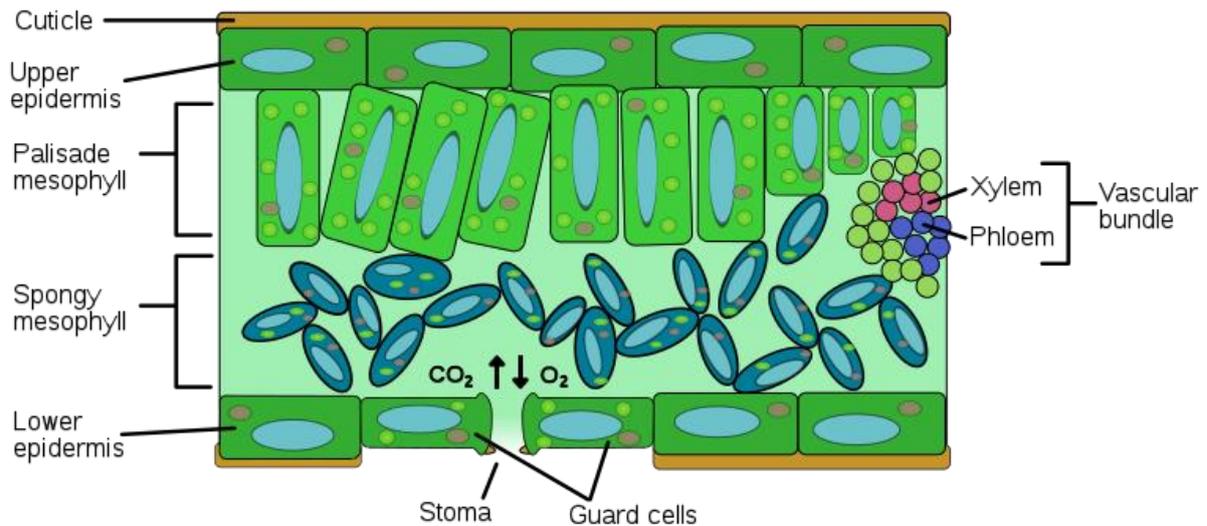


Stomata on Leaves - Worksheet

By Louise Lopes

Introduction:

Life is made up of intricate and finely balanced systems. A leaf is no different, serving as a primary organ to its plant. Leaves have many elements. This investigation looks at tiny openings on the lower leaf surface called the stomata (stoma for singular). You will learn their function and how to identify them. Below is a diagram of leaf anatomy.



PART ONE

Question:

Your aim is to look at a leaf's surface under a microscope, and identify an open and a closed stoma.

Plan:

This investigation has been planned for you. You will use the following materials.

- Microscope
- Microscope slides
- Clear Sellotape
- Clear quick-dry nail polish
- Freshly picked leaf



Nail polish is a poison, be careful when using it.

Conduct:

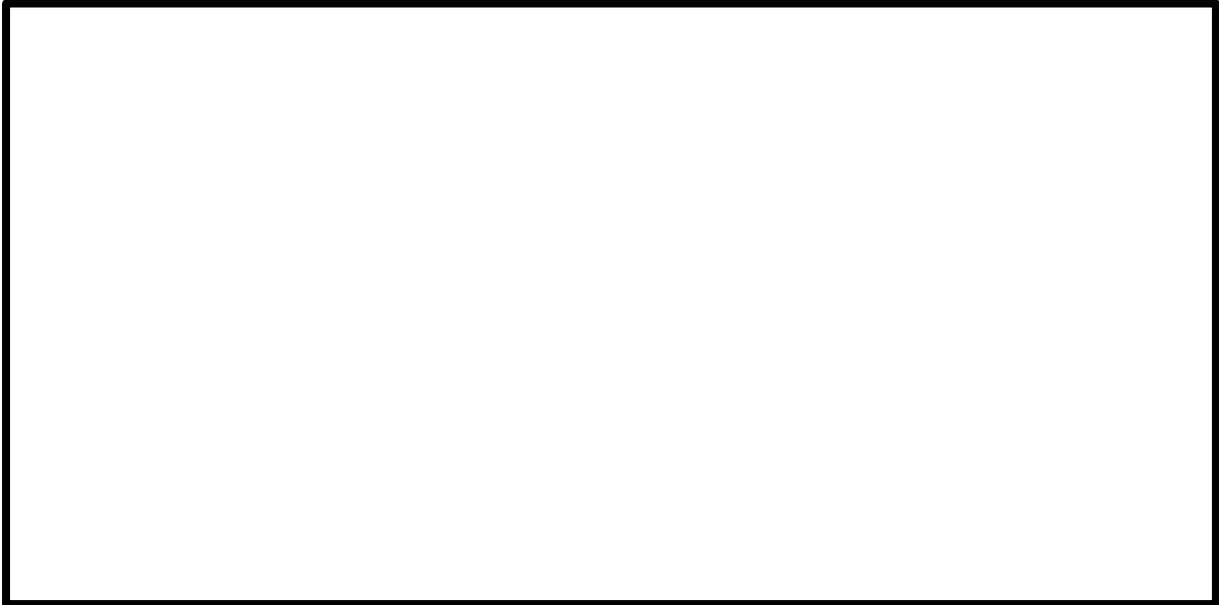
You have been provided with instructions:

1. Collect leaves from different plants
2. Take the clear nail polish and paint a thin coat on the underside of the leaf, covering at least half the area of the leaf.

3. Allow the nail polish to dry. This will take 5-10mins depending on air temperature and humidity.
4. When the polish is dry, stick the clear tape on the area of the leaf that is coated with polish.
5. Slowly peel off the tape, the layer of nail polish should come with it.
6. Carefully place the layer of tape and dried nail polish on the microscope slide and observe under high magnification.

Analysis:

Draw a picture of what you see in the field of the microscope. What is visible through the eyepiece on high magnification without moving the slide?



Are the stomata open or closed? _____

Problem-Solves:

Describe the arrangement of the stomata on your leaf. Do you think other plants might have different arrangements?



What do you think is the purpose of stomata on leaves of plants?



PART TWO

Question:

Design and carry out an experiment that will address the following question. Do Australian native plants show adaptations for the Australian climate with respect to their stomata?

Write a hypothesis here:

Plan:

You will need to design your own investigation. Describe your plan below:

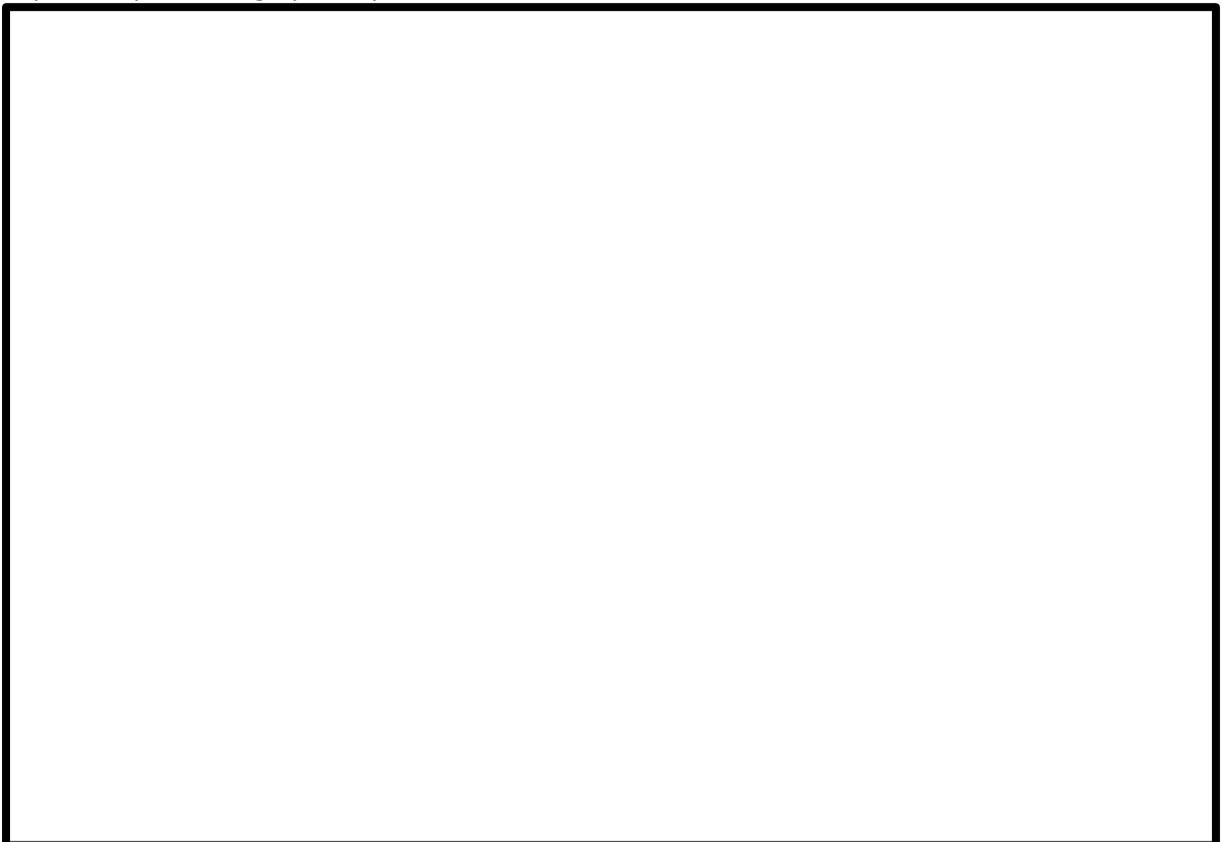
Conduct:

Record your results:

A large, empty rectangular box with a black border, intended for recording experimental results.

Analyse:

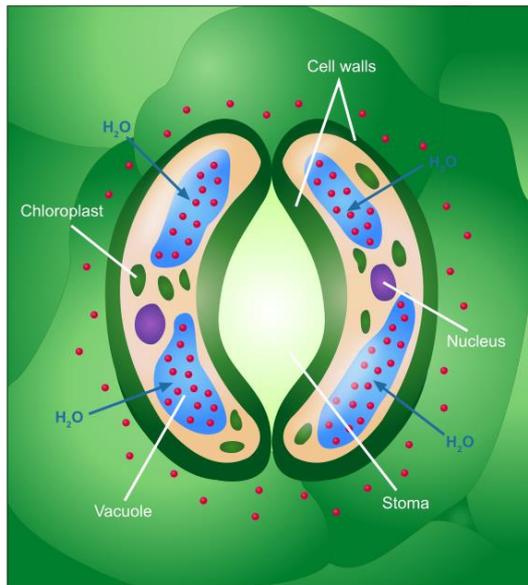
Represent your data graphically OR make mathematical calculations:

A large, empty rectangular box with a black border, intended for graphical representation of data or mathematical calculations.

Problem-Solves:

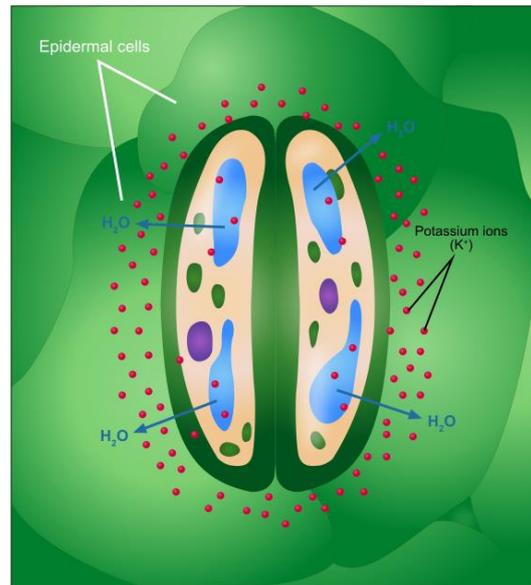
KEY CONCEPTS

Guard cells (swollen)



Stoma opening

Guard cells (shrunken)



Stoma closing

- Stomata provide a way for the plant to (a) exchange gases to and from the cells and (b) control their release of water to the atmosphere.
- Plants generally have an impermeable epidermis and a waxy cuticle to prevent uncontrolled water loss.
- The plant must balance the need for carbon dioxide with the avoidance of dehydration and regulate the stomata accordingly.
- The stomata are surrounded by guard cells that collapse and swell to close and open the stomata, depending on the plant's needs.
- In most plants, the stomata open in the light and close in the dark.
- In order for photosynthesis to take place, the leaf must consume carbon dioxide. So, when the sun comes up, the stomates open and carbon dioxide enters the leaf. Whenever the stomates are open, the leaf is also losing water in the form of water vapor (because of transpiration).

Write a short report on whether Australian native plants show adaptations for the Australian climate with respect to their stomata:

Evaluate the reliability of your experiment. Do you believe you were successful? Was there any human error? Are there any ways that the experiment could be improved?

Conclusion:

Provide a brief summary of your report here. Also include whether you achieved your Aim and if your predictions were correct.

References:

Image 1 – H McKenna, https://commons.wikimedia.org/wiki/Leaf#/media/File:Leaf_anatomy.svg
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