

## **Practical 2 - Microscopic observation of cells and tissues**

This practical focuses on microscope technique and making and recording observations in the form of biological drawings.

### **Intended learning outcomes**

By the end of this practical you should be able to:

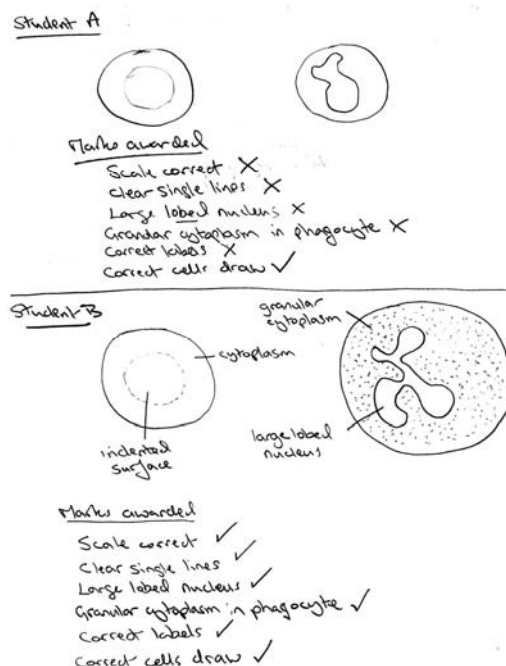
- Use a microscope with skill and precision
- Show all the structures that can be seen in the defined part of a specimen
- Make clear, accurate, labelled, scale drawings of specimens

#### Safety Information.

There are no particular hazards in this practical, however you must follow your laboratory rules.

### Background information

- Drawings should be done with a sharp HB pencil making clear single lines. Examiners do not give credit for sketchy lined drawings. A soft rubber can be used to correct errors.
- Always **draw what you see** and **not** what you expect to see from memory or textbook diagrams.
- Candidates often draw diagrams too small but rarely draw them too large. Ensure that your drawing is large enough to show all the detail.
- All parts of the drawing should be kept in correct proportions. In poor quality drawings, proportions changes as the drawing progresses.
- Biological drawings can be both high-power and low-power.
- Low-power drawings are usually plan drawings that do not contain cellular detail but do show the distribution of various tissues. When a plan drawing is requested, examiners may give credit for **not** drawing cellular detail.
- If more than one drawing of the same or different specimens or parts of a specimen are made, examiners may ask that they are drawn to the same scale (which means the same magnification). Credit is then awarded for this skill.
- Look at the following two sets of drawings of a red and white blood cell, made by different students and how marks would be allocated by an examiner.



- Student A would be awarded 1 mark. Student B would be awarded 6 marks.

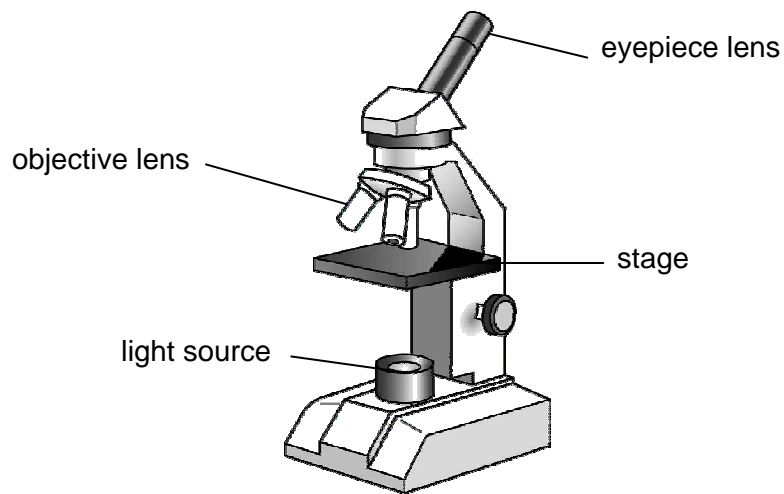
You will observe a TS of plant tissues through a microscope using both low and high power and draw appropriate structures.

- Read the information above.
- Read your textbook and look carefully at any drawings that have been made of biological material. Take care however; the quality of drawings in some textbooks is not all that could be desired.
- Write down the key features that are found in good biological drawings.

## Method

### Preparation

1. You have been provided with a compound light microscope with both low- and high-power objective lenses and a slide of a TS of a plant stem.



2. Place the slide onto the stage of the microscope.
3. Adjust the light source so that you can see a bright light when looking through the eyepiece lens.
4. With some microscopes it is possible to rack the objective lens so far down that it will break the slide. In order to prevent this it is good microscope technique to:
  - set the objective lens on low power.
  - not look through the eyepiece but to look at the side of the microscope and carefully lower the objective lens until it is nearly, but not quite touching the slide.
  - now look through the eyepiece and gradually raise the objective lens until the slide comes into focus.
5. You should now carefully move the slide around on the stage until you find the area that you wish to observe.
6. To change to high power, do not re-focus, but change the objective lens from low to high power. The slide should be almost in focus and only a fine adjustment to the focus should be necessary.
7. Practice focussing the slide on both low and high power until you are familiar with the technique.

### Making observations

1. You are provided with a stained transverse section through part of a dicotyledonous plant.

Examine the specimen using the low-power of your microscope.

Make a large, labelled, **plan** drawing to show the distribution of tissues.

2. Make a high power drawing to show a group of **four** cells from the region nearest the centre of the specimen.

### Follow-up

- State from which part of the plant the section was taken. Explain your answer
- Exchange your drawings with another student and mark their drawings using the following mark scheme.

### Mark scheme

#### Plan drawing

- Corner vascular bundles larger than other vascular bundles ✓
- No individual cells drawn ✓
- Four sided shape to plan ✓
- Both xylem and phloem correctly labelled ✓
- Parenchyma correctly labelled ✓
- Sclerenchyma on outer edge of vascular bundle labelled ✓
- Collenchyma in corners labelled ✓

#### High power drawing

- Good quality of drawing i.e. clear single lines** ✓
- 4 cells only drawn, similar in size and shape ✓
- between 5-8 sides to each cell ✓
- Air spaces shown between corners of cells ✓
- Thin cell walls shown either by a thin single line or two lines close together ✓
- Add up the marks out of 12 and return the drawings to the student.
- Write a list of all the reasons why you did not score full marks with your own drawings.

## Practical 2 - Lesson Plan

### Microscopic observation of cells and tissues.

#### Context

A practical investigation set in the context of 9700 syllabus – Cell structure and transport

#### Key aims of the lesson

This practical is designed to develop the skills of using a microscope and the recording and interpretation of observations by producing biological drawings.

#### Intended learning outcomes

By the end of the practical and the write-up the student should be able to

- Use a compound light microscope
- Make clear and accurate plan and cellular drawings of biological tissue
- Be able to interpret structures seen through the microscope

#### Resources required

White board or flipchart and suitable pens or blackboard and chalk

Practical materials specified on the Technical Information Sheet.

Copies of the student worksheets.

#### Planned activities

Timings/ minutes	Teacher/ Student Activities
End of previous lesson	<b>Preparation</b> – Student worksheet given out for students to read in preparation for the practical lesson. Students to look at examples of drawings of cells and tissues in their textbooks.
0 - 3	<b>Introduction</b> to the aims, intended outcomes and shape of the lesson – teacher led oral presentation
3 - 5	<b>Context</b> – review the protocols for setting up and using a microscope to observe slides
5 - 10	<b>Introduction to method</b> – Teacher briefly outlines method and answers any student questions on procedure. Teacher emphasises safety concerns regarding breaking slide by focussing down with the objective lens.
10 - 25	<b>Carrying out the practical</b> – students carry out the practical work.

25 - 50	<b>Obtain results</b> – Students observe the plant tissue and produce clear labelled diagrams as requested, then clear away apparatus as soon as they have finished
50 - 60	<b>Drawing together the threads</b> – Teacher led discussion on the manipulation and observational skills that have been developed as well as discussion on results obtained. Teacher to go through the mark scheme with the students and students compare their marks and understand why marks were not awarded.

## Practical 2 - Technical information

### Microscopic observation of cells and tissues

The apparatus and materials required for this practical are listed below.

The amount of apparatus listed is for one student or one group of students if they are to work in groups.

1. 1 x prepared slide TS *Lamium* stem
2. 1 x microscope with suitable illumination and;
  - high-power objective lens e.g. x40 (equal to 4mm or 1/6")
  - low-power objective lens e.g. x10 (equal to 16mm or 2/3")
3. suitable white paper, HB (Medium hard) pencil and rubber

#### Safety Precautions.

No specific hazards have been identified in this practical, however a risk assessment should be carried out as a matter of course.