



**Prepare and Examine One Plant Cell,
Unstained and Stained, Using The Light
Microscope**

Biology – Leaving Cert

Experiments

Materials/Equipment

Microscope	Small Scissors
2 Microscope slides	Small paintbrush
2 Cover slips	Sharp Knife
Beaker for used slides	Labels
Iodine Stain	Seeker/mounted needle
Petri dish	Filter paper/absorbent paper
Onion	Dropper
Chopping board	Disposable gloves

Procedure

Unstained

1. Familiarise yourself with all procedures before starting.
2. Set up the microscope.
3. Place a drop of water on the slide.
4. Cut the onion in half.
5. Separate two fleshy leaves and locate the epidermis between them.
6. Peel off the epidermis and cut it into small pieces.
7. Put these pieces into water in a petri dish.
8. Transfer one piece into the drop of water on the slide, using the small paintbrush.
9. Apply the cover slip.
10. Dry the slide if necessary and label it.
11. Examine under the microscope following the usual procedure.
12. Draw labelled diagrams of what you see at $\times 100$ and $\times 400$.

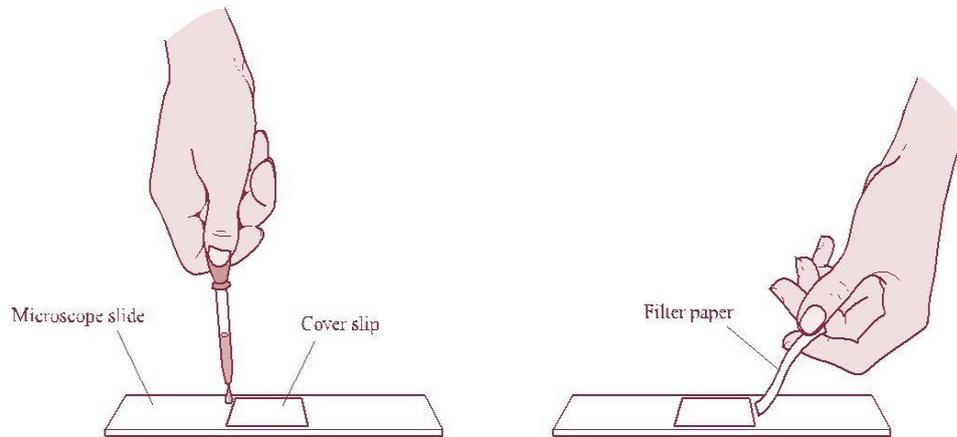
Result

Conclusion

Procedure

Stained

1. Prepare another slide as above and stain as follows.
2. Place a drop of iodine solution at one side of the cover slip and draw it across the plant tissue by placing the edge of a piece of filter paper at the opposite side of the cover slip.



3. Dry the slide carefully with filter paper/absorbent paper and label it.
4. Examine under the microscope following the usual procedure.
5. Draw labelled diagrams of what you see at $\times 100$ and $\times 400$.

Result

Conclusion

SKILL ATTAINMENT

PREPARE AND EXAMINE ONE PLANT CELL, UNSTAINED AND STAINED, USING THE LIGHT MICROSCOPE (· 100, · 400)

Following instructions

Familiarise yourself with all procedures before starting

Follow instructions step by step

Listen to the teacher's instructions

Correct manipulation of apparatus

Use the light microscope

Remove some of the onion epidermis

Transfer small pieces of the epidermis to water in the petri dish

Put a piece of the epidermis in a drop of water on the slide

Apply the cover slip

Draw the iodine across under the cover slip, using the filter paper

Observation

Locate the epidermis between the fleshy leaves of the onion

Locate cells under the microscope

View cells under different magnification

Appreciate the limitations of the unstained preparation

Appreciate the value of a stained preparation

Recording

Write up the procedure

Draw labelled diagrams

Interpretation

Draw reasonable conclusions from your observations and results

Application

Become aware of any other application(s) of what you learned in this activity

Organisation

Exercise caution for your personal safety and for the safety of others
Work in an organised and efficient manner

Label as appropriate

Work as part of a group or team

Clean up after the practical
activity

Background information

The human eye has a resolving power of 0.1 mm. Most eukaryotic cells are between 0.01 mm and 0.03 mm in diameter some 3 to 10 times below the resolving power of the human eye. Most of our current knowledge of cell structure has been gained with the assistance of microscopes.

We are asked to view animal and plant cells at $\times 100$ and $\times 400$. The cheek cell, taken from the loose tissue on the inside of the mouth, provides us with a good example of a typical animal cell. The cells and tissues under the microscope may lack contrast with their surroundings. They are often nearly invisible. Stains provide contrast. Methylene blue stain is an aqueous solution that stains the nucleus a dark colour.

After a specimen has been treated with a staining substance all of the stain that does not adhere to the structures must be washed away. To prevent the cells being washed away or damaged they may need to be fixed. Fixing may be carried out by chemicals or by heat but in the experiment above air drying for one minute is sufficient.

The onion cell provides us with a good example of a typical plant cell. However, the onion cells lack chlorophyll as the onion is an underground organ. Chloroplasts can be seen in *Elodea* or moss leaf cells. Iodine stain is used to stain plant cells. The starch in some plant cells turns the iodine a blue-black colour.

Advance preparation

- Prepare methylene blue stain.
- Prepare iodine stain.

Helpful hints

- Gloves should be worn by students when using stains.
- Place the slides on a rack over a small tray when staining to avoid spillages on the desk. Such a rack may be made with two 10 cm³ pipettes linked together at each end with rubber tubing.
- Ethanoic acid (10%) may be used on the unstained animal cell to highlight the nucleus. Ethanoic acid is not a stain.
- Used inoculating loops/swabs and slides with cheek cells should be sterilised with disinfectant and then disposed of at the end of the activity.
- Cut small pieces of the onion epidermis while still on the onion.
- Multiple nucleoli (two) may be seen in onion nuclei.

