S4 - S6

Senior Phase

"Every breath you take"

Aim: To compare the stomatal density on the upper and lower surface of Tradescantia leaves.

N5 Biology, Unit 2, KA5: Transport systems - Plants.

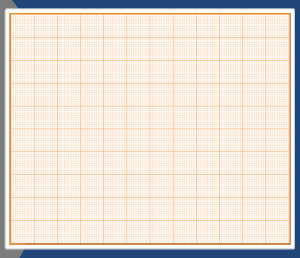
Tradescantia provide a beautiful specimen from which to observe stomata: the deep purple colour of the leaf contrasts to the green stomata for clear observation. Numeracy and investigative skills are important in this practical activity.

Materials

- Light microscope
- Thick acetate
- Graph paper (mm squares)
- Photocopier
- Scalpel
- *Tradescantia zebrina* leaf.

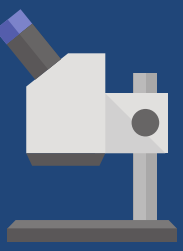
Stage 1: Preparation of the graduated "slide"

1. Photocopy mm-squared graph paper onto thick acetate.



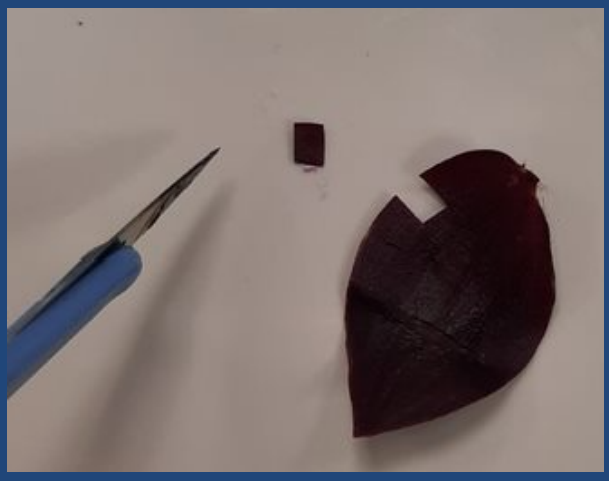
2. Cut the acetate into microscope slide sizes to make graduated "slides".

3. Using a microscope, observe the graduated "slide" and determine the area of the field of view at each magnification.



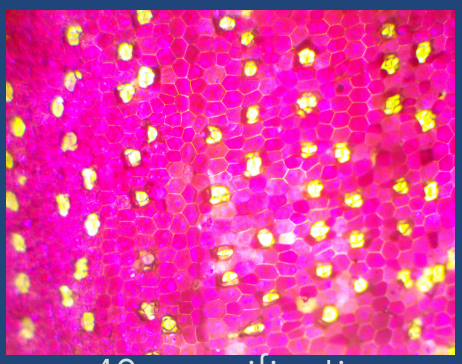
Stage 2: Observe stomata on the lower surface of a Tradescantia leaf

1. Using a scalpel, remove a small section of a leaf from Tradescantia.



2. Place the leaf on a microscope slide with the lower surface facing the objective lens

3. Observe the stomata and count the number of stomata you can observe in the field of view. Note the magnification used to perform the count.



x40 magnification

x100 magnification

4. Calculate the number of stomata per squared centimetre of the Tradescantia.

How to determine the density of stomata in Step 4

- At x100 magnification, there were ***13 stomata in the field of view.***
- Using the "graduated slide", the diameter of the field of view at x40 magnification was ***4 mm.***
- Diameter of the field of view at x100 magnification:
  - (40/100) x 4 = 1.6 mm
- Area of the field of view at x100 magnification:
  - $\pi r^2 = \pi \times (0.8)^2 = 2.01$ mm^2
  - 13 stomata / 2 mm^2
  - **6.5 stomata / mm^2 of lower leaf surface**

Stage 3: Observe stomata on the upper surface of a Tradescantia leaf

1. Repeat Stage 2 for the upper surface of the leaf.

2. Calculate the percentage change between the upper and lower surface of the leaf.

Questions to explore

Explain the conclusion you have drawn from your data.

Suggest a plant that might not show this distribution in stomata.