Diving into the world of plankton with the Curiosity Microscope

Worksheet 1 - Observations with the Curiosity Microscope

Sample preparation and observations with the Curiosity microscope

The Curiosity microscope is an optical microscope that uses a small LED as a light source. In contrast to conventional light microscopes, the Curiosity microscope does not have an eyepiece. Instead, there is a camera at the bottom of the microscope, which is used to observe samples. The main part of the microscope is made of wood and environmentally friendly dyes.

Sample preparation

At most 24 hours before your observations:

1. Scoop plankton from the body of water by fully submerging the sieve in the water and following an “infinite” sign eight times.

Note: As more plankton accumulates in the sieve, water will flow through it more slowly. Retrieve the accumulated plankton by pipetting the remaining water from the sieve into a falcon tube. Collect around 20 mL of samples into a container.

2. Now transfer your sample into a Petri dish from the kit using a plastic pipette. You can choose one of the following two alternatives:

    a. Fill the entire petri dish with the sample until you have a convex meniscus on top. Flip the lid of the petri dish over and slowly cover the petri dish.

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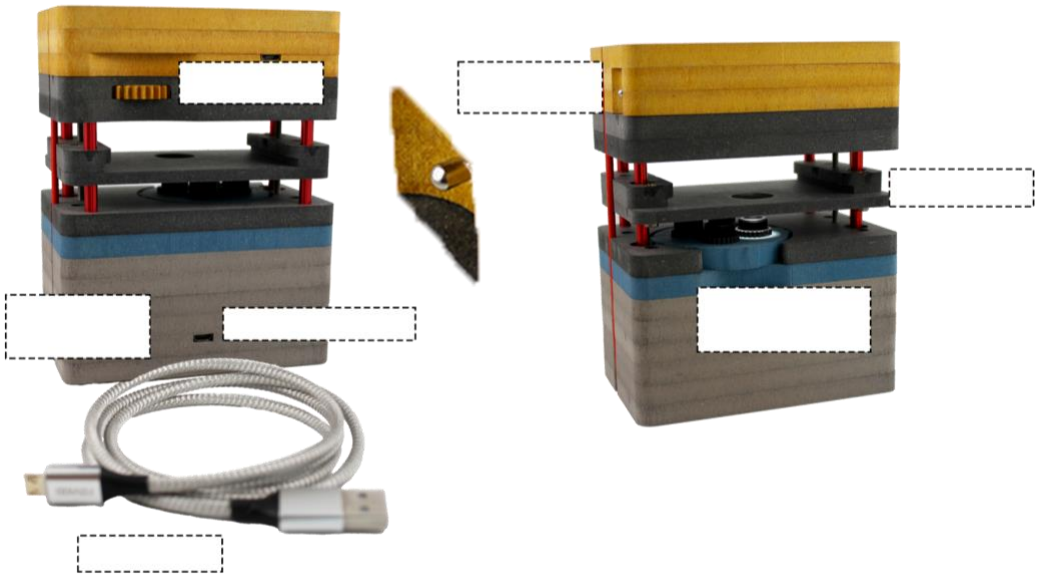
Note: During this process, some samples will be lost. Keep a tissue around the petri dish to clean the workspace.

   b. Alternatively, cover the bottom of the Petri dish with a thin layer of the sample you have prepared.

3. Place the petri dish on the sample holder and in between the light source and the camera. Your sample is ready for observation.

Visualisation under the microscope

Label the parts of the microscope in the following pictures **(5 minutes)**.



Curiosity microscope and its parts. Image by: Noan Le Bescot, Plankton Planet

To use the microscope,

1. Connect the microscope camera to a screen such as your phone, tablet or smartboard using the USB-C cable supplied.

2. Use the camera app on your display device to transfer the camera images to the screen.

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3. Switch on the LED light source* with the light switch.

*To avoid eye damage, DO NOT look directly at the light source.

4. Place the sample on the sample holder plate.
5. Start your observation with the lowest magnification.
6. Use the objective disc to increase/decrease the magnification.
7. Note your observations in the activity sheet.

Using the Curiosity microscopes we will explore and identify some of the planktonic organisms we can find in the water **(40 minutes total observation time)**.

After placing your sample on the sample holder, view it at different magnifications, starting at the lowest magnification and working up to the highest magnification. Use the available space below to insert an image of a plankton species taken with the microscope. Use the magnification at which you can best see the plankton and make a note of the magnification used **(10 minutes)**.

*You can also draw your observations instead of taking pictures.

1. **Outline** the general characteristics of the planktonic organism you observe by answering the questions below **(10 minutes)**.

   a. Look at your picture and find out whether your observed plankton lives alone or in colonies.

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b. State the colour of the plankton you observe.

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c. **Describe** the shape of the plankton.

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2. The word plankton means "drifter" and refers to the fact that they cannot swim against the currents. However, some planktonic organisms have body parts that enable them to move in calm water. While some planktonic organisms swim around using cilia and/or flagella, others use body parts such as legs. Below are examples of planktonic organisms and the structures they use for swimming[1] **(5 minutes)**.

Figure 1: Plankton can use different structures such as flagella, flagella or jointed legs to swim in water. Ciliated plankton from Phyto'pedia (CC BY-NC-ND 3.0), UBC and the Antarctic krill from Wikipedia (CC BY-SA 3.0)

a. Identify a moving plankton for observation and capture it in a picture with the microscope. Paste the picture below or draw the plankton in the box.

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b. Describe its movement and note the structure it uses to move OR include a picture of the structure that you took with the microscope (if visible).

3. While some plankton in the water have an animal-like character (zooplankton), others are more plant-like (phytoplankton). Phytoplankton are the most common life forms in the ocean. Thanks to the green pigment chlorophyll, they utilise sunlight to produce food and grow. Chlorophyll is also found in plants and is the molecule that gives both plants and phytoplankton their green colour. Zooplankton, on the other hand, cannot capture sunlight and have no chlorophyll, so they are not normally green in colour. Zooplankton hunt other organisms like phytoplankton to feed, and therefore may also have small mouths, arms, claws, and in the case of jellyfish, even tentacles with which to capture prey. Below is a group of plankton. Label one that you think is a phytoplankton. Label another one that you think is a zooplankton. Explain your reasoning below **(5 minutes)**.

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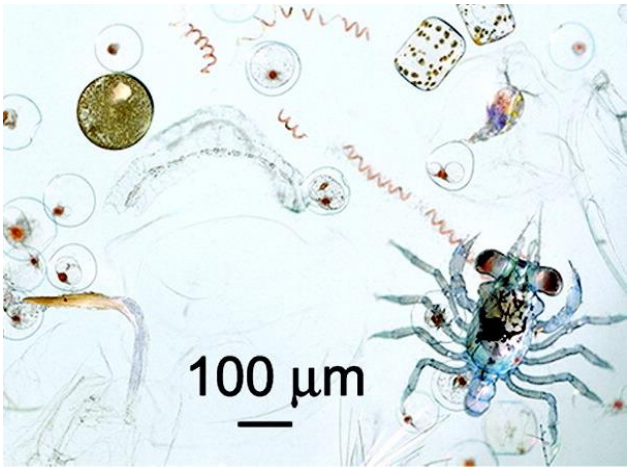

Marine microplankton photographed aboard the NOAA ship Oscar Elton Sette off Kona, 20 September 2006 by Jay Nadeau and others. CC BY-SA 4.0

4. While looking at the water sample with your microscope, take a picture of a phytoplankton AND a zooplankton and paste them below. Answer the questions **(10 minutes)**.

a. **Indicate** whether they live alone (solitary) or in colonies.

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b. **Describe** the general appearance of the plankton with reference to the characteristics below.

   i. Colour, shape, visible structures (grooves, symmetrical individual cells)
   ii. Presence of claws, spines, eyes, legs and/or mouth
   iii. Presence of cilium or flagellum/cilia or flagella

References

1. Kiørboe, T. (2016). Observing zooplankton with high speed video. https://www.tkboe.aqua.dtu.dk/research-areas/observing-zooplankton-with-high-speed-video

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