LIFE UNDER A MICROSCOPE

9

"Seek and you shall find"

You must have already used the microscope in the kit a number of times. However, in this chapter the microscope forms the very hearts of your **searches.**

People often frown when they see this cheap and light-weight microscope, and on putting their eye to the lens they say, "rubbish", "useless", and so on. But remember that experiments of this chapter have actually been done a number of times using this microscope. Those who have no practice looking through it, will have trouble in the beginning. But with a little practice, they will be able to see all sorts of tiny things quite easily. In fact, even when looking through big expensive microscopes, scientists often spend hours straining their eyes and adjusting the lens up and down.

That is why at the top of the page it says: "Seek and you shall find." Therefore, when you put your eye to the microscope for the first time and you do not see anything, do not lose heart — keep trying. Once you have learnt to look through it, you will want to bring things from all around to look at them.

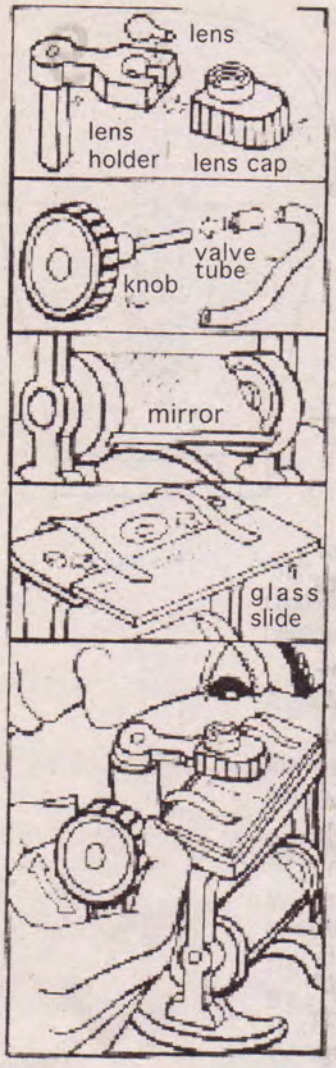
You must have seen many different things through the microscope in your kit- insects, ovules, pollen, larvae, pupae, fungi etc. You must have noticed that little things appear big when seen through the microscope. Come, let us use the microscope to look at a few more tiny things from the living world.

The correct way to use the microscope

Look at figure 11 of the chapter "Fun and games" in class six and then proceed.

1. First check the microscope in the following way -

(a) Remove the lens cap and take out the lens. Is your lens clean? If not, clean it with a soft clean cloth.



(b) When you rotate the knob, does the lens move up and down? If the knob is loose, change the piece of valve-tube covering it.

(c) The mirror of the microscope is always to be kept clean. Adjust it to such an angle that you see a bright background while looking through the lens.

2. Wash the glass slide well and wipe it dry with a clean cloth.

3. To look at something through a microscope, you have to move the lens up and down till the image looks sharp. This is called "focussing" or "bringing into focus". Sometimes, while doing this, the thing you are looking at or the water in which it is kept touches the lens. To prevent the lens getting dirty in this way, a method of making a slide cover from a polythene bag is described below.

Take a clean transparent polythene bag from the kit and cut it open with a blade so that you have one flat sheet.

Now use the blade to cut the sheet into square pieces about 2 cm X 2 cm. These squares are the slide covers.

4. When you want to look at something put a drop of water on the slide with either your finger or with a dropper. To put specimen in the water drop, you may use a *babool* (Acacia) thorn, a pair of tweezers, or a cycle spoke. Put a polythene slide cover over it.

If there is too much water around the cover, dry it up with filter paper, so that the cover and the thing you want to look at stays put and does not float away.

5. Fasten the slide under the clips on the microscope. Move the slide sideways so that the thing you want to see is right under the lens. Move the lens up and down to focus.

Now decrease or increase the amount of light by rotating the mirror.

Micro-organisms

Experiment 1

Take a little water from a ditch or a pond with stagnant water. Put one drop of this water on a slide and look at it through the microscope.

Do you see any organisms floating in the drop?

Observe four or five drops of this water one after another in the same way.

Make pictures of the organisms you see in the water drops. (1)

Find an earthen pot (*ghada*) or water tank somewhere nearby in

which the water has not been changed for at least ten to fifteen days. Observe four or five drops of this water through the microscope.

Were you able to see the same organisms in the stale water from the pot or tank that you saw in the water from the ditch or pond?

If you saw any other organisms, make pictures of them too. (2)

Slime (*Kai*)

Experiment 2

Get some floating slime from a puddle. Use an acacia thorn to pick up a very small amount of slime and put it on a slide. Separate out one fibre and look at it through the microscope.

Inspect the fibre closely and make a picture of what you see of its inner structures. (3)

Cells

Experiment 3

Peel an onion and use a blade to cut out a more or less square piece of thick, juicy layer from it (Figure 1a).

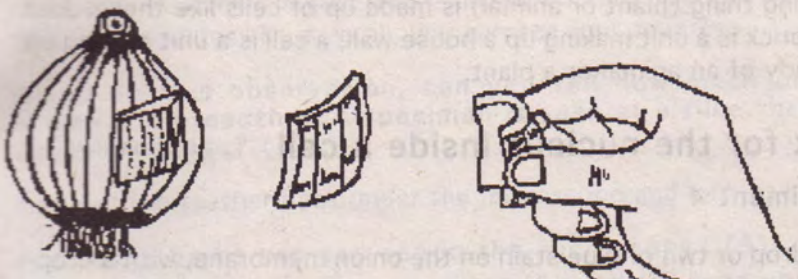


Figure-1a

Figure-1b

Fold this piece in half to crack it and gently pull the two pieces apart (Figure-1b). You will see a thin transparent membrane separating

out from the inner side of the layer. Peel off this membrane and cut a piece out of it. Put this piece in two or three drops of water on a glass slide and spread it out nicely with the help of an acacia thorn (Figure 2).

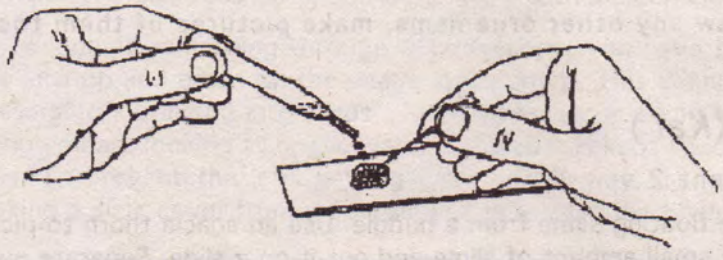


Figure- 2

Look at the membrane through the microscope. Moving the slide sideways, observe all parts of the membrane.

In the membrane, could you see lots of rectangular structures arranged side by side? (4)
Make a picture of these structures. (5)

These structures seen in the onion membrane are called **Cells**. Every living thing (plant or animal) is made up of cells like these. Just like a brick is a unit making up a house wall, a cell is a unit making up the body of an animal or a plant.

Look for the nucleus inside a cell

Experiment 4

Put a drop or two of blue stain on the onion membrane, with a dropper. Heat up the slide slightly by moving it over a burning match stick. Now let the slide stand for ten minutes. Keep watching it to ensure that the membrane does not dry up. If it starts drying, add one or two more drops of stain. Also make sure that dust does not fall on it. Now put a slide cover on the stained onion membrane and look at its cells under the microscope.

Do you see a tiny, round, dark coloured thing inside each cell? (6)

This round thing is the **nucleus**.

Can you see thick lines around each cell? These thick lines between cells are actually the walls surrounding each cell.

These walls are called cell **walls**.

Can you see a substance inside each cell which is less dark than the

nucleus? This is called the **cytoplasm.**

A special effort

Instead of the blue stain, use red ink to stain the onion membrane (according to the same procedure) and look at the nuclei of the cells.

Measuring Microscopic Things

By now you have used the microscope to observe many things in plants and animals. Those things are indeed small, but can they be measured? Come, let us learn a method of finding out the length and width of things seen under the microscope.

Experiment 5

Find a feather of some bird. Look at any barb emerging from the main shaft of the feather.

Guess how wide one barb is. Give your answer in millimetres. (7)

Cut out one square centimeter from a millimeter graph paper. Put this square on a glass slide and look at it through the microscope. If you put your eye very close to the lens, then from the left to the right you can see two small squares, which are each one square millimetre (1 mm^2) in size. From top to bottom also you can see two small squares. Thus, in all, you can see four squares.

Based on this observation, can you tell how much of the length and breadth of a specimen is seen at a time through the microscope? (8)

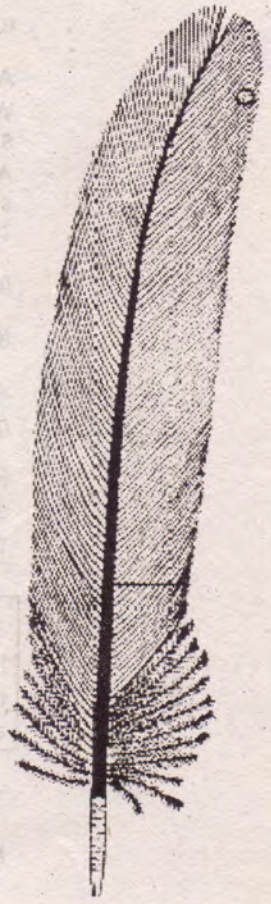
Now put the feather back under the microscope and look at it.

How many barbs can you see in the microscope? (9)

Based on the answers to questions (8) and (9), can you say what is the average width of a barb of the feather? (10)

Compare your answers to questions (7) and (10). After thinking it over, which answer do you find more accurate? Why? (11)

Using the same method, find the average length and width of an onion membrane cell, and write it down in your note book. (12)



Variations in Cells

Experiment 6

Get a thin, delicate stem or branch from some tap rooted (dicot) plant. You will be able to clearly see the cells in a thin section of *panvar* (*chirauta*) or *bathua* stem.

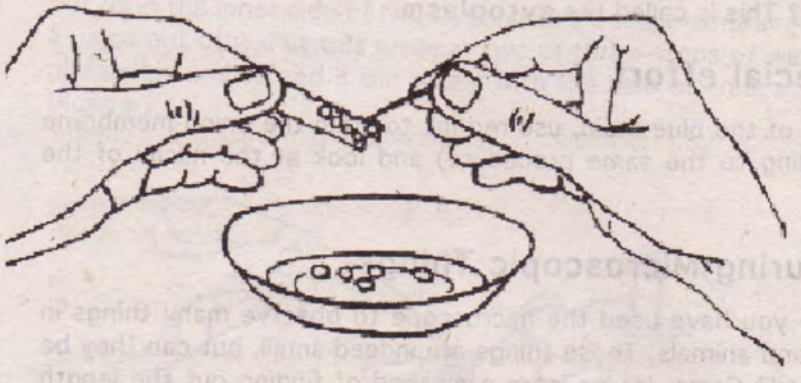


Figure- 3

Now cut thin cross sections from the stem.

Get a small dish or bowl of water. Use a babul thorn to scrape the sections off the blade and put them in water. In this way, collect a lot of sections in the bowl (Figure 3). Examine the sections with a magnifying glass. Find the thinnest and most transparent section which is intact, and with the help of a babul thorn put it in a drop or two of water on a slide. Put the section under a microscope and examine well it to find various kinds of cells it has.

Are all the cells in the stem alike? (13)

What is the difference between the cells seen in the cross-section of the stem and those of an onion? (14)

Are the cells of the section of the stem arranged in any special order? If so, draw a picture of what you can see through the microscope. (15)

In this experiment, you have so far seen cells of dicot stems .

Now get a plant with fibrous roots (a monocot) .

A small plant of rice, wheat, millet, corn or some other variety of grain would be suitable for this.

Remove the leaves from the plant and cut a small piece from the stem. Cut sections of this stem in the same way as you had done in the case of the dicot plant.

Do not mistake the leaves for the stem!

In monocots, the leaves are arranged all around the stem. When you cut the cross section of such a stem, some pieces scatter from around the edge of the stem. These are the sections of leaves.

Take one section and observe it through the microscope.

Make a picture of the section of the monocot skin. (16)

Look at your own cells

Experiment 7

Gargle well with clean water. Take an unused, clean matchstick. Put the uncoated wooden end of the matchstick in your mouth and scrape out a little skin from the inside of your cheek.

Put one drop of water on a glass slide and put this scraped material in it. Put a slide cover on it and observe it through the microscope.

Draw a picture of the cells you see. (17)

Take out the slide and add blue stain drop by drop on one edge of the slide cover, soaking up the extra water on the other side with a piece of filter paper (Figure-4). By doing this, the stain should go underneath the slide cover. Use a burning matchstick to heat up the slide just as you did for the onion membrane.

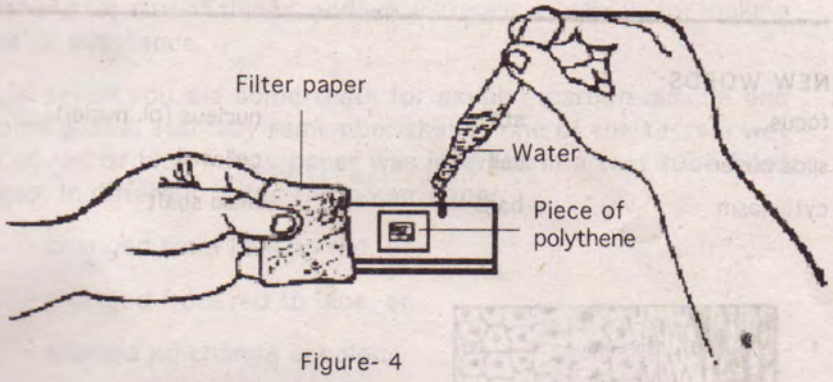


Figure- 4

Now let the slide stand for 10 minutes. After that, add some water drop by drop with a dropper to one side of the slide cover and soak it up with filter paper on the other side. This will wash away quite a bit of the stain.

Can you think of a reason why you cannot wash the sample scraped from your mouth without the slide cover like you did with the onion membrane?

Now observe the slide under the microscope.

Were you able to see the nuclei in the cells? If yes, make a picture showing cells with the nuclei. (18)

Cells - building blocks of life

So thus far you have looked at cells from onions, plant stems, and the inside of your cheek. You also saw micro organisms which can not be seen without a microscope.

You have measured the length and width of onion cells. All parts of plants and animals are made up of cells like these. But some cells are very, very small. It is not possible to see all kinds of cells with your microscope.

You will be surprised to know that some cells in human body are so small that 40,000 to 50,000 of them can fit on the head of a pin.

It is not necessary that small living things have small cells and large living things have large cells. Large living things have a greater number of cells.

Cells in different parts of a living being have different functions. For example, cells in the lung play a role in breathing, muscle cells move parts back and forth and cells of the digestive system digest food. Cells with different functions have different sizes and shapes.

NEW WORDS:

focus	stain	nucleus (pl. nuclei)
slide cover	cell	cell wall
cytoplasm	barb	main shaft