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ABCs of Life

Prior to the invention of the microscope, people actually thought that earthworms fell from the sky when it rained and mice came from hay in barns. This belief of “spontaneous generation” was completely wrong, but no one knew any differently because they could not see everything... especially if it was small. The invention of the microscope led **Robert Hooke** to “discover” **cells** and **Anton van Leeuwenhoek** to create the **simple microscope** which helped him examine just about everything close to 300 times its normal size. The microscope began to change the way all scientists viewed the world and many discoveries in biology and medicine came about as a result.

In this lab, you will see the world as Robert Hooke and Anton van Leeuwenhoek began to see it back in the mid-1600s. You will look at a variety of cells from plants and animals so you too can see how life really comes to be.

Materials

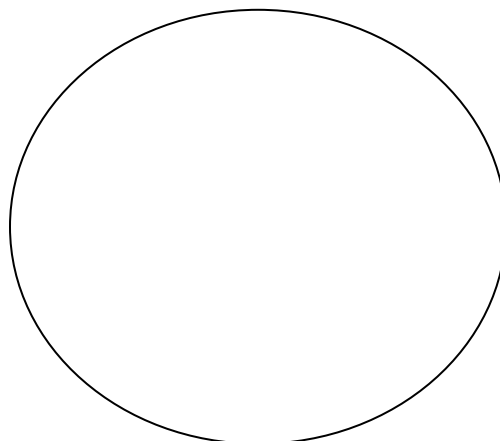
compound light microscope
prepared slide—cork
clean glass slide
cover slip
thin piece of onion skin

prepared slide—human cheek cell
iodine solution
colored pencils
safety goggles

Part 1: Observe Robert Hooke’s Cork

Directions:

Step 1 Get a prepared slide of cork (thick porous outer bark of the cork oak tree) and place the slide on the stage of the microscope. Using your “proper microscope use” as a guide, set up the slide and view under low, medium, and high power. Sketch a small section of what you observe under the highest power (you do not have to fill in the entire circle below). Every time you draw cells, be sure to include the name of what you are drawing magnification size.



_____, _____ X

Step 2 Turn to p. C12 in your textbook. What did Robert Hooke call the “boxes” he saw in the cork?

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Step 3 The outermost edge of each little “box” are called cell walls, left behind after the living parts of the cells in tree bark die. Go back to the drawing of cork above and label one cell wall. (When drawing scientifically, use a ruler to draw the line to identify the part, do not use any arrows at the end of the line, and only label one of the parts even though you may see it many times.)

Step 4 Hooke did not know that he had been the first to examine “evidence” that living things are made up of these basic building blocks which everyone calls cells today. Read the information about the development of the cell theory below and answer the following questions.

In 1839, during a conversation over coffee, Matthias Schleiden and Theodor Schwann realized much of their research involving the study of plant and animal tissues was the same. Schleiden, who was studying plants at the time, shared with Schwann, who was studying animals, that he was seeing the same basic structures over and over again. Schwann agreed and together they published their “theory” that every living thing must be made of cells and they are basic units of structure and function. Not knowing any differently at the time, they also said that cells form by “free-cell” formation...spontaneously. This was later proven wrong almost 20 years later, by Rudolf Virchow who insisted “abiogenesis” (spontaneous generation) impossible and cells actually generated from already living cells. These three ideas changed the world and many scientists have based their research on these 3 fundamental principles of the cell theory.

A) Who were the three scientists involved in developing the cell theory?

B) What year did Hooke see cells?

C) Approximately how many years transpired between Hooke’s discovery and the first publication of the cell theory?

Step 5 Copy the statements of the cell theory from p. C13 in your textbook.

Step 6 Demonstrate your understanding of the cell theory by illustrating the three statements below.

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Part 2: Plant vs. Animal Cell

In part 2 of this lab, you will compare and contrast plant and animal cells.

SAFETY

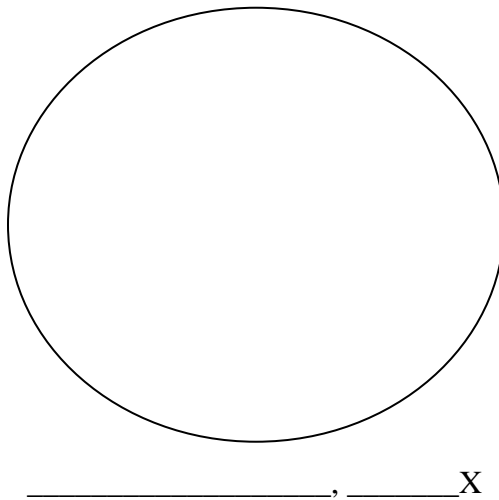
- Use care when using glass slides and cover slips.
- Iodine is poisonous and stains. Use caution when using iodine.
- Always wear safety goggles when using chemicals.

Onion Cell

Step 1 Prepare a wet mount prep of onion skin. Check off these steps as you work.

- Put on your safety goggles and keep them in place throughout Step 1 of this procedure.
- Get a piece of onion skin from your teacher and place it in the center of a clean microscope slide. It is important not to fold it or to get any wrinkles in it.
- Place the microscope slide with the onion skin on a paper towel.
- Cells are virtually colorless so in order to see them better we use stains. The iodine will stain the cells so you can see them and their parts better. Put 2-3 drops of iodine solution on the onion skin.
- Cover with a cover slip as your teacher has demonstrated (come in at an angle like you are landing a plane).
- Clean up any mess from iodine leaking and throw away the paper towel.
- Let the stain set for 5 minutes before observing the cells.

Step 2 Using your “proper microscope use” as a guide, set up the slide and view under low, medium, and high power. Sketch 6-7 adjoining (touching) cells exactly as you see them in the highest power. Remember to include the name and total magnification.



Step 3 Turn to p. C22 in your textbook. Examine the drawing of the plant cell on this page (drawn at a much greater magnification). The cell membrane always surrounds the cytoplasm and is extremely close to the cell wall. In most cases you cannot see them as separate, but if the cell is dehydrated (losing water), you may be able to see them. Using the diagram on this page, label the following parts: **cell wall, cell membrane, cytoplasm, nucleus**. (When drawing scientifically, use a ruler to draw the line to identify the part, do not use any arrows at the end of the line, and only label one of the parts even though you may see it many times.) **cytoplasm is found on C20*

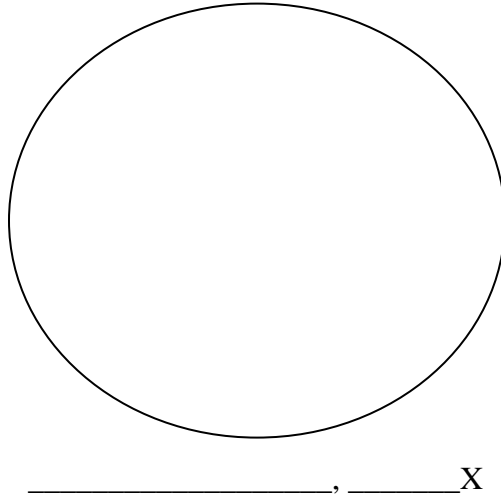
Step 4 Clean up as your teacher directs.

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Human Cheek

Step 1 Using your “proper microscope use” as a guide, set up the prepared slide of the human cheek cell (squamous epithelium) and view under low, medium, and high power. Sketch 4-6 cells exactly as you see them in the highest power. Remember to include the name and total magnification.



Step 2 The cells on this prepared slide were obtained by scraping the inside of a human’s cheek and stirring them into a fixate (something to hold them in place) on the slide. This is not how they would really appear inside your mouth. Inside your mouth they would be arranged side by side. Turn to p. C22 in your textbook. Examine the drawing of the animal cell on this page (drawn at a much greater magnification). Using the diagram on this page, label the following parts: **cell membrane, cytoplasm, nucleus**. (When drawing scientifically, use a ruler to draw the line to identify the part, do not use any arrows at the end of the line, and only label one of the parts even though you may see it many times.) **cytoplasm is found on C20*

Step 3 Clean up as your teacher directs.

Summary

- 1) Compare the onion cell and cheek cell and place a ✓ in the column if you observed the cell part listed.

Cell Part	Onion	Cheek
Cell wall		
Cell membrane		
Cytoplasm		
Nucleus		

