Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

CELLS – THE BASIC UNITS OF LIFE

**Problem**: What are cells? What features distinguish plant cells from animal cells?

More than 300 years ago, the English scientist Robert Hooke first described the cavities in sliced cork as “cells.” The cork cells Hooke examined were actually empty shells that had once contained live material. In the early part of the 19th century, the German biologists Schleiden and Schwann realized that all living things – plants and animals – are made up of cells. This understanding eventually established the cell theory: the cell is the basic unit of structure and function of all living things.

**DON’T FORGET TO USE YOUR MICROSCOPE DRAWING GUIDELINES DURING THIS LAB!!**

**Materials**:

Microscope slides cover slips forceps

Bottle cork onion iodine stain razor blade, single edge

Colored pencils human cheek cells toothpick methylene blue

**Investigation**:

**A. CORK**

Carefully shave a very thin section from a bottle cork with a single-edged razor blade. Prepare a wet mount of the cork slide. Examine the cork specimen under low power, studying it in different positions. Then examine the specimen under medium and under high power. **Remember:**  *Do not use the coarse adjustment while viewing with any power other than low!!!* Prepare 2 fields of view and sketch your observations of the cork on Low and High power. Be sure to follow the proper format for fields of view.

1. How would you describe the units that compose the cork? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Describe the shapes and sizes of the individual units. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. What do you see inside the units? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Are there spaces between the cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Are these cells living or nonliving? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**B. ONION**

The epidermis (outer layer) of the onion is ideal for cell study because it is composed of a single layer of cells. As you study these cells, you are looking into functioning units of living material.

Cut an onion lengthwise. Remove a thick scale and peel the delicate transparent tissue from the ***inner surface***. Cut a square of the tissue and mount it on a slide in a drop of water. (NOTE: Avoid wrinkling the tissue.) Add a cover glass to your wet mount. Then examine the living cells under low power.

6. What is the shape of the cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. Are all the cells similar in shape? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. What color is the living cytoplasm? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Carefully raise one side of the cover glass and add a drop of iodine stain. Select one cell that shows the contents clearly. Move it to the center of the microscope field. Using high power, examine all the parts of the cell. Prepare a field of view (high power) and sketch your observations. LABEL: ***cell wall, plasma membrane, cytoplasm,*** and ***nucleus***.

9. When you add a drop of iodine, what effect does the stain have on the cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Choose one cell that is easy to see. Examine its parts and answer these questions.

10. What is the appearance of the cytoplasm? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. What is the appearance of the nucleus? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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12. Are the nuclei in the same position in all of the cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. Does the onion epidermal cell have depth? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**C. CHEEK**

Gently scrape the inside of your cheek with a clean toothpick. Prepare a wet mount of the material that you have scraped. Add a drop of methylene blue and a cover glass. Examine the cells under low power of the microscope. Switch to medium and focus, then switch to high power. Carefully look for the outer edge of the cytoplasm. Prepare a field of view. Draw a single cheek cell as you observed it under high power. LABEL: ***plasma membrane, cytoplasm,*** and ***nucleus.***

14. How does the outer edge of the cheek cells compare with the outer edge of the onion cells? \_\_\_\_\_\_\_\_\_\_

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15. What is this outer edge called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. Describe the shape of cheek cells. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. How did the cork units differ from those of the onion and cheek cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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18. What are the differences between plant and animal cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. What is the outer covering of an onion cell called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

20. What is the basic unit of structure in all living things? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**D. GREEN ALGAE --Prepared Slide**

Choose a prepared slide of the green algae. Examine the cells under low power of the microscope. Switch to medium and focus, then to high power. Carefully look for the outer edge of the cytoplasm. Prepare a field of view. Draw a single algae cell as you observed it under high power. LABEL: ***plasma membrane, cell wall, cytoplasm,*** and ***nucleus.***

14. How does the outer edge of the algae cells compare with the outer edge of the cheek cells? \_\_\_\_\_\_\_\_\_\_

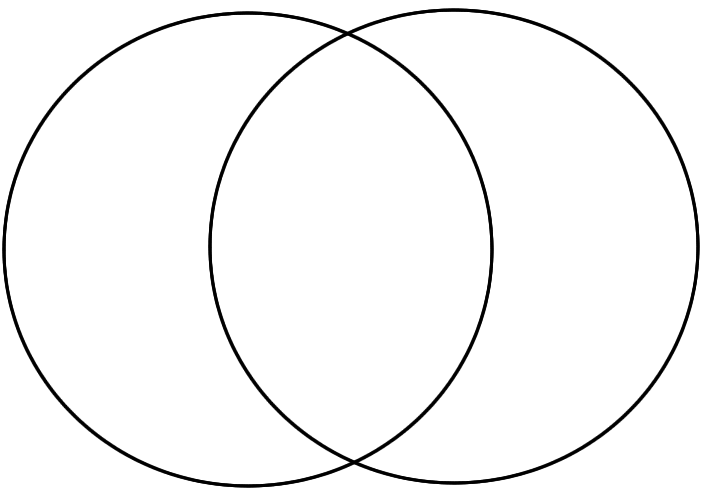
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15. What is this outer edge called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. Describe the shape of algae cells. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. How did the algae cells differ from those of the onion and cheek cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**In the space below, make a Venn Diagram to compare and contrast the four cells we looked at in this lab.**

**PLANT CELLS BOTH ANIMAL CELLS**