

# "Every breath you take"

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

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

*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

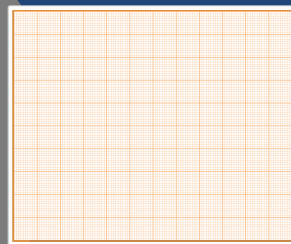
- Light microscope
- Thick acetate
- Graph paper (mm squares)
- Photocopier
- Scalpel
- *Tradescantia zebrina* leaf.



## Stage 1: Preparation of the graduated "slide"

1

Photocopy mm-squared graph paper onto thick acetate.

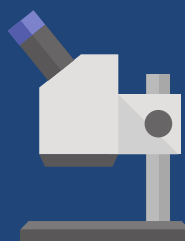


2

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

3

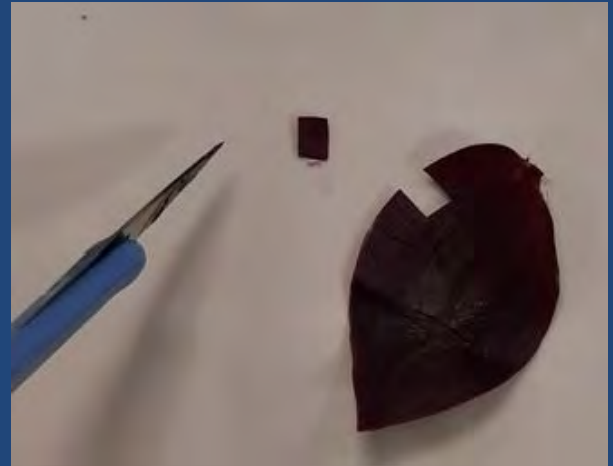
Using a microscope, observe the graduated "slide" and determine the area of the field of view at each magnification.



## 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.

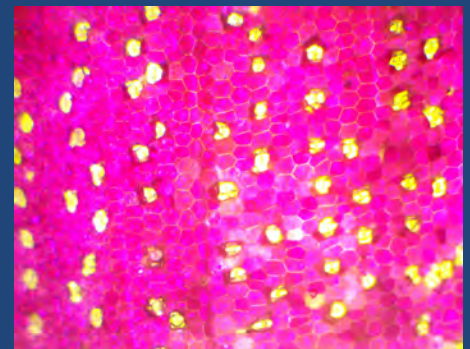


2

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

3

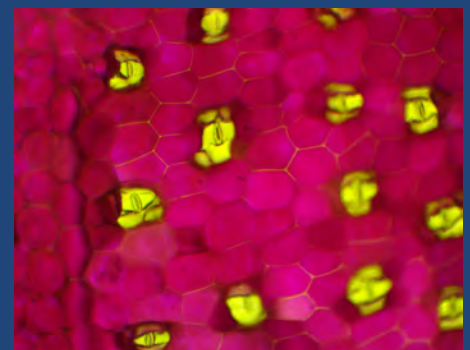
Observe the stomata and count the number of stomata you can observe in the field of view. Note the magnification used to perform the count.



x40 magnification

4

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



x100 magnification

### 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:
  - $(40/100) \times 4 = 1.6 \text{ mm}$
- Area of the field of view at x100 magnification:
  - $\pi r^2 = \pi \times (0.8)^2 = 2.01 \text{ mm}^2$
  - 13 stomata / 2 mm<sup>2</sup>
  - 6.5 stomata / mm<sup>2</sup> 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

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

Explain the conclusion you have drawn from your data.