S1 - S3

Third / Fourth Level

"It's all about you"

Observing cheek cells - the basic unit of (your) life

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

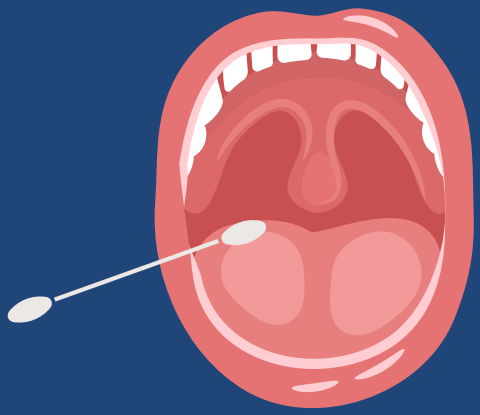
Materials

- Light microscope
- Glass microscope slide
- Coverslip
- Paper towel
- Dropping pipette
- 0.1% (w/v) Methylene blue stain
- Sterile, individually packed cotton swabs
- Discard jar with 1% *Virkon*.

According to SSERC's "Materials of Living Origin" (page 18, Appendix 2) [1], the following safety protocols must be adhered to:

- Pupils must only work with their own cheeks cells.
- Used cotton buds and slides/coverslips must be immersed immediately in a small volume of freshly prepared chlorine-based disinfectant or Virkon.
- The teacher/technician should place the used (disinfected) cotton buds in a polythene bag. The bag should be sealed and then disposed of in normal refuse.
- The disinfected slides and coverslips should be washed thoroughly and dried before re-use.

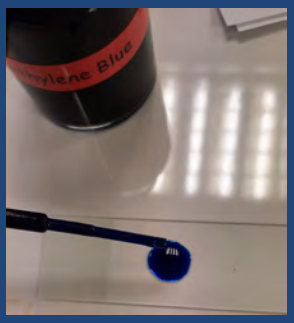
1. Move the cotton bud over the inside of the cheek on one side of the mouth and along the outer lower side of the gum.



2. Smear the cotton swab over a small area of a clean microscope slide. Place the used cotton bud immediately in a small volume of freshly prepared disinfectant.

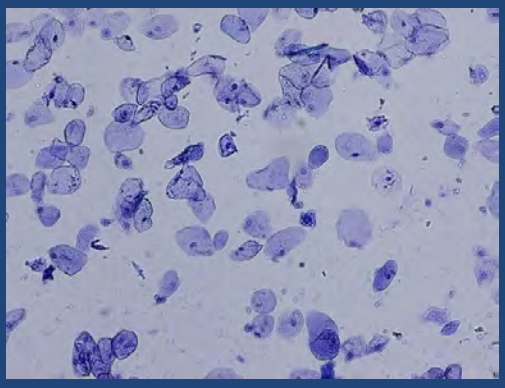
Methylene blue: stains the negatively charged molecules in the cell, including nucleic acid. This dye is toxic if ingested and causes iritation when in contact with skin or eyes.

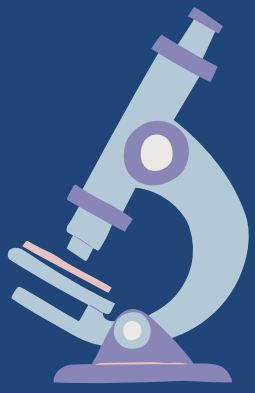
3 Add a drop of methylene blue over the smear and then place a coverslip over the top. Use a paper towel to soak away excess stain.



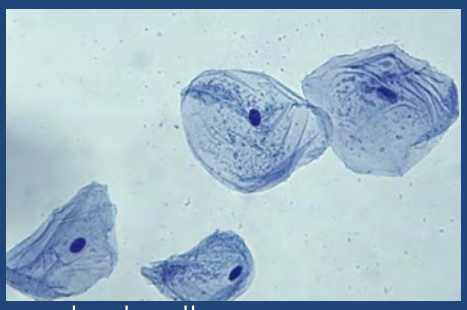
4 View the microscope slide using a light microscope, firstly focused using the x4 objective lens (x40 total magnification).

5 Now view at higher magnification by gently rotating the larger objective lens into position.





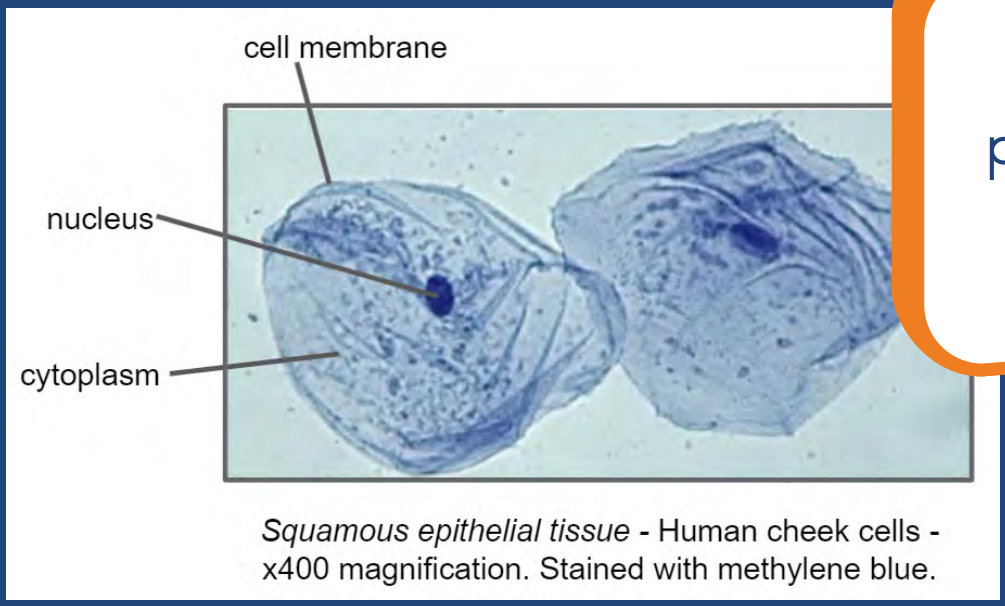
6 If you have a smartphone, carefully position the lens of the camera above the eyepiece. With a steady hand, capture an image of your own cheek cells.



Cheek cells are squamous epithelial cells from the outer layer of epithelium in the mouth. The nucleus should be clearly visible; the small blue dots are bacteria from the mouth.

7 You can now upload your image to your Google/One Drive. Insert your image into a presentation slide and, using textboxes, add any labels to cell structures you recognise. Then share your image with your class using Classroom or Teams. Who presented the best processed image?

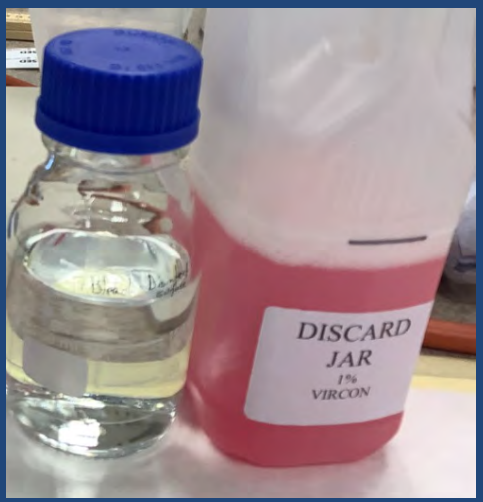
Share with @SSERCBiology



Squamous epithelial tissue - Human cheek cells - x400 magnification. Stained with methylene blue.

Include your processed image in your class notes.

8 After the cells have been observed, immerse the slide and coverslip in the discard container.



I already saw the cell. Why do I need to digitally process it?

Images will often need to be processed to be viewed later and shared with others, who need full details of the image. This might be to support the diagnosis of a disease.

Microscopes in the World of Work

Forensic scientists provide scientific evidence to support criminal or civil investigations. Various methods are used, including microscopy, to examine and identify minute traces of physical evidence from crime scenes. Their scientific findings can be used in the courtroom to support the defence or prosecution in a variety of investigations since their evidence may establish a link between a person suspected of a crime and the crime scene [2].

Click on the two icons to access more information in this area of work.

Microscopes in the World of Work

There are many jobs that rely on microscopy to solve problems, including those within the NHS. Cytopathology is an example of this: it involves the study and diagnosis of diseases by looking at cells using a light microscope [3].

Click on the two icons to access more information in this area of work.

Shakey hands? No problem. This device can be replaced with the eyepiece to hold your mobile phone steady. Record and snap away!

A BMS Microscope device available from SciChem[4].

References

[1] Materials of Living Origin - Educational Uses A Code of Practice for Scottish Schools and Colleges (SSERC, 2018).
[2] My World of Work - Forensic Scientist - weblink here.
[3] NHS - Cytopathology - weblink here.
[4] BMS Microscopes - available via SciChem - Phonetube mobile phone adapter