Heading

Title

**Introduction**

This lab has two main parts, covering the basic structure of plant and animal cells.

**Part 1 A Typical Plant Cell – the Onion**

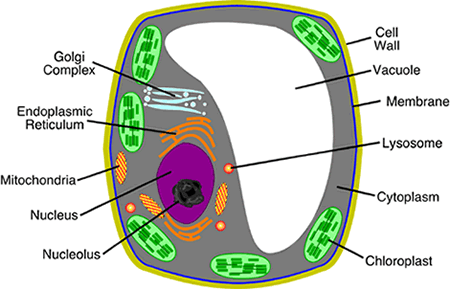
<http://somup.com/c3eQqLTyme> (3:23) Study of the Cell – Plants (Onion Cell)

**Purpose**

To examine typical plant cells, becoming familiar with the various cell parts as revealed by the compound light microscope.

**Discussion**

A plant cellhas many of the same parts found inside an animal cell, but there are a few organelles that are only found in plant cells. Plant cells have a large, central vacuole



When filled with water, it creates **turgor pressure** to give strength and support to the cell. This allows the plant to support heavy structures such as flowers and leaves.

Chloroplasts are also found only in producers (organisms that perform photosynthesis). Chloroplasts absorb energy from sun and convert it to the chemical energy of a molecule of glucose (similar to a solar power plant). They also contain enzymes and pigments for photosynthesis.

The most obvious difference between plant and animal cells is that plants have a cell wall, which supports and protects cells of plants and fungi. It is found outside of the cell membrane and is composed mostly of cellulose, a tough carbohydrate fiber.

**Hypothesis**

If a wet mount slide of an onion skin is made, then the basic plant organelles that distinguish it from animal cells can be observed.

**Materials** Onion Microscope Glass Slides Cover Slips

Razor Blade Toilet Paper Iodine Stain Alcohol

**Procedures & Calculations and Data**

A. Watch the video and make an outline of the MAJOR procedures (no more than 7) to prepare a wet mount slide of the onion and viewing under the microscope.

1.

2.

3.

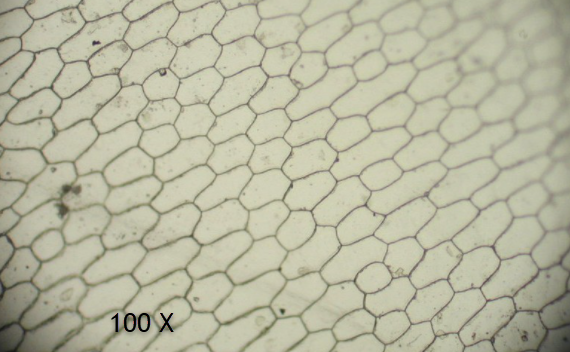
4.

5.

6.

7.

B. Examine or observe the living onion cells under low and high power, adjusting the diaphragm settings to get the optimal vision and lighting of your specimen.

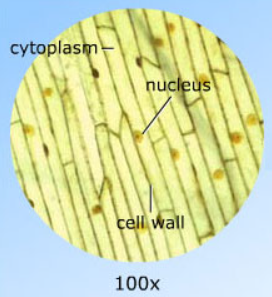


1. Describe the **shape** of an individual onion cell.

2. Describe the **color** of the protoplasm (*the living cell*) of the onion.

C. Carefully add one drop of iodine stain to the side of the cover slip, allowing it to seep under the cover slip by “capillary action.” You may use a piece of toilet paper OPPOSITE the side of the cover slip you add the stain to, to help pull the stain over the onion tissue sample.

Observe the cells under low power, adjusting the diaphragm settings to get the optimal vision and lighting of your specimen. Use the image below:



1. Describe the **effect of the iodine stain** on your view of the onion cell.

2. What is the observable **advantage of using stains**?

3. Label the **nucleus**, **cell wall**, and **cytoplasm** on the cell image (*use the text boxes*).

D. Assume your microscopic field is 2 mm in diameter. Estimate the **length** (longest side) of the average onion cell in millimeters (*mm*) and in microns (*micrometers* or *um*). Show work for all your calculations.

* + - *Multiply the millimeter cell length by 1000 to get microns*

E. Estimate the **width** of the average onion cell in millimeters and microns. (Show work)

D. SWITCH the microscope to HIGH POWER. Observe the cell parts. Label the following cell parts on the image (*use the text boxes*):

cell wall – thick, outer structure of each cell.

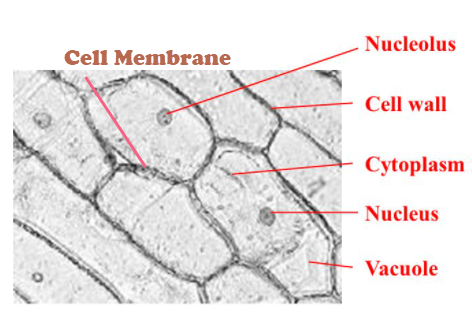
cell membrane – just inside the cell wall and pushed to the outer edge of the cytoplasm. (*difficult to see*)

nucleus – heavily stained, spherically shaped structure inside cell. The genetic material of the cell absorbs the most stain.

Nucleoli – inside the nucleus, appearing as small dots of stained material

cytoplasm – granular appearing area of cell inside the cell wall and outside the nucleus

vacuole – fluid filled sac in the cytoplasm that appears less granular than the cytoplasm. May look like a bubble.



**Part 2 Human Cheek Cell (Animal)**

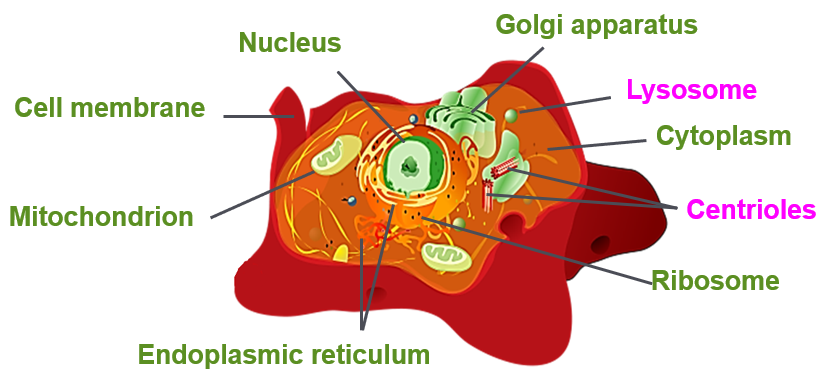
<http://somup.com/c3eQYlTyHU> (6:46) Study of the Cell – Animal (Cheek Cell)

**Purpose**

To examine typical animal cells, becoming familiar with the various cell parts as revealed by the compound light microscope. To compare the similarities and differences between typical plant cells and animal cells.

**Discussion**

An animal cellhas many of the same parts found inside a plant cell, but there are a few organelles that are only found in animal cells. Animal cells have small vacuoles dispersed throughout the cytoplasm, which store fluids and nutrients.



Lysosomes contain digestive enzymes and is known as the “stomach of the cell.” It digests carbohydrates, proteins, and lipids into small molecules that can be used by the rest of the cell. Flagella propel cells for locomotion (e.g. human sperm) and since plants are stationary, they do not need flagella. Centrioles are only found in animal cells and exist near the nucleus. They appear during cell division to help to pull chromosome pairs apart to opposite ends of the cell.

**Hypothesis**

If a wet mount slide of a human cheek smear is made, then the basic animal can be observed.

**Materials** Toothpick Microscope Slides Cover Slips

Gentian Violet Stain Toilet Paper Alcohol Lens Paper

**Procedures**

1. Set up the microscope properly.

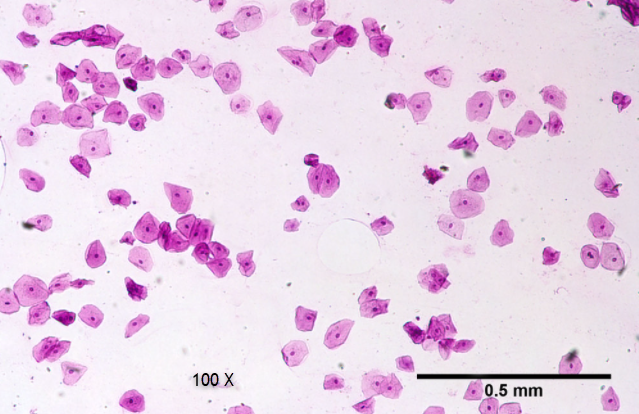
* It should be on LOW power when you retrieve it from the microscope cabinet
* Use one hand on the “Arm” and the other hand underneath the “base” to carry it
* Wipe off the ocular, objective lenses, and light source of the microscope with a small piece of lens paper
* Check that your diaphragm setting allows for the maximum amount of light to pass through the stage opening – you will adjust this setting for optimal observations

2. Use a toothpick to gently scrape some cheek cells.

3. Prepare a wet-mount slide of some human cheek cells AS FOLLOWS:

* *CLEAN and DRY a glass microscope slide using alcohol and toilet paper*
* *Place a drop of water in the center of the glass slide*
* *Add one drop of Gentian Violet stain to the center of the water drop*
* *Use a CLEAN toothpick and LIGHTLY scrap the inside lining of your cheek with one end of the toothpick*
* *Place the end of the toothpick with cheek cells in the drop of water and Gentian Violet stain and stir.*
* *Cover the sample with a cover slip by holding one edge of the cover slip to the left or right of the water drop and at a 45-degree angle to the microscope slide*
* *drop the cover slip over the sample*
* *GENTLY tap on the cover slip to remove excess air bubbles*

4. Examine the living cheek cells under low power, adjusting the diaphragm settings to get the optimal vision and lighting of your specimen.



a. Describe the **shape** of an individual onion cell.

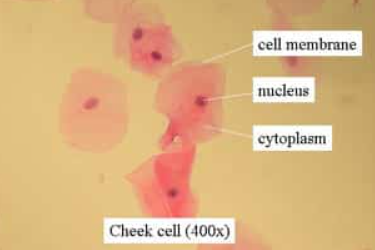
b. Describe the **color** of the protoplasm (*the living cell*) of the onion.

5. Assume your microscopic field is 2 mm and the cheek cell is the same in diameter anywhere in the cell.

* Count the number of cheek cells that would extend from top to bottom in the image.
* Estimate the **diameter** of the average onion cell in millimeters (*mm*) and in microns (*micrometers* or *um*). Show work for all your calculations.
  + - *Multiply the millimeter cell length by 1000 to get microns*

6. SWITCH your microscope to HIGH POWER.

7. Label the nucleus, cell membrane, and cytoplasm on the cell image (*use the text boxes*).



**Conclusions and Questions**

1. What is the outer edge of an animal cell called? What is the outer edge of a plant cell called?

2. Compare the appearance (*thickness, shape*) of the outer edge of an animal cell (*human cheek cell*) with the outer edge of a plant cell (*onion cell*).

3. Consider the metabolic processes of cellular respiration and photosynthesis.

a. Define each process.

b. In what kinds of cells does each of these processes take place?

c. What common molecule represents energy currency in the cell?

4. Did you find this lab “cheeky”?