GCSE Biology required practical activity: Microscopy / cells

Using a light microscope to observe, draw and label cells in an onion skin

Method

You are provided with the following:

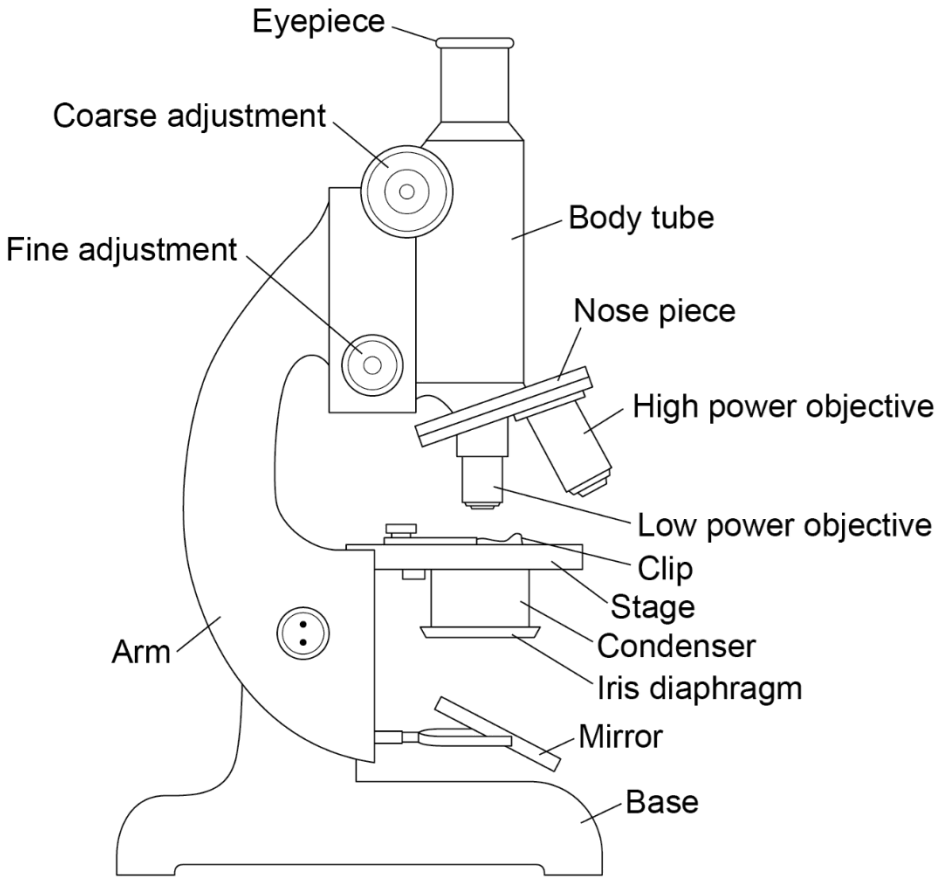
- a small piece of onion
- a knife
- a white tile
- forceps
- a microscope slide
- a coverslip
- a microscope
- iodine solution in a dropping bottle
- prepared animal and plant cells
- Perspex ruler.

Read these instructions carefully before you start work.

1. Use a dropping pipette to put one drop of water onto a microscope slide.
2. Separate one of the thin layers of the onion.
3. Peel off a thin layer of epidermal tissue from the inner surface.
4. Use forceps to put this thin layer on to the drop of water that you have placed on the microscope slide.
5. Make sure that the layer of onion cells is flat on the slide.
6. Put two drops of iodine solution onto the onion tissue.
7. Carefully lower a coverslip onto the slide. Do this by:
    - placing one edge of the coverslip on the slide
    - use the forceps to lower the other edge onto the slide
8. There may be some liquid around the edge of the coverslip. Use a piece of paper to soak this liquid up.
9. Put the slide on the microscope stage.

Using the microscope to look at animal and plant cells

The diagram shows a typical microscope.



This microscope has a mirror to reflect light up through the slide. Some microscopes have a built-in light instead of a mirror.

10. Use the lowest power objective lens. Turn the nosepiece to do this.

11. The end of the objective lens needs to almost touch the slide. Do this by turning the coarse adjustment knob. Look from the side (**not** through the eyepiece) when doing this.

12. Now looking through the eyepiece, turn the coarse adjustment knob in the direction to increase the distance between the objective lens and the slide. Do this until the cells come into focus.

13. Now rotate the nosepiece to use a higher power objective lens.

14. Slightly rotate the fine adjustment knob to bring the cells into a clear focus and use the low-power objective (totalling ×40 magnification) to look at the cells.

15. When you have found some onion epidermal cells, switch to a higher power (×100 or ×400 magnification).

16. Make a clear, labelled drawing of some of these cells. Make sure that you draw and label any component parts of the cell.

17. Write the magnification underneath your drawing.

18. Use this technique to draw a range of animal and plant cells on prepared slides.

Calculating the size of a single cell

19. Carefully place a Perspex ruler on top of your prepared slide so that it sits above a layer of onion epidermal tissue.

20. Place the ruler and the slide back on to the stage of the microscope.

21. Rotate the nosepiece to use medium power objective (totalling x100 magnification).

    Adjust the position of the ruler until it lines up with a continuous group of cells across 1 mm of the ruler. 1mm = 1000 microns (µm).

22. Count the number of cells across the 1000 µm sample.

23. Calculate the size of a single onion cell in microns using the formula by dividing the number of cells counted by the length of the tissue sampled. In this case, the length of the tissue sampled is 1000 µm:

$$\text{Length of cell in µm} = \frac{\text{Number of cells counted in sample}}{1000\ \mu m}$$

24. Write the actual length of the cell on the diagram you have drawn.

25. You can draw a 500 micron scale bar by using the following equation.

$$\text{Scale bar length} = \frac{\text{Drawn length of cell in µm} \times 500}{\text{Actual length of cell in µm}}$$

26. Use the microscope to make observations of other plant and animal tissues.