**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

prepared slide—animal cell

colored pencils

**Part 1: Observe Robert Hooke’s Cork**

**Directions**:

**Step 1** Your teacher has set up prepared slides at microscope stations. ***Do not touch the adjustment nobs or attempt to change/refocus the microscopes! If your microscope is out of focus raise your hand and wait for your teacher to assist you!***

Step 2 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?

**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.

**Part 2: Plant vs. Animal Cell**

In part 2 of this lab, you will compare and contrast plant and animal cells. Your teacher has set up examples of plant and animal cells at microscope stations. ***Do not touch the adjustment nobs or attempt to change/refocus the microscopes! If your microscope is out of focus raise your hand and wait for your teacher to assist you!***



**Safety**

* Use care when using glass slides.

**Plant Cell**

**Step 1** Sketch 6-7 adjoining (touching) cells exactly as you see them in the highest power. Remember to include the name and total magnification.

**Step 2** Turn to pg. 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*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_X

**Step 3** Clean up as your teacher directs.

**Human Cheek**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_X

**Step 1** 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/Plant** | **Cheek/Animal** |
| Cell wall |  |  |
| Cell membrane |  |  |
| Cytoplasm |  |  |
| Nucleus |  |  |

1. Compare (describe) the shape of the onion cell to the shape of the cheek cell.
2. Read p. C20 in your textbook. How would you describe the onion and cheek cells…eukaryotic or prokaryotic? Explain your reasoning.

**Application**

1. In your words, tell **why** and **how** the microscope is an important tool to the study of science. How might your life be different if it were not invented? Use details from this lab to support your answer. Use complete sentences.
2. You will learn more about how animal and plant cells are alike and different later, but if the onion represents the typical plant cell and the cheek represents the typical animal cell, compare and contrast between the plant and animal cell based on your observations above. Use complete sentences.

**ABCs of Life Lab Quiz**

1. What type of cells have cell walls?
	1. Plants (cork)
	2. Animal (cheek)
	3. Both plants and animal
	4. Only bacteria have cell walls
2. Which of the following is NOT part of the cell theory?
	1. Cells come from other cells
	2. Cells carry out the functions needed to support life
	3. All organisms have more than one cell
	4. Every living thing is made up of 1 or more cells
3. Label the cell wall, cell membrane, cytoplasm, and nucleus of the cell below.



Ignore this arrow.

1. Eukaryotic cells have \_\_\_\_\_\_ that prokaryotic do not.
	1. Cytoplasm
	2. A name
	3. A nucleus
	4. DNA
2. Create a Venn diagram with the following terms to compare plant and animal cells.

Have a cell wall

Have a cell membrane

Have a nucleus

Rectangular in shape

Irregular or round shape

Found in plants

Found in animals

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