

**IX CLASS**  
**BIOLOGY**  
**LAB RECORD**

(English Medium)



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## ACTIVITY - 1

### OBSERVING PLANT CELL AND CELL MEMBRANE (CELL ITS STRUCTURE AND FUNCTIONS)

**Aim:** To observe the plant cell and cell membrane in Rheo leaf.

**Materials required:** Rheo leaf, slide, water, cover slip and microscope.

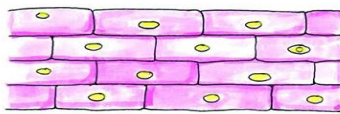
**Precautions:** We have to take a thin peel of Rheo leaf.

#### Procedure:

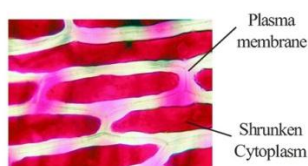
1. Take Rheo leaf and tear the leaf in a single stroke.
2. Observe it against the light and take a small piece of leaf peel with light colored portion.
3. Put it on the slide and put a drop of water on it.
4. Cover it with cover slip and observe the light portion of leaf under microscope.
5. Draw the diagram and put 1-2 drops of dilute salt solution the membrane and leave it for 5 to 10 minutes.

#### Observations:

1. When the Rheo leaf is observed under microscope, a tissue of rectangular compactly arranged plant cells are seen.



2. But when we put the salt solution over the peel of Rheo leaf, water present inside the leaf cells comes out.
3. It results in the shrinking of cytoplasm along with the cell membrane.



4. The outer boundary of colored area is actually the cell membrane or plasma membrane which becomes separated from the cell wall.

#### Details:

1. The Rheo leaf peel is the typical example for plant cells which are rectangular and compactly arranged .
2. The cell membrane and cell wall are the outer covering of the plant cell. The cell membrane is made up of lipids and proteins where as the cell wall is made up of cellulose, hemi cellulose, etc.

## ACTIVITY – 2

### OBSERVING NUCLEUS (CELL ITS STRUCTURE AND FUNCTIONS)

**Aim:** To observe the nucleus in cheek cells.

**Materials required:** An ice cream spoon, glass slide, cover slip, watch glass, needle, blotting paper, 1% methylene blue, normal saline, glycerine, microscope, etc.

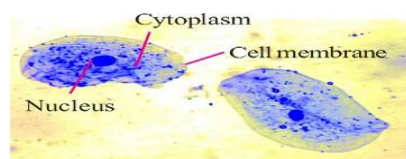
**Precautions:**

1. Do not scrape the cheek too hard as it may injure buccal mucosa.
2. Scraped material should be spread uniformly on the slide.
3. Excess stain should be drained off.
4. There should be no air bubbles under the cover slip.

**Procedure:**

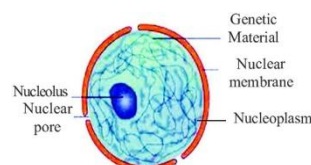
1. Wash the mouth and scrape a little of the internal lining of the cheek inside the mouth with a clean ice cream spatula.
2. Place the scrape in a watch glass containing a very small quantity of normal saline.
3. Then place the material on a glass slide
4. Put a drop of methylene blue and wait for a couple of minutes.
5. Wipe off the extra stain with a fine cloth or blotting paper.
6. Put a drop of glycerine over it.
7. Place a cover slip and tap the cover slip with the blunt end of needle so as to spread the cells.

**Observation:** Under low magnification it is observed that the cells are shapeless containing a dense nucleus at the center of the cell.



**Details:** 1. The dark coloured dot in the cells is known as nucleus. It is the largest and most distinct of all cell organelles.

2. It is covered with nuclear membrane and contains all genetic information. It also controls all functions of the cell.



## ACTIVITY – 3

### OBSERVING MITOCHONDRIA (CELL ITS STRUCTURE AND FUNCTIONS)

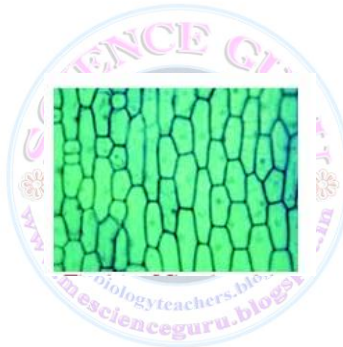
**Aim:** To observe the mitochondria in the cells of onion peel cells.

**Materials required:** Onion peel, Janus green - B solution, watch glass, cover slip and microscope.

**Procedure:**

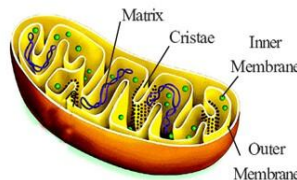
1. Make a fresh solution of Janus green - B in a beaker.
2. Mix 200 mg Janus Green - B in 100 ml of water.
3. Take watch glass, pour some solution, put the onion peel in this solution and keep it for about half an hour.
4. Keep a piece of onion peel on the slide and wash thoroughly with water.
5. Cover the slide with a cover slip and observe under microscope at high magnification.
6. Draw the diagram and compare it with the given diagram.

**Observation:** Green oval or cylindrical grains scattered in the cytoplasm are observed. These are known as Mitochondria.



**Details:**

1. Mitochondria are small, spherical or cylindrical organelles with 2-8 microns long and about 0.5 micron wide. It is about 150 times smaller than the nucleus.



2. When seen under the compound microscope, the mitochondria appear as oval or cylindrical dots in the cell. Electron microscope reveals their unique internal structure in great detail.
3. Information derived from the electron microscope tells us that the mitochondria are made of double membrane wall.
4. The inner membrane of the wall protrudes into interior in folds and forms cristae. The space between the cristae is known as matrix.
5. Mitochondria are responsible for cellular respiration and are known as 'power houses of the cell'.

## ACTIVITY – 4

### OBSERVING MITO CHONDRIA (CELL ITS STRUCTURE AND FUNCTIONS)

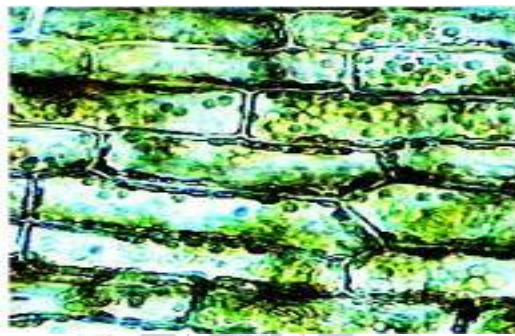
**Aim:** Observation of chloroplast in Rheo leaf

**Materials required:** Rheo leaf peel, slide, coverslip and compound microscope.

**Procedure:**

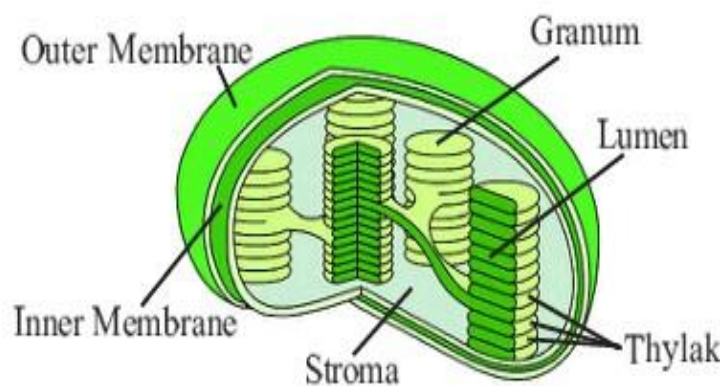
1. Take the peel of Rheo leaf and mount it in water on a slide.
2. Observe it under compound microscope and draw it in observation note book.

**Observation:** Small green granules are observed scattering in the cells. These are known as chloroplasts.



**Details:**

1. Chloroplast is a type of plastid in green color and it is of different shapes as disc, oval, etc.
2. The diameter of chloroplasts in higher plants can vary between 4 to 10 microns.
3. The primary function of chloroplasts is to trap energy from sunlight and transform it to chemical energy, thus helping to carry out photosynthesis.



## ACTIVITY – 5

### OBSERVING VACUOLE IN SUCCULENT PLANT (CELL ITS STRUCTURE AND FUNCTIONS)

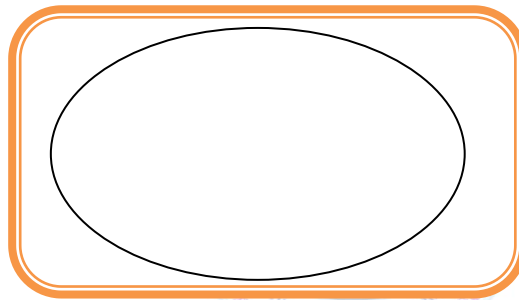
**Aim:** To observe the vacuole in a succulent plant.

**Materials required:** Leaf or stem of any succulent plant, blade, watch glass, safranin solution, slide and microscope.

**Procedure:**

1. Take the leaf or stem of any succulent plant ( ex: cactus )
2. Take thin cross section of stem of cactus in a watch glass containing water.
3. Stain it with dilute safranin solution.
4. Observe the section under low and high power microscope and draw it.

**Observation:** The large empty space is observed which are called as vacuole.



**Details:**

1. The large empty spaces present in the cell are vacuoles.
2. These are fluid filled sac like structures.
3. In mature plant cells they might occupy almost the entire cell space.
4. Vacuoles maintain turgor pressure within the cell.
5. They export unwanted substances from the cell.

## ACTIVITY – 6

### OBSERVING THE ARRANGEMENT OF CELLS IN ONION LEAF PEEL (PLANT TISSUES)

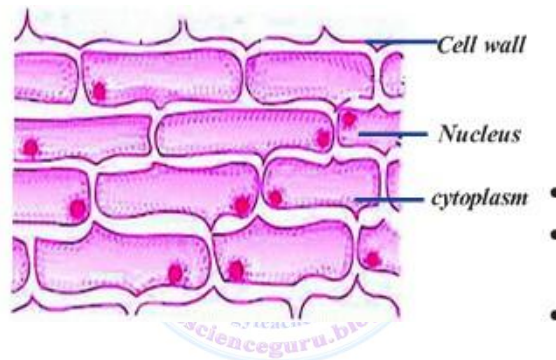
**Aim:** To observe the arrangement of cells in an onion peel

**Materials required:** Onion peel, slide, water, glycerine, cover slip and microscope.

**Procedure:**

1. Take a piece of onion peel and place it on a slide
2. Put a drop of water and then a drop of glycerine on it.
3. Gently cover it with a cover slip, observe under microscope and draw & label the diagram.

**Observation:** It is observed that cells are present in groups with certain arrangement. They are compactly arranged without leaving any intercellular spaces.



**Details:**

1. The characteristic feature of plant cell is the cell wall.
2. So all the cells in the plant tissue are arranged compactly to provide support and stamina to the plants.
3. These arrangements have special role to play in the plant body.

## ACTIVITY – 7

### OBSERVING THE MERISTEMATIC TISSUES IN ROOT TIP AND SHOOT TIP (PLANT TISSUES)

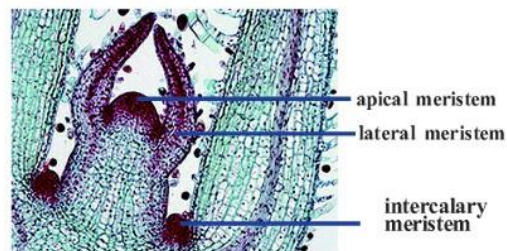
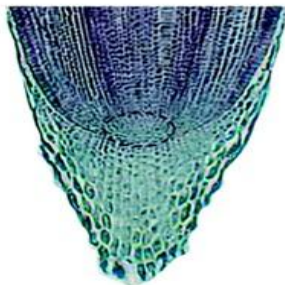
**Aim:** To observe the different tissues in root tip.

**Materials required:** Onion, transparent glass, slide, cover slip, microscope and permanent slide of shoot tip.

**Procedure:**

1. Take transparent bottle filled with water and take an onion bulb slightly larger than the mouth of the bottle.
2. Put the onion bulb on the mouth of the bottle and growth of roots is observed after few days.
3. Take the onion and cut some of the root tips, take an onion tip and place it on a slide.
4. Put a drop of water and then a drop of glycerine on it.
5. Cover with a cover slip, put 2 to 3 layers of filter papers on the cover slip.
6. Tap the cover slip gently and press with the blunt end of needle or brush to spread the material.
7. Observe under microscope and draw the diagram.
8. Take a permanent slide of shoot tip, observe and draw the diagram.

**Observation:** The tissue with the small and minute cells is observed at the tip of the root and stem. This is known as meristematic tissue.



**Details:**

1. Tissues that bring about overall growth and repair are called meristematic tissue
2. From the above observation we can infer that meristematic tissues are present on the tip, sides and in between layers of other tissues.
3. Meristematic tissues at the growing tip that bring about growth in the length are called as apical meristematic tissue.
4. Tissues present around the edges in a lateral manner and giving rise to growth in the girth of stem are called lateral meristematic tissues.
5. Areas from which branching takes place we find a kind of meristematic tissue called intercalary meristematic tissue.



## ACTIVITY – 8

### PREPARATION OF TEMPORARY MOUNT OF DICOT STEM (PLANT TISSUES)

**Aim:** To prepare temporary mount of T.S of dicot stem and observation.

**Materials required:** Sharp blade, Tridax plant, brush, watch glass, microscope, slide, cover slip, safranin and glycerine.

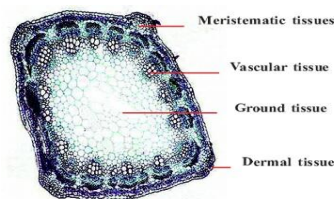
**Precautions:**

1. Over staining should be avoided.
2. Air bubbles must be avoided.
3. Select the thin sections for observation and discard the thick and oblique sections.

**Procedure:**

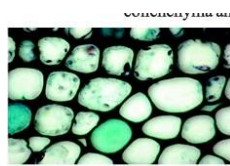
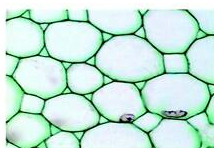
1. Take 2 to 3 cm long pieces of Tridax stem, keep it in the slice made in the pith material of potato.
2. Make thin slices of pith material along with stem piece and transfer them into the watch glass.
3. Collect the thin cross section of stem and put it onto the slide with the help of brush.
4. Add a few drops of safranin to the section and leave it for 3-5 min
5. Later drain off stain and wash with water if necessary .
6. Put a drop of glycerine over the material , cover it with a cover slip and observe under microscope.

**Observation:** The T.S of stem is observed as follows containing different tissues such as dermal tissue, ground tissue and vascular tissue.



**Details:**

1. The T.S of stem shows the outermost epidermis, ground tissue and vascular bundles.
2. The ground tissue consists of three types such as parenchyma, collenchyma and sclerenchyma.



## ACTIVITY – 9

### OBSERVATION OF EPITHELIAL TISSUE IN A CHICKEN PIECE( ANIMAL TISSUES)

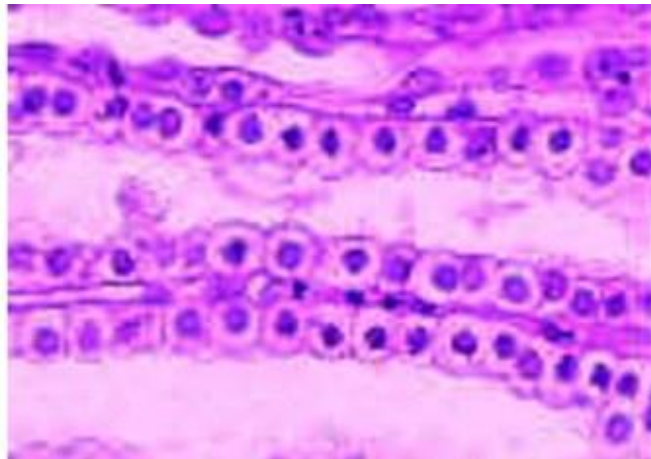
**Aim:** To observe the cells in the epithelial tissue of chicken piece.

**Materials required:** Microscope, a small piece of chicken, dil HCl, forceps, slide and brush.

**Procedure:**

1. Put the piece of chicken in dilute HCl for two hours.
2. Take the skin part of chicken piece.
3. Place the material with forceps or brush on the slide.
4. Then keep another slide on it and press both the slides gently.
5. Place a cover slip tap on it, observe under microscope and draw the diagram.

**Observation:** The epithelial tissue with thin and flat cells is observed and it is as follows.



**Details:**

1. All the cells in this tissue are similar and tightly packed and formed as continuous sheath.
2. This is known as squamous epithelium.
3. We find this type of epithelium in oesophagus, lining of mouth, lining of blood vessels, lung alveoli where transportation of substances selectively occurs through permeable membrane.
4. The epithelial tissues protect inside and outside of the animal body.

## ACTIVITY – 10

### OBSERVATION OF MUSCLE TISSUE ( ANIMAL TISSUES)

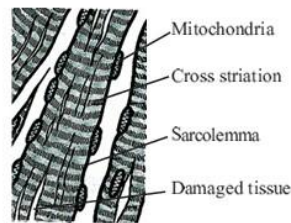
**Aim:** To observe the muscle tissue of a chicken piece.

**Materials required:** A piece of chicken, dil HCl, forceps, slides and microscope

**Procedure:**

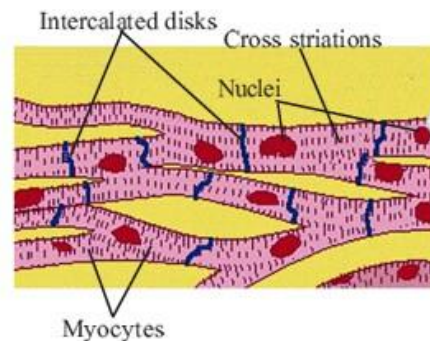
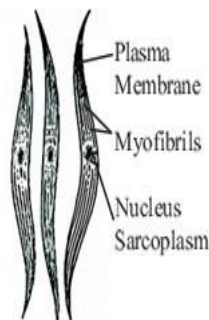
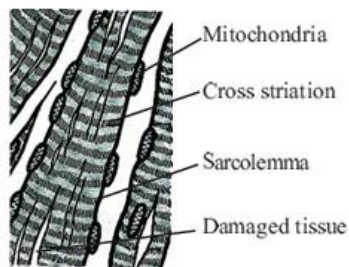
1. Take a piece of muscle of chicken piece, put it in dil HCl for two hours.
2. Now take a small piece of muscle on as slide with forceps.
3. Press gently with another slide , put a few drops of water and place a cover slip on it.
4. Observe under microscope and draw the diagram.

**Observation:** The muscle tissue is observed with Long, striated and unbranched cells. These are known as striated muscles or voluntary muscles.



**Details:**

1. Muscles are responsible for the movement of hands and legs and also for several internal organs such as intestine and heart.
2. Small amounts of muscle tissues also present in blood vessels.
3. Based on the structure, location, and function muscles are of three types.
4. Striated muscles, nonstriated muscles and cardiac muscles.



## ACTIVITY – 11

### TESTING OF BLOOD GROUP ( ANIMAL TISSUES)

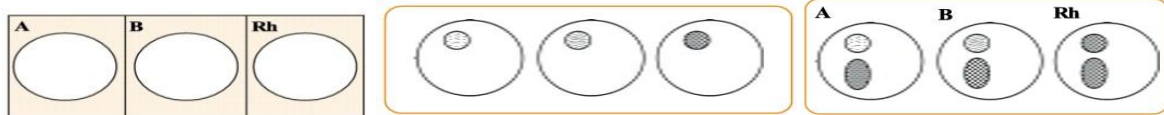
**Aim:** To identify the blood group of our class members.

**Materials required:** Blood group identification kit, Glass slide, Wax pencil, cotton, 70% alcohol, and tooth picks.

**Kit components:** Anti sera A, Anti sera B, Anti sera Rh D, Wax pencil, Needle and instruction manual.

**Precautions:**

1. Before pricking the finger, it must be rubbed with alcohol to avoid contamination.
2. The first oozed out blood must be removed, since it is mixed with alcohol.
3. The pricked finger must be immediately hold with spirit cotton.
4. Separate tooth picks must be used to mix the anti serums and blood drops.
5. Used needles must be disposed.



**Procedure:**

1. Take a clean and dry glass slide, draw three circles with wax pencils and name them as A, B and Rh.
2. Place one drop of the corresponding anti serums near the edge but within the circle.
3. Clean the left ring finger with spirit cotton ( cotton dipped in spirit ) and keep the cotton ball nearby.
4. Press the finger tip and quickly prick it with the help of disposable needle.
5. Remove the blood that oozes out first, press the finger and let one drop of blood get into each circle, but not touching the anti sera.
6. After putting three drops of blood, hold the wound with cotton ball.
7. Use a tooth pick to mix the blood and anti serum.

**Observation:** Watch to see any agglutination. The agglutination will appear as the grainy clumps of red blood cells suspended in a clear solution.

**Inference:** Determine the blood group as follows.

If agglutination occurs in anti Rh D serum, the Rh factor is positive and if it does not the the Rh factor is negative.

Anti- A	Anti-B	BLOOD GROUP
Yes	No	A
No	Yes	B
Yes	Yes	AB
NO	No	O

## ACTIVITY – 12

### DRY GRAPES IN DIFFERENT SOLUTIONS (PLASMA MEMBRANE)

**Aim:** To observe the changes of dry grapes in different solutions

**Materials required:** Two beakers, Tap water, Sugar, Dry grapes.

**Procedure:**

Fresh water



Saturated solution



1. Take 100 ml of water in a beaker and keep dry grape in it.
2. Leave it for one hour and note the observation.
3. Then take 100 ml of saturated solution of sugar in a beaker.
4. Keep the swollen dry grape in it and leave it for over night.
5. Next morning note the observations.

**Observation:**

1. When the dry grape is kept in fresh water, it is swollen since the water enters into the grape.
2. When it is kept in saturated solution, the dry grape are shrunken since the water comes out of it.

**Inference:** When the grape is kept in fresh water, the water moved into the grape as it contains concentrated substances Whereas the saturated solution is highly concentrated than the swollen grape. So the water comes out of the dry grape. Movement of molecules through the plasma membrane according to the concentration gradient is known as osmosis.

## ACTIVITY – 13

### POTATO OSMOMETER (PLASMA MEMBRANE)

**Aim:** To prove osmosis with potato and sugar solution.

**Materials required:** One raw potato, one boiled potato, two beakers/ bowls, two pins, water and sharp knife.

**Precautions:** The potato cup does not float or submersed in the water.



#### Procedure:

1. Take the raw potato and boiled potato.
2. Peel off the skin and cut cube shaped cup from them as shown in the figure.
3. Prepare a few amount of saturated sugar solution.
4. Pour the sugar solution in the potato cup to a level.
5. Mark the level of sugar solution by piercing the pin.
6. Keep this potato cup in the bowl containing water.
7. Leave the arrangement for half an hour and note the observations.
8. Repeat the above experiment by taking sugar solution in the beaker and water in the potato cup. Note the observation and compare it with previous observation.

#### Observation:

1. When the fresh water is taken in the beaker and sugar solution in the potato cup, the water level raised in the potato cup.
2. But when the sugar solution is taken in the beaker and fresh water in the potato cup, the water level is decreased in the potato cup.

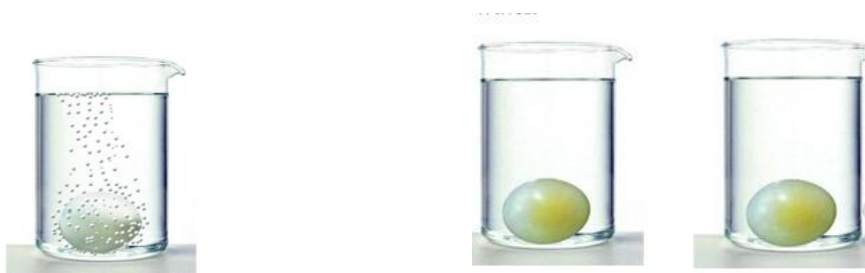
**Inference:** From the observations it is concluded that the water always moves towards the sugar solution. Such process in which water moves towards sugar solution is called osmosis. We see that the movement of water through membrane in osmosis i.e. from less solute concentrated to more solute concentration.

## ACTIVITY – 14

### OSMOSIS WITH EGG (PLASMA MEMBRANE)

**Aim:** To prove osmosis with egg

**Materials required:** Three beakers, petridish, salt, Dilute HCl, two equal sized raw eggs, cloth to wipe, a strip of paper for measurement, one table spoon.



**Procedure:**

1. Keep the raw eggs in dilute HCl for 4 to 5 hours or until the egg shell is completely diluted.
2. Take out the egg with the help of table spoon and wash it under tap water.
3. Measure the circumference of each egg with the long strip of paper, at its widest place, and mark on the paper with pen or pencil.
4. Prepare concentrated salt solution in a beaker.
5. Place one egg in the beaker with tap water and place the other in the salt water.
6. Leave the beakers for 2 to 4 hours
7. Take the eggs out, wipe them and measure the circumference with the same strip of paper and mark on the paper with pen or pencil.

**Observation:** The circumference of the egg is increased which is placed in the tap water and the circumference of the egg is decreased which is placed in the salt water.

**Inference:**

1. The egg placed in the salt water shrinks and the shrinking is due to movement of water from the egg into highly concentrated sugar solution.
2. The egg placed in the tap water swells, the swelling is due to movement of water from the beaker which is less concentrated into the egg which is highly concentrated.
3. The process in which water molecules leave the cell is called exosmosis and the process in which water molecules enter the cell is called endosmosis.

## ACTIVITY – 15

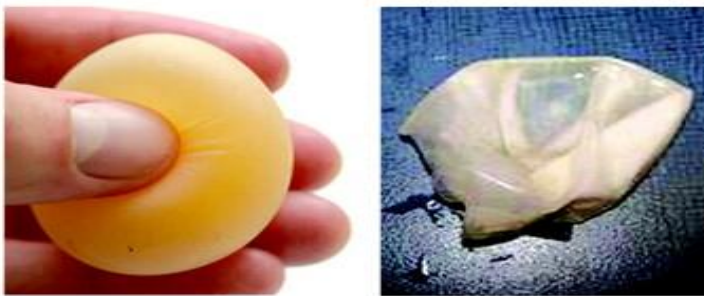
### SEMI PERMEABLE MEMBRANE (PLASMA MEMBRANE)

**Aim:** To prepare semi permeable membrane from an egg.

**Materials required:** One raw egg , dilute HCl and a pencil.

**Precautions:**

1. There is a lot of chances for tearing of egg membrane in this activity.
2. So care should be taken while piercing the membrane.



**Procedure:**

1. Take one raw egg and keep the raw egg in dilute HCl for 4 to 5 hours.
2. The shells which are made up of  $\text{CaCO}_3$  are dissolved .
3. Wash the eggs under tap water and carefully pierce a pencil sized hole in the egg membrane and drain the contents.
4. Wash the membrane with fresh water.

**Result:**

1. The membrane gained from the egg acts as a semi permeable membrane.
2. This can be utilized in osmosis experiments.



## ACTIVITY – 16

### OSMOSIS WITH SEMI PERMEABLE MEMBRANE (PLASMA MEMBRANE)

**Aim:** To prove the process of osmosis with egg membrane.

**Materials required:** Two egg membranes, beakers, sugar, water, thread, measuring jar and disposable syringe.

**Precautions:** Egg membrane should be carefully handled.



#### Procedure:

1. Take one egg membrane and fill it with 10 ml of saturated sugar solution with a syringe.
2. Tie its mouth with a thread.
3. Measure 100 ml of tap water in a beaker and keep the egg membrane in a fresh water beaker. Leave it for overnight.
4. Take the second egg membrane and fill it with 10 ml of tap water with the syringe.
5. Keep it in a beaker filled with sugar saturated solution and leave it for overnight.
6. Measure the contents of the egg membrane and beakers & note the observations.

**Observation:** The egg membrane filled with sugar saturated solution is swollen and the one filled with tap water is shrunken.

**Inference:** The egg membrane acts as semi permeable membrane. When the two solutions with different concentration are separated with a semi permeable membrane, the water moves along with concentration gradient. So the water enters into the egg membrane filled with sugar solution and the water comes out of the egg membrane filled with tap water. The movement of molecules across the membranes from solutions of one concentration to the other is known as osmosis.

## ACTIVITY – 17

### SPECIMAN OBSERVATIONS ( DIVERSITY IN LIVING ORGANISMS )

**Aim:** To observe the specimens of different organisms, draw the diagrams and make a note on it.

**Specimens:** Moss plant, Fern leaves, Tape worm, Round worm, Earth worm, Scorpion, Snail and star fish.

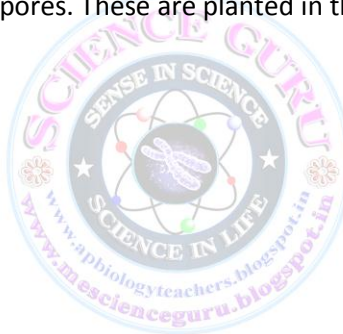
**Observations:**

#### MASS PLANT:



It belongs to Bryophyta. Bud like structures are observed. These are not flowers but structures that contain seed like structures called spores. These are planted in the soil with rhizomes.

#### FERN LEAVES:



It belongs to Pteridophyta. These are the leaves of Fern Plant. They are known as fronds. They contain small brownish or blackish dot like structures. These are the spore bearing bodies known as sporangia. They reproduce by spores.

#### TAPE WORM:



It belongs to Platyhelminthes. The body is bilaterally symmetrical. It contains pseudo coelome. The body is flattened dorso ventrally. So it is also known as flat worm. It is a free living and parasitic organism.

### ROUND WORM:



It belongs to Nematoda. The body is cylindrical and bilaterally symmetrical. Body cavity is pseudo coelom . This is familiar as parasitic organism.

### EARTH WORM:



It belongs to Annelida. The body is bilaterally symmetrical and have true coelom. The body is segmented. It is easily identified with the presence of clitellam.

### SCORPION:



It belongs to arthropoda family. It is characterised with jointed legs. This is bilaterally symmetrical and segmented.

### SNAIL:



It belongs to Mollusca. This is bilaterally symmetrical. There is little segmentation. This group of animals is characterized with their shells made of calcium carbonates. There is a foot that is used for moving around.

### STAR FISH:



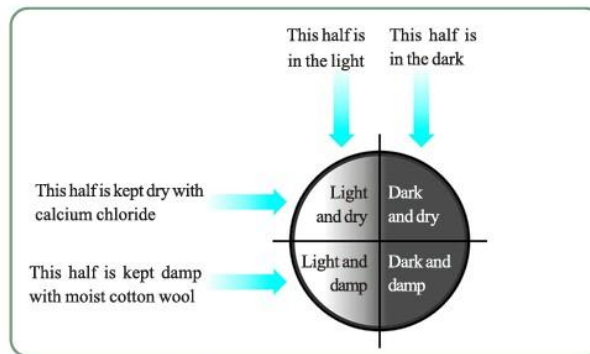
It belongs to Echinodermata. It is spiny skinned. They have a peculiar water driven tube system that they use for moving around. They have hard calcium carbonate structures that they use as a skeleton.

## ACTIVITY – 18

### OBSERVATION OF ANIMAL BEHAVIOR ( ANIMAL BEHAVIOUR )

**Aim:** To study the behavior of cockroach in controlled conditions.

**Materials required:** A cord board box and cockroaches.



#### Procedure:

1. Take a box and divide into four chambers with the help of a cord board.
2. Make tiny holes in any two chambers of one side so that light can pass through these holes into the chambers and let other two chambers as it is.
3. Now create humid environment with the help of moist cotton wool in one of the lightened and one of the dark chambers.
4. so the box has been divided into four chambers with different conditions i.e. light and dry, light and humid, dark and dry, dark and humid.
5. The number of cockroaches are introduced into these four chambers equally.
6. Cover the box and leave the set up for 15 to 20 minutes, count the number of cockroaches in each chamber and note your observations

**Observations:** All the cockroaches are gathered in the chamber with dark and humid conditions.

**Inference:** Cockroaches prefer dark and damp conditions. So the quarter of the choice chamber contains all the cockroaches. With this we learn that we have to keep our surroundings clean and dry to avoid cockroaches.

## ACTIVITY – 19

### OBSERVATION OF PLANTS IN DIFFERENT HABITATS ( ADAPTATIONS )

Aim: To observe the features of the plants that live in desert and pond.

Specimens: *Aloe vera* and *Hydrilla*.

Observations:

Aloe vera:



Adaptations:

It is a desert plant. The leaves are reduced to spines so as to avoid transpiration. The water is stored in the stem. So it is also known as succulent plants. This helps the plant to live in the conditions of water scarcity as we come across in deserts.

Hydrilla & Hyacinth:



Adaptations:

Hyacinth is a submerged plant. It has numerous air spaces inside the stem, leaves, roots that aid in gaseous exchange and buoyancy. Leaf bases of water Hyacinth form air filled structure to keep them afloat. In Hydrilla plant the stomata are absent. Leaves are thin. Stem is highly flexible.