexual dimorphism :

i. Male and female ascaris are different in appearance and are separate.

ii. Male is smaller than female and measures about 15 - 30 cm in length. Posterior end of male is curved ventrally and shows a pair of penial setae.

Disease and symptoms :

1. Ascariasis causes pain in the intestine as the intestinal wall gets eroded.
2. It results in vomiting, diarrhoea, constipation and insomnia (sleeplessness).

Experiment No. 5

Spot (F - A)

(B) Ringworm – Microsporumandouini

Salient Features :

1. Microsporumandouini is commonly called ringworm
2. Ringworm (dermatophytotis) is not a worm.
3. The fine mycelium of the fungus occurs in break in the dermis.

Diseases and Symptoms :

1. Skin infection appear as flat, spreading ring like lesions followed by itching.
2. Scaling or cracking of skin especially between toes.
3. Hair become grey and lusterless and may lead to permanent baldness.

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Experiment No. 5

Spot (F - A)

(B) Ringworm – Microsporumandouini

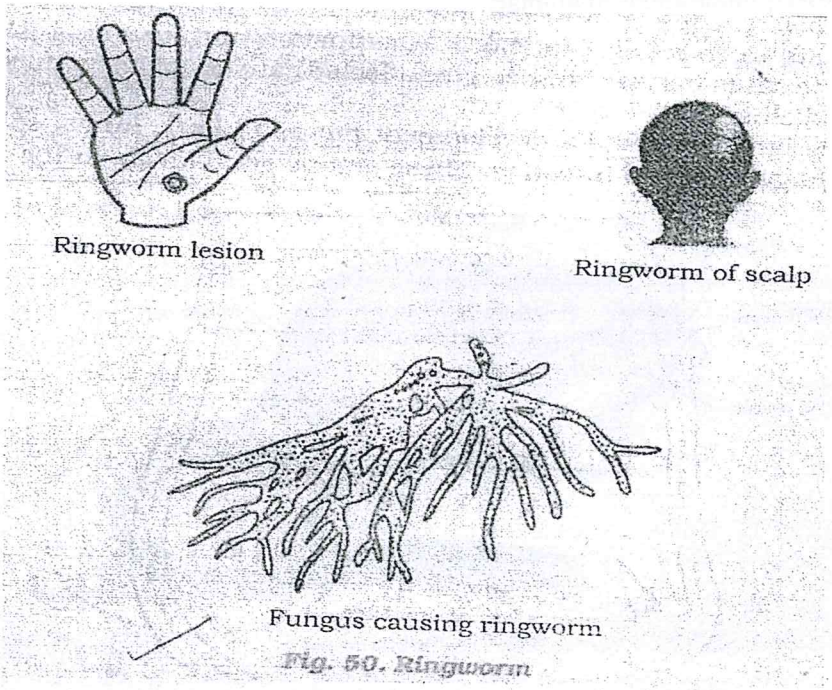

Fig. 50. Ringworm

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Experiment No 5.

Spot (F - B)

a) Xeric (Desert) Adaptations In Animals

i. Kangaroo Rat

Diagram :

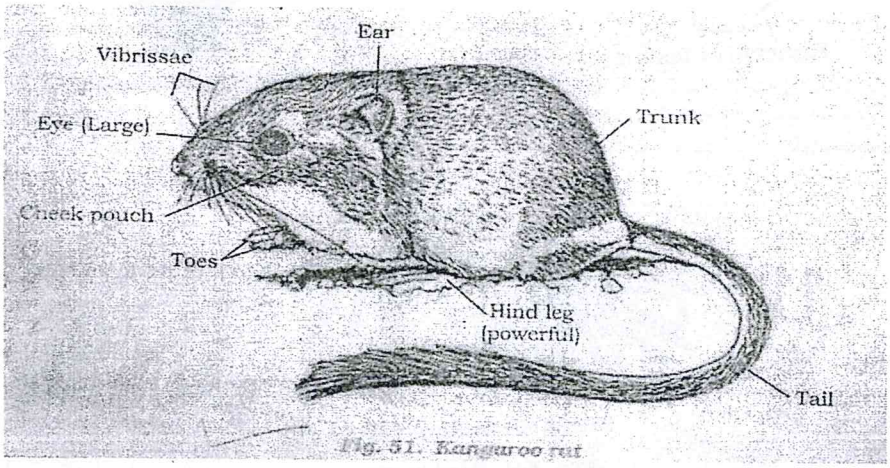

Fig. 51. Kangaroo rat

Experiment No 5.

Spot (F - B)

(A) Study of animals found in Xeric (desert) and Aquatic conditions with respect to their morphological adaption (Two animals each)

a) Xeric (Desert) Adaptations In Animals

i. Kangaroo Rat

1. It is a Xerocoles rodent, which avoids heat by adopting nocturnal habits.
2. It seals its burrow by day to keep its chamber moist.
3. It goes into a 'move-freeze' mode which reduces predation at night.
4. It converses water, by lowering its metabolic rate, thus reducing the loss of water through its skin and respiratory system.

Experiment No 5.

Spot (F - B)

(A) Study of animals found in Xeric (desert) and Aquatic conditions with respect to their morphological adaption

(b) Aquatic Adaptations In Animals

i) A fresh water fish (ROHU)

1. Body of fishes is stream-lined and laterally compressed to reduce friction and to allow swift passage in water while swimming.
2. It respires by gills which are specialized breathing organs to use gases dissolved in water.
3. It has air-bladder or swim bladder which acts as an accessory respiratory and hydrostatic organ to maintain buoyancy.
4. Eyes have no eyelids. Eyes are protected by hardened lens.

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Experiment No 5.

Spot (F-B)

(b) Aquatic Adaptations In Animals

i. A fresh water fish (ROHU)

Diagram :

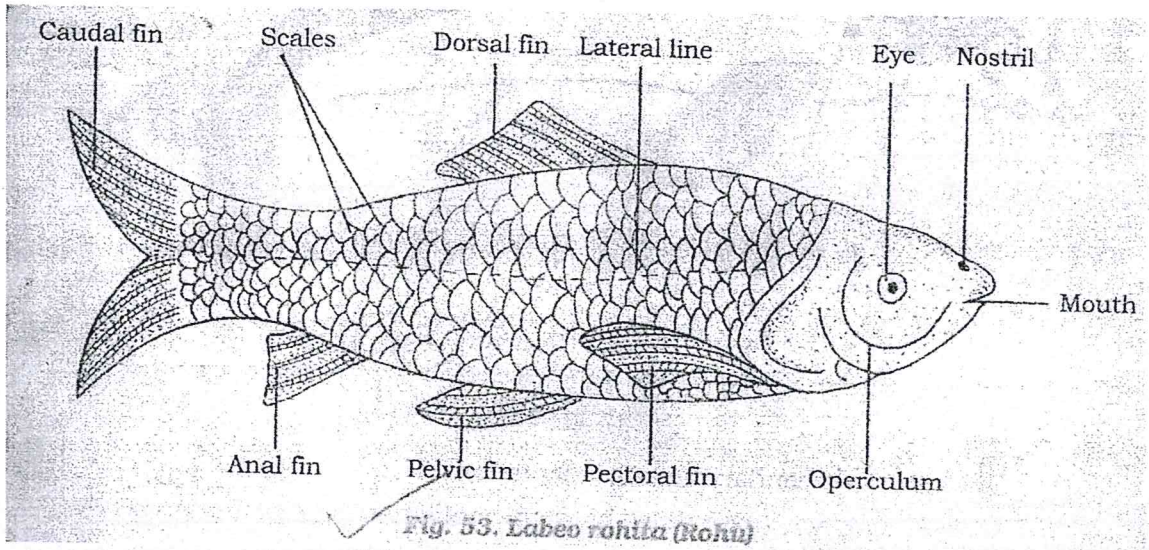

Fig. 53. Labeo rohita (Rohu)