

"Beet It"

Using real-time imaging to explore cell structure

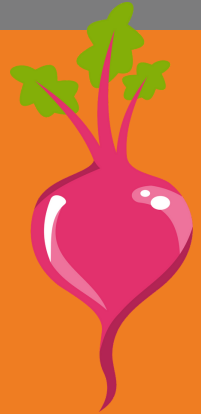
SCN 3.13a: Using a microscope, I have developed my understanding of the structure and variety of cells and of their functions.

Ever touched a beetroot and been left with purple fingertips for the whole day? Blame the **betalain pigments**, found within the vacuole of beetroot cells.

It is thought that this vibrant colour attracts pollinating insects and birds for seed dispersal. Microscopy can be used to investigate these cells in more detail and observe how environmental changes affect cell structure.

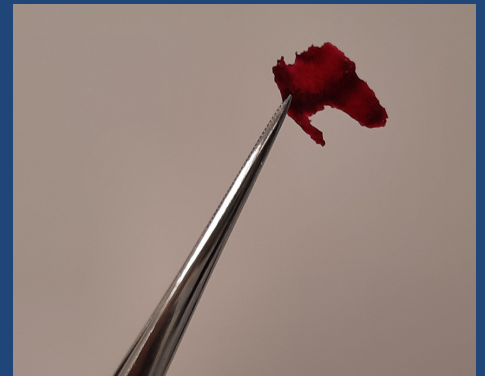
Materials

- Beetroot
- Coverslip
- Microscope slide
- Pipette
- Beaker of Water
- Scalpel
- Salt solution
- Veho DX-1 2MP microscope
- PC with Micro Capture Plus software installed.
- Cocktail stick/mounted needle



1

Using a scalpel, extract a thin section of the beetroot tissue and place on a microscope slide. The tissue must be thin enough to allow light to pass through.



2

Soak the section of beetroot in a beaker of water to remove excess pigment that has leached from cells. Replace the water several times.

3

Using a pipette, add a drop of distilled water to the microscope slide to bathe the beetroot tissue. Place the coverslip on top of the tissue, lowering it gently using a mounted needle or cocktail stick.

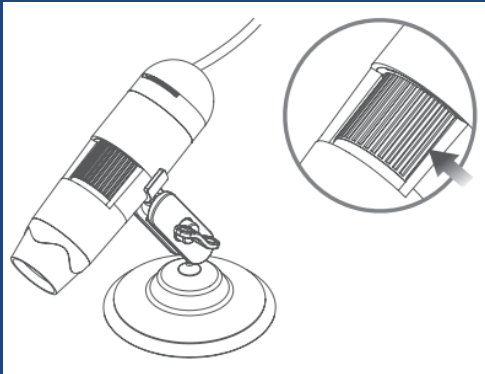
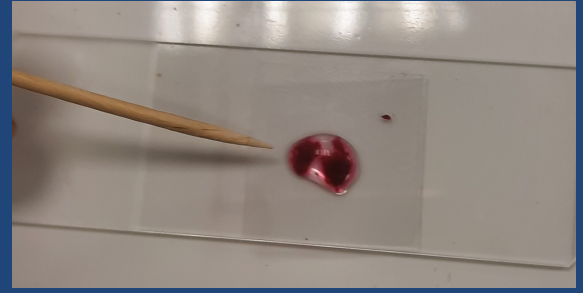


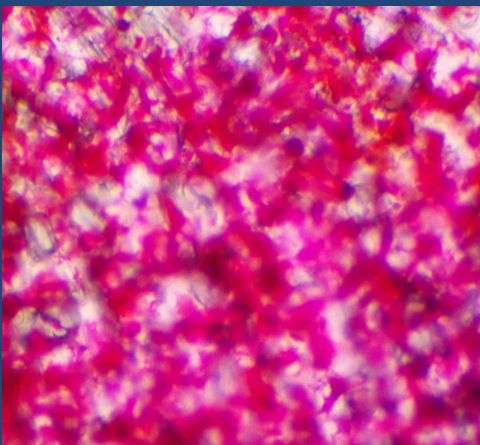
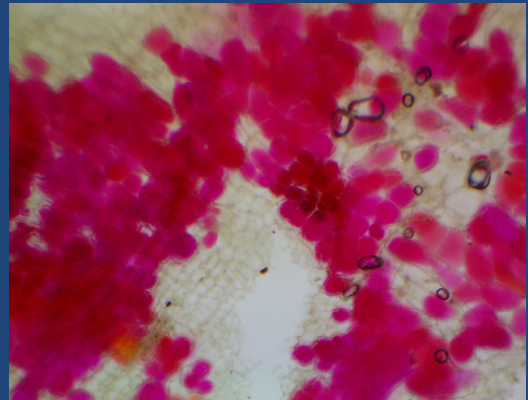
Image from [1].

4

Place the slide under a Veho microscope and, using the focus wheel, bring the cells into focus.

5

Observe the beetroot cells at x200 and capture an image. Carefully replace the water bathing solution with a salt solution. Replace the coverslip. Click "Capture Video" on Veho software.

**6**

Observe the plasmolysis of beetroot cells during your recording. This happens because water molecules leave the beetroot cells by osmosis when placed in a hypertonic solution. The cell membrane and vacuole contract, leaving the cell looking deflated.

More fun with Beetroot!



- Is Beetroot an effective pH indicator? Why not compare it to the tried-and-tested red cabbage indicator? The smell factor might be more favourable!
- Beetroot are a fantastic plant for exploring cell membrane permeability. To learn more about [this](#), read this article from the University of Birmingham.
- Learn about osmosis by cutting bores of beetroot and soaking them overnight in varying concentrations of sucrose. What happens to the beetroot mass? Can you explain what has happened?

You have observed the pigment-packed life of beetroot at a cellular level.



Plants with such intense pigmentation are thought to attract insects for pollination.



Click [here](#) to find out more about why this is so important for the future of our planet [2].



Feeling inspired? Why not plant a "[nectar cafe](#)" in an outdoor classroom or garden space [3]? Remember the role of intense colour in attracting pollinators.



References

[1] [Veho World - DX1 Digital Microscope 2MP manual](#)

[2] BBC - Would we starve without bees - <https://www.bbc.co.uk/teach/would-we-starve-without-bees/zkf292p>

[3] Wildlife Trust - Plant flowers for bees and pollinators - <https://www.wildlifetrusts.org/actions/plant-flowers-bees-and-pollinators>