**Year 11 Biology: School Assessed Coursework 2014**

**Unit One: Outcome 1**

**Practical Activity 1: Cells and the Microscope**

**Aim: 1.**  to describe the microscopic structure of a variety of cells and relate this to their

function.

1. to identify cell organelles that are visible under a light microscope.

**Materials: 1**. Compound Microscope, slides, coverslips, razor blade, toothpick,

pipette, iodine solution, onion/red onion, green banana, red capsicum.

1. *Elodea* leaf, Cultures of *Paramecium, Amoeba, Euglena*.
2. Prepared Slides- Human Blood Smear, Ciliated Columnar Epithelium, Motor Neurone.

**4.** Culture of horse manure.

**Your Task:** *For each cell type, you will be expected to observe it under a light microscope and draw it using an appropriate magnification. Complete labelling of each drawing is essential. Each cell type that is drawn should be accompanied by some notes explaining how the cell is specialised to carry out particular functions and any other information that is relevant. It is not essential to observe every cell type. However, an example of a plant cell, an animal cell, a protoctist and a bacterial cell must be observed. Questions associated with each cell type observed need to be answered. Take a digital image of each cell using the digital microscope.*

**Each drawing should include a scale that gives an indication of the size of the cell. This is to be based on the field of view of the microscope.**

**For x 40, the diameter of the field of view is 4500um.**

**For x100, the diameter of the field of view is 1800 um**

**For x400, the diameter of the field of view is 450 um**

**For x1000, the diameter of the field of view is 180 um**

**A: Investigating Plant Cells**

**1. Onion Epidermis**- Peel off the thin surface layer of an onion scale. Place this layer on a drop of water on a glass slide and cover with a coverslip. Repeat the procedure using a drop of iodine instead of water. The cell wall, nucleus and nucleolus should be visible in both preparations.

Question A. What is the advantage of using iodine?

**2. Banana Cells**- Scrape a small piece from the edible part of a green banana and smear it onto a glass slide. Add one drop of iodine and leave for 30 seconds. Add a coverslip. The cell wall should be clearly visible, appearing somewhat like “gladwrap”. In each cell, there should be large numbers of leucoplasts. Some cells are likely to rupture.

Question A. What is the purpose of using iodine?

Question B. Why is a green banana used and not a ripe one?

Question C. What are leucoplasts?

**3. Red Capsicum Cells**- Peel a small piece of the thin surface layer from a red capsicum and place onto a glass slide. Add a drop of water and cover with a coverslip. The coloured structures of varying size and shape are chromoplasts. The cell wall should be visible and a nucleus might also be visible in some cells.

Question A. What are chromoplasts and what function do they serve?

**4. Red Onion Epidermis**- Peel back a small section of the red coloured, outer epidermal layer from a red onion. Place the epidermis in a drop of water on a glass slide and cover with a coverslip. The cells of the red epidermis are red like the tomato pulp cells. However, they are not coloured by chromoplasts, but by a large vacuole which contains a water soluble red pigment. The vacuole may appear to take up the whole of the cell. Close examination should show some cells showing a clear ring of cytoplasm surrounding the vacuole. The cell wall will also be visible.

Question A. What is an epidermis?

Question B. Suggest what would happen to the size of the vacuole if the cells were immersed in a strong salt solution. *(This can be done in the practical activity)*

Question C. Describe two different functions served by plant vacuoles.

**5. *Anacharis* (*Elodea*) Leaf**- Pick a leaf from the growing tip of *Anacharis* and place it on a drop of water on a glass slide. Add a coverslip. The leaf of *Anacharis* is made up of two layers of cells. These two layers can be seen by carefully using the fine focus of your microscope. Close observation should show green chloroplasts that are moving. The chloroplasts can be seen streaming around a large central vacuole. This is known as cytoplasmic streaming. The cell wall will also be visible and a nucleus may also be seen.

Question A. Suggest what these cells are specialised to do.

Question B. What evidence is there that these cells are alive?

Question C. Staining with iodine highlights the location of the nucleus. Suggest what other effect it might have on the cells of the leaf.

Question D. What is the probable three dimensional shape of these cells?

**B: Investigating protists (single-celled eukaryotic organisms.**

**1. *Amoeba***- Take a drop of the *Amoeba* culture and place it on a glass slide. Add a coverslip. *Amoeba* is a large protoctist. Structures visible include a nucleus, contractile vacuole(s), food vacuoles, pseudopodia and the cell membrane. The cytoplasm can be divided into a clear, outer ectoplasm and a granular, inner endoplasm.

Question A. Describe how *Amoeba* moves.

Question B. Suggest how *Amoeba* obtains food.

Question C. What is the function of the contractile vacuoles?

Question D. What effect would staining have on *Amoeba*?

**2. *Paramecium***- Take a drop of *Paramecium* culture and place it on a glass slide. Add a coverslip. *Paramecium* is a fast moving protoctist. Structures visible include cilia, a nucleus, contractile vacuoles, an oral groove and a cell membrane.

Question A. Describe how *Paramecium* moves.

Question B. Suggest how *Paramecium* obtains its food.

Question C. What is the function of the contractile vacuoles?

Question D. What effect would a strong salt solution have on *Paramecium*?

**3.** ***Euglena***- Take a drop of *Euglena* culture and place it on a glass slide. Add a coverslip. *Euglena* is much smaller than *Paramecium* or *Amoeba*. Structures visible include a flagellum, nucleus, chloroplast, contractile vacuole and a reddish eye spot. They don’t have a cell wall but have a cell membrane reinforced with protein strips which is referred to as the pellicle.

Question A. Describe how *Euglena* moves.

Question B. How would *Euglena* obtain organic matter?

Question C. Suggest the function served by the reddish eye spot.

**C: Investigating Animal Cells**

**1. Human Blood Cells**- Obtain a prepared slide of a stained human blood smear. Two basic types of cells should be evident. Small red blood cells and several different types of white blood cells. The red blood cells lack a nucleus and are very small cells. The white blood cells tend to be larger and have prominent dark staining nuclei. All of these cells have a cell membrane.

Question A. What is the approximate ratio of red to white blood cells?

Question B. Suggest why white blood cells are described as “white”.

Question C. Suggest why red blood cells are very small, have a concave shape and lack a nucleus.

**2. Ciliated Columnar Epithelial Cells**- Obtain a prepared slide of stained ciliated columnar epithelial cells. These cells are from the respiratory tract. Each cell should show cilia, a nucleus and a cell membrane.

Question A. Why are these cells described as “columnar”?

Question B. What function do the cilia serve?

**3. Motor Neurones**- Obtain a prepared slide of stained motor neurones. These are very large cells with a large region known as the cell body which contains the nucleus. A nucleolus should also be visible within the nucleus. Radiating out from the cell body are projections known as dendrites. Motor neurones also contain a longer single projection known as an axon. This may not be readily visible. All of these cells have a cell membrane.

Question A. What is a motor neurone specialised to do?

Question B. What would normally travel along the cell membrane of the dendrites, cell body and axon of a functioning motor neurone?