

LU 8.5 Microorganisms at our doorstep

Introduction

In the rainy season, puddles are formed in our surroundings. We enjoy jumping over or into such puddles. Sometimes, we have sailed paper boats in them. Often we do not pay too much attention to such places. Do you know that such puddles, the holes in the drainage covers, even the soil in the backyard, can be of immense significance for learning/understanding about tiny life-forms, and their varieties?

We shall explore our immediate surroundings, i.e. our doorstep, to learn about the tiny life-forms (microorganisms) in the local context. Let us see what we can find in these places. We can collect some soil or sample from a puddle anywhere in our surrounding and use our skills with the microscope to explore what lies around us. As they say, variety is the spice of life!

Are you familiar with these ideas?

- unicellular and multicellular organisms
- classification of living organisms

Materials

- (Samples from the local environment) soil sample, water from puddles, drainage covers, wells, ponds, small container, spoon, etc.
- (Lab material) test tubes, test tube stand, droppers, brush, hand lens, microscope, slide, coverslip, brush, detergent, soap.
- (Stationery items) pencil, paper, graph paper, labels, (optional items: marker pen, coloured pencils, sticky notes, sticky tape).

Task 1: Collect a sample

Q1. What do puddles contain?

Q2. When you observe these puddles carefully over a period of time, what are your experiences and what do you notice?

Q3. Instead of a puddle, if you were to observe just dry soil, would you find organisms in it? If so, where do you think these come from – soil, water, or air?

Q4. When the wet soil in a puddle dries up, what happens to the life-forms in it?

Q5. Will there be life-forms in a drop of clear water? Why do you think so?

Q6. What do we call the life-forms that are visible under the microscope but not with the naked eye?

In your school ground/backyard, locate some puddles and/or a drainage cover with pits that are filled with soil, leaves, water, etc. These puddles or pits on the drainage covers may be dry or wet depending on the season and place. Can you collect a sample of soil or water from such places?

Q7. How will you collect a dry soil sample and a wet soil sample?



Figure 1: Drainage cover



Figure 2: Drainage cover



Figure 4: Puddles



Figure 3: Puddles

Task 2: Observe, describe, draw, and record

Materials

- (Lab material) test tubes, test tube stand, droppers, brush, hand lens, microscope, slide, coverslip, brush, detergent, soap.
- (Microscope setup) ordinary compound microscope, smartphone (as a digital camera), (optional items: ocular eyepiece, stage micrometre).

- (Stationery items) pencil, paper, graph paper, labels, (optional items: marker pen, coloured pencils, sticky notes, sticky tape).

In the following task, you will prepare a slide of the sample and observe it under the microscope.

- Prepare your slide - Place a drop of your sample on the slide and cover it with a cover-slip.
- Pat off the excess water on the slide with a blotting paper.
- Observe the slide under the 10X objective lens. Explore all the areas of the slide and note the variety of objects you see.
- Once you find an object to observe, change the objective lens to the higher magnification and observe the same object. Observe the living organisms, and note the relative sizes.

Calculate the total magnification (i.e. magnification of eyepiece X magnification of objective lens) while observing.

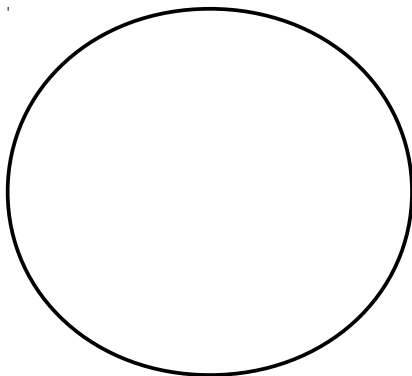
Total magnification is _____times.

Q1. What do you observe under the microscope (visual field)? Describe it in your own words in terms of the number of organisms, sizes, shapes, colours, location, movement, etc.

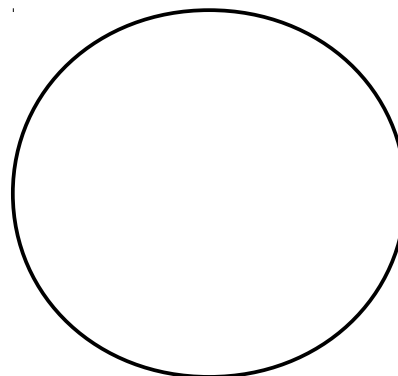
Q2. Are the objects that you see living or non-living ? Why do you think so?

On a plain paper or graph paper provided to you, draw what you observed. Draw a circle of your visual field and use the space inside the circle to draw the microorganisms that you observed according to their position, size, shape, colour, and so on.

Change the magnification and draw what you see, again following the same method of drawing inside the circle of visual field.



Magnification: ____X



Magnification: ____X

Using a smartphone or a camera, click pictures of the life-forms that you observed in the visual field. Share the photographs with the group and the teacher. Teachers can also collect students' drawings and prepare charts. These charts can be placed in the classroom or lab.

Q3. Can you think of any other places where microorganisms may be present?

Collect at least two more samples from your home or surroundings.

Task 3: Explore and observe microorganisms in your surroundings

Materials

- (Stationery items) pencil, paper, graph paper, labels, (optional items: marker pen, coloured pencils, sticky notes, sticky tape).

Prepare a slide for the new samples collected from your surroundings and observe it under the microscope.

Q1. What do you observe under the microscope (visual field)? Describe it in your own words stating the number of organisms, sizes, shapes, colours, location, movement, etc.

Draw your observations on a plain paper or a graph paper.

Change the magnification and draw the same microorganisms at various magnifications. You can follow the earlier method of drawing inside the circle of visual field.

Q2. Have you observed the same kinds of organisms in two different samples? The different samples can be either from different sources or from same source but from different days. If yes, what was the difference between them, if any? State in terms of number, size, variety, etc.

Q3. If yes, what would you like to infer from it?

Task 4: Estimation of the size of a microorganism

Size is an important characteristic of each microorganism. Since you have learnt how to use a microscope in Learning Unit 8.4, can you now estimate the sizes of microorganisms that you see?

Using a plastic ruler (as shown in Task 6, LU 8.4), find the diameter of the visual field.

The diameter of visual field = _____ mm = _____ micrometer (Note: 1 mm = 1000 micrometer)

Now consider one of the organisms you have observed and drawn above. If you want, you can make a small sketch here for reference. Mark it organism 1.

Imagine and guess how many organisms of the same kind you can keep side by side along the diameter of the visual field. Number = _____

From these two numbers (diameter of the visual field and number of organisms than can fit along diameter), estimate the size of the organism.

Size = _____ mm = _____ micrometer.

Following the same method, estimate the size for other microorganisms as well.

Organism 2: Size = _____

Organism 3: Size = _____

Organism 4: Size = _____

Credits

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