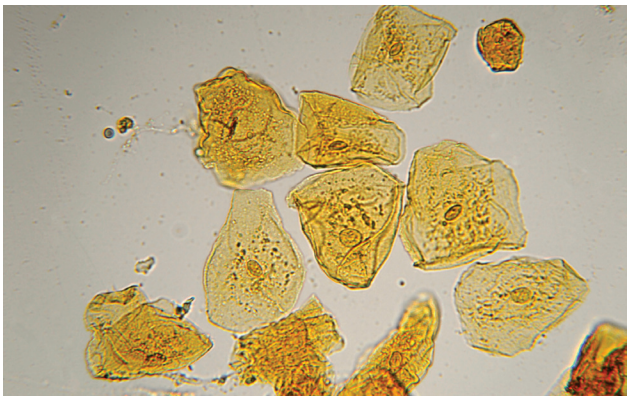


Human Cheek Cells

Activity 6: Animals—Human Cheek Cells

*Animalia, or animals, are one of the five kingdoms of life. Animal cells have two structures not shared with plant cells: the centriole and lysosomes. In this activity, you will explore the structure of human cheek cells, and you will compare and contrast them with the plant (*Elodea*) cells from Activity 5.*

Purpose:

To observe the structures of animal cells

Overview:

Students explore human cheek cells under the microscope. They examine the cell structures, measure the size and calculate the volume of the cells, and they compare and contrast animal cells with plant cells, as examined in Activity 5.

Time:

One (50 minute) session

Materials:

- *Swift* Digital Microscopes
- Computers
- Flat toothpicks
- Pipettes or eyedroppers
- Microscope slides and cover slips
- Projector (for one computer)
- Staining solution or Methylene Blue

Standards:

- National: The Cell 1, Biological Evolution 5
- California: Cell Biology 1c
- Florida: SC.912.L.14.2, SC.912.L.14.3, SC.912.L.15.6
- New York: 1
- Texas: 4B, 5A, 8C

Textbook Matching:

BSCS Biology: An Ecological Approach

- *Chapter 5: The Cell; 5.2 — Biologists Use Microscopes to Study Cells, 5.3 — Cells Are of Two Basic Types, 5.4 — Membranes Organize Eukaryotic Cells, 5.5 — Eukaryotic Cells Contain Various Organelles*
- *Chapter 10: Ordering Life in the Biosphere; 10.5 — Cell Structure Is Evidence for Relatedness, 10.6 — Organisms Are Grouped into Five Kingdoms*
- *Chapter 14: Eukaryotes: Animals*

Glencoe Science Biology (National Geographic)

- *Chapter 7: Cellular Structure and Function; Section 7.1 — Cell Discovery and Theory: Microscope Technology and Basic Cell Types, Section 7.2 — The Plasma Membrane, Section 7.3 — Structures and Organelles*
- *Chapter 24: Introduction to Animals; Section 24.1 — Animal Characteristics, Animal Cell Structure*

McDougal Littell Biology (Stephen Nowicki)

- *Chapter 3: Cell Structure and Function; 3-1 — Cell Theory, 3.2 — Cell Organelles, 3.3 — Cell Membranes*
- *Chapter 23: Invertebrate Diversity; 23.1 — Animal Characteristics*

Prentice Hall Biology (Miller and Levine)

- *Chapter 7: Cell Structure and Function; 7-1 — Life is Cellular, 7-2 — Eukaryotic Cell Structure, 7-4 The Diversity of Cellular Life*
- *Chapter 26: Sponges and Cnidarians; 26-1 — Introduction to the Animal Kingdom*

Background:

Animal cells have two structures not shared with plant cells: the centriole and lysosomes.

The average volume of a cheek cell is about 28,000 cubic microns. Students will see "granulations" in the cytoplasm as the magnification is increased. This effect is produced by many different kinds of vacuoles.

Procedure:

1. Have students work in pairs or teams to complete the activity.

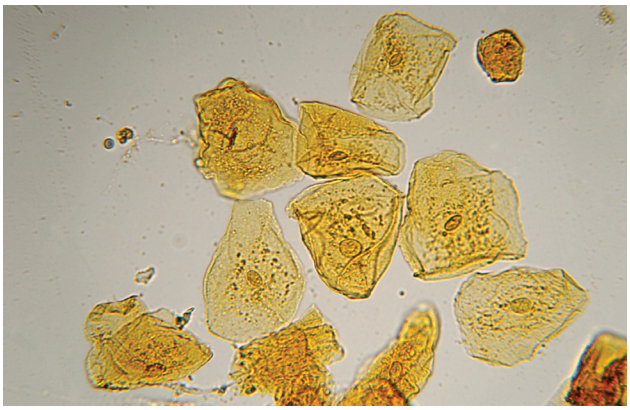
   SAFETY NOTE: This activity involves the collection, handling, and disposal of the human cheek cells; your students need to be careful and follow all safety rules.
2. Lead a discussion on the structure of a human cheek cell, and of animal cells in general, and on the functions of the various structures. Compare and contrast animal and plant cell structures and functions.

Extension:

- Have your students expose the human cheek cells to a saline environment to explore the process of osmosis and the function of the cell membrane. (For more, see Activity 14 in the unit *Behavior—Responses to Environmental Conditions*.)
- Have your students hypothesize about correlations between cell size and the size and other characteristics of the person from which the cells came. For example, are the cells of a larger person larger? Are the cells of boys and girls the same size?

Assessment:

Have your students develop a table with all the structures of a cell listed and check marks indicating which are found in plant cells, which in animal cells, and which in both.



Human Cheek Cells

Student Sheet
Activity 6: Animals—Human Cheek Cells

*Animalia, or animals, are one of the five kingdoms of life. Animal cells have two structures not shared with plant cells: the centriole and lysosomes. In this activity, you will explore the structure of human cheek cells, and you will compare and contrast them with the plant (*Elodea*) cells from Activity 5.*

1. Prepare a microscope slide of cheek cells.
   - Using a pipette or eyedropper, place a drop of staining solution or Methylene Blue on a slide. (Warning: These chemicals can stain clothing, skin, etc.)
   - Rinse or dispose of the pipette or eyedropper.
   - Using a toothpick and being careful not to hurt yourself, gently scrape the inside of your cheek.
   - Swirl the toothpick in the liquid on the slide, transferring cells from the toothpick to the liquid.
   - Throw away the toothpick, as directed by your teacher.
   - Add a cover slip.

   SAFETY NOTE: Be extra careful collecting, handling, and disposing of the human cheek cells in this activity.

2. With a partner, examine the cheek cells at 40X, 100X, 400X, and 1000X magnification using the *Swift* Digital Microscope.
   - Examine the cheek cells at each magnification, using the microscope's eyepieces and mini-digital screen (and/or the computer screen).
   - Describe the shape or overall appearance of human cheek cells. *How do various human cheek cells compare with each other? Why do you think the various cells look different?*
   - Discuss the image on the screen(s) with your partner to get agreement on which structures can actually be seen. Use your textbook and other references to help you identify the cell structures.
   - Check with other students at other microscopes as to what structures of the cells they can or can't see, comparing their view with yours.

REMEMBER to practice proper safety techniques in all science laboratory activities!

3. Draw and label pictures of animal cells.
   - Draw a picture of the human cheek cells you see using the *Swift* Digital Microscope. Label the structures. Don't include or label structures you can't actually see using the microscope. Title this drawing "Human Cheek Cells—Microscope View."
   - Draw a second picture, based on what is in your textbook or other reference, that includes all the structures of an animal cell. Title this drawing "Animal Cell—Idealized Diagram."

4. Measure the dimensions of and calculate an estimate for the volume of a human cheek cell.
   - Take a picture of the human cheek cells using the *Swift* Digital Microscope's built-in camera.
   - Using the measurement tools of the software, measure and record the approximate diameter and area of at least 10 cheek cells.
   - Calculate and record an average diameter and average area for a cheek cell.

$$\text{average diameter} = \frac{\text{diameter 1} + \text{diameter 2} + \ldots + \text{diameter n}}{\text{number of cells}}$$

   - Check the Measure Table, comparing your calculations to the calculations of the software.
   - Human cheek cells are flat, floppy cells. For area calculation purposes, they can be considered to be thin cylinders, about 10 microns high. Calculate the approximate volume of a human cheek cell.

$$\text{approximate average volume} = 2\pi rh = \pi dh = \pi \times \text{average diameter} \times \text{average height}$$

   - Record the average diameter, area, and volume of a human cheek cell on your drawn picture(s).

Comparing and Contrasting

5. Compare and contrast the structure of the human cheek (animal) cells to that of the *Elodea* (plant) cells.
   - *Based on what you can see using the microscope, how are the cells similar? How are they different? How do their sizes compare? What structures do they share? What structures are unique to each?*
   - Using your textbook or other references, summarize the similarities and differences between plant and animal cells.