

Your teacher may watch to see if you can:

- handle microscopes and slides carefully and safely.

Aim

To use a microscope to observe cells and sub-cellular structures.

Method 1: Examining pre-prepared slides of cells

Apparatus

- light microscope
- lamp
- prepared slides
- transparent ruler

⚠ Safety

Handle slides with care.

- Set up your microscope on the lowest magnification objective lens. Work out the total magnification and measure the diameter of the **field of view** (by using the microscope to observe a transparent ruler).
- Put the next most powerful objective lens in place. Work out the magnification and by how much it has increased from the magnification in step A (e.g. moving from a $\times 10$ to a $\times 50$ is an increase of 5 times). Now divide the diameter of the field of view from step A by the increase in magnification to give you the new diameter of the field of view (e.g. if the field of view in step A was 2 mm, then $2 \div 5 = 0.4$ mm). Do this for each objective lens. Record the total magnification and field of view diameter for each objective lens.
- Now go back to the lowest magnification objective lens and observe a prepared slide.
- Use higher magnifications to observe the cells. Estimate the sizes using your field of view diameters.
- Identify the cell parts. Have a look for **mitochondria** (you may not find any as they are very difficult to see).

Method 2: Examining your cheek cells

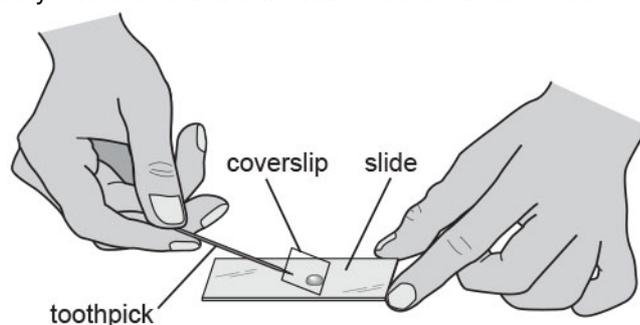
Apparatus

- light microscope
- lamp
- microscope slide
- coverslip
- methylene blue stain
- pipette
- paper towel
- water
- gloves
- wooden toothpick/ cocktail stick
- sterile wooden spatula/tongue depressor
- disinfectant

⚠ Safety

Handle slides with care. Anything that you have put into your mouth should be placed in disinfectant after use. Wear gloves if using stains. Wear eye protection.

- Using the pipette, add a small drop of water to the slide.
- Stroke the inside of your cheek gently with the wooden spatula. You only want to collect loose cells, so do not scratch the inside of your mouth.
- Use the end of the spatula that has been in your mouth to stir the drop of water on the slide. Place the used spatula in disinfectant.
- Put on gloves and use a pipette to add a small drop of methylene blue stain. This makes cells easier to see.
- Place a coverslip onto the slide at a 45° angle on one edge of the drop. Then use a toothpick to gently lower the coverslip down onto the drop, as shown in the diagram on the right. Avoid trapping air bubbles, which appear as black-edged circles under a microscope.
- Touch a piece of paper towel to any liquid that spreads out from under the coverslip.
- Use the lowest magnification objective lens to observe the slide. The **nuclei** of the cheek cells will be dark blue.
- Use higher magnifications to observe the cells. Estimate the sizes using your field of view diameters.
- Identify the cell parts. Have a look for mitochondria (you may not find any as they are very difficult to see).



Method 3: Examining onion or rhubarb stem cells

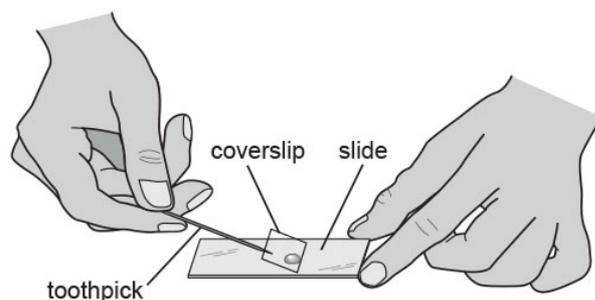
Apparatus

- | | | |
|--------------------|----------------|---------------------------------------|
| • light microscope | • iodine stain | • wooden toothpick |
| • lamp | • pipette | • piece of onion bulb or rhubarb stem |
| • microscope slide | • paper towel | • water |
| • coverslip | • forceps | • gloves |

Safety

Handle slides and microscopes with care. Wear gloves if using stains. Wear eye protection.

- A** If you are going to look at onion cells, put on gloves and use a pipette to add a drop of iodine solution to a microscope slide. If you are going to look at rhubarb, add a drop of water to a microscope slide.
- B** Using forceps, remove a very small piece of the thin 'skin' on the inside of the fleshy part of the onion. It is very thin indeed and quite tricky to handle. Or remove a thin piece of red 'skin' from a rhubarb stem.
- C** Place the small piece of skin on the drop on the slide.
- D** Place a coverslip onto the slide at a 45° angle on one edge of the drop. Then use a toothpick to gently lower the coverslip down onto the drop, as shown in the diagram on the right. Avoid trapping air bubbles, which appear as black-edged circles under a microscope.
- E** Touch a piece of paper towel to any liquid that spreads out from under the coverslip.
- F** Use the lowest magnification objective lens to observe the slide. Then use higher magnifications to observe the cells in more detail. Estimate sizes as you observe.
- G** Identify the cell parts. Have a look for mitochondria (you may not find any as they are very difficult to see).



Recording your results

- 1 Make a drawing of each type of cell that you examine. Label the parts and record the magnification.
- 2 Label the cells and their parts with any sizes that you have estimated using the diameter of the field of view.