



Cell structure and organisation: onion cells and cheek cells Transcript

Plant and animal cells share many basic structures, some of which can be viewed under a light microscope. For example, both types of cell have a nucleus, cytoplasm and a cell membrane.

Plants cells have some additional structures, including a cell wall, chloroplasts and a vacuole.

In this experiment, onion cells and human cheek cells will be prepared and viewed under a microscope.

Onion cells are perfect for viewing plant cells under a microscope because the onion's epidermis is one cell thick. The epidermis is a thin layer on the inside each of an onions fleshy leaves.

Slides and coverslips are fragile. They are held carefully at the edges like this to prevent breakage and to prevent getting fingerprints on the glass.

A sharp knife is used to cut the onion on a white tile. Care is taken when using the sharp knife.

Clean slicing motions are used to cut a slice about 1 centimetre thick.

A small square of one of the onion layers is taken.

A drop of water is placed onto a microscope slide.

Forceps are used to gently separate the epidermis from the onion.

The epidermis is carefully placed onto the slide, over the drop of water. A mounted needle is used to help flatten out the epidermis and push it onto the drop of water.

The coverslip is held at an angle and gently lowered over the epidermis. A mounted needle is used to help. Care is taken to avoid trapping air bubbles under the coverslip, as they reflect light when under the microscope and can obscure the image.

Excess water is soaked up using filter paper.

Iodine solution is used to stain the cells to make it easier to see different structures. A drop of iodine solution is added at one edge of the coverslip.

A piece of filter paper is held against the other edge so that the iodine solution will gradually move underneath the coverslip. Alternatively, a drop of iodine solution can be added directly to the onion epidermis before adding the coverslip. The slide is left for 1 minute to give time for the iodine to react with the onion cells.

The slide is placed onto the stage of the microscope so that the part of the slide with the onion cells on is over the hole in the stage. The least powerful lens is selected.

Looking from the side of the microscope, the focussing dial is turned until the stage is as high as it will go without touching the slide; if the lens touches the slide, the slide could break.

Whilst looking down the eye piece, the focussing dial is gently turned in the other direction, so that the stage moves away from the objective lens, until the slide comes into focus.

It is possible to see a group of cells that look a bit like bricks in a wall. Unfortunately, in this sample, the staining is very weak. However, it is still possible to see some structures of the cells. What structures can you see?

The solid outline of each cell is the cell wall.

It is also possible to see the nucleus in some of the cells but they are difficult to see at this magnification.

What could these small black circles be?

These are starch granules, which have been stained black by the iodine.

This is just an air bubble trapped under the coverslip.

To see more clearly, the magnification is increased by selecting another objective lens. The stage should be moved down before changing the lens.

Can you identify the structures?

It is possible to see the nucleus, cell wall and the cytoplasm.

Why do you think you cannot see any chloroplasts?

They are not present in the cells of the epidermis because this part of the onion grows underground where there is no sunlight for photosynthesis.

Now let's look at an animal cell. Human cheek cells are easy to obtain because they rub off during eating and after contact with the tongue, so they are perfect for viewing animal cells under a microscope.

A cotton bud is used to rub very gently against the inside of the cheek.

Smear the cotton bud onto the centre of the slide to transfer the cheek cells. It might not be possible to see anything on the slide because the cheek cells are too small to see with the naked eye.

A drop of methylene blue is added to the spot where the cheek cells were transferred. Methylene blue will stain each cell to make them easier to see. A coverslip is gently lowered onto the epidermis, using a mounted needle for support. Air bubbles are avoided as much as possible.

Excess methylene blue is removed using filter paper. The slide is left for 1 minute to give time for the stain to work.

Set up the microscope as before.

Remember not to let the lens touch the slide.

The focussing dial is turned so that the stage moves away from the objective lens and stops when the slide comes into focus.

Animal cells are often smaller than plant cells, so it might only be possible to see some small blue blobs with the lowest power objective lens. A different objective lens is selected so show more detail. Using a higher magnification, each cell looks a little bit like a pale blue fried egg. It might be possible to see the nucleus in the middle. Methylene blue stains the nucleus dark blue, and the cytoplasm light blue.

What are the main visible differences between the cells?

The visible differences are:

- The onion cells are all joined together, but the cheek cells are separate.
- The onion cells are larger than the cheek cells.
- The onion cells have a regular (roughly rectangular) shape, whereas the cheek cells have an irregular shape.
- The onion cells have cell walls, but the cheek cells do not.