Name ______________________ Class ______________ Date ____________

Observing Cell Parts and Processes

A cell's structures affect how it responds to changes in its environment. In this investigation, you will observe the differences between plant and animal cells. You will then determine how plant and animal cells are affected by hypertonic and hypotonic solutions and relate those effects to the cells' structures.

Problem

How do the differences in structure between plant and animal cells affect how they are affected by hypertonic and hypotonic solutions?

Materials

- forceps
- piece of red onion
- scalpel
- 4 glass slides
- dropper pipette
- 4 coverslips
- iodine solution
- paper towel
- microscope
- prepared slide of human cheek cells
- concentrated salt solution
- distilled water
- animal blood
- disposable plastic gloves
- safety goggles
- apron

Skills Observing, Comparing and Contrasting, Drawing Conclusions

Procedure

Part A: Plant and Animal Cell Structures

1. Put on safety goggles and a lab apron. Using forceps, peel a thin layer from the inner surface of a piece of red onion.
2. Use a scalpel to cut a small piece out of the layer you removed. **CAUTION:** *The scalpel is very sharp. Handle it carefully and make sure to cut away from yourself.*
3. Place the piece of onion in the center of a glass slide. Add a drop of water to the piece of onion and cover it with a coverslip.
4. Use a dropper pipette to place a drop of iodine solution at one end of the coverslip. **CAUTION:** *Iodine can stain skin and clothing. Be careful not to spill it on yourself.* Hold a piece of paper towel near the opposite edge of the coverslip. This will draw the iodine under the coverslip, where it will stain the onion cells.
5. Examine your slide under the low-power objective of the microscope. **CAUTION:** *Microscopes and slides are fragile. Handle them carefully.* In the space provided on the following page, sketch one cell and label any structures you recognize.

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Onion Cell	
Low Power	High Power

6. Carefully switch to high power and observe the cell again. Try to identify other cell structures and add them to your sketch with appropriate labels.
7. Repeat steps 5 and 6 using prepared slides of human cheek cells. Use the space provided below for your sketch.

Cheek Cell	
Low Power	High Power

Part B: Response to Hypertonic and Hypotonic Solutions

8. Repeat steps 1 to 3 to prepare another onion cell wet mount. Using the same method as in step 4, add a drop of concentrated salt solution to the slide and use a paper towel to draw it under the coverslip.
9. Observe the onion cells under the microscope under both low power and high power. Record your observations on the lines below.

   Observations: ____

   ____
10. Prepare a wet mount slide using animal blood. Do not add water as you did with the onion cells.
11. Observe the blood cells under the microscope under low power and high power. Sketch one cell in the space provided, and label any structures you recognize.

Blood Cell	
Low Power	High Power

12. Using the same method as in step 4, add a drop of concentrated salt solution to the slide and use a paper towel to draw it under the coverslip.
13. Observe the blood cells under the microscope under both low power and high power. Record your observations on the lines below. Rinse out the dropper pipette with distilled water.

    Observations: ________________________________

    ____
14. Prepare another wet mount slide of blood cells. This time, add a drop of distilled water to the slide and draw it under the coverslip.
15. Observe the blood cells under the microscope under both low power and high power. Record your observations on the lines below.

    Observations: ________________________________

    ____

Analyze and Conclude

1. **Applying Concepts** Describe the general shapes of the onion cells and the cheek cells you observed in Part A. What structures did you see in the onion cells? The cheek cells? Describe the functions of each of the structures you saw.

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2. **Comparing and Contrasting** How are plant and animal cells similar in structure? How are they different?

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3. **Drawing Conclusions** Explain your observations in step 9 in terms of osmosis.

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4. **Drawing Conclusions** Explain your observations in steps 13 to 15 in terms of osmosis.

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5. **Applying Concepts** What part of the cell is involved in the processes you observed in steps 9, 13, and 15? Explain your answer.

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6. **Comparing and Contrasting** Why don't onion cells burst when they are in distilled water? Relate your answer to the differences between plant and animal cells.

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