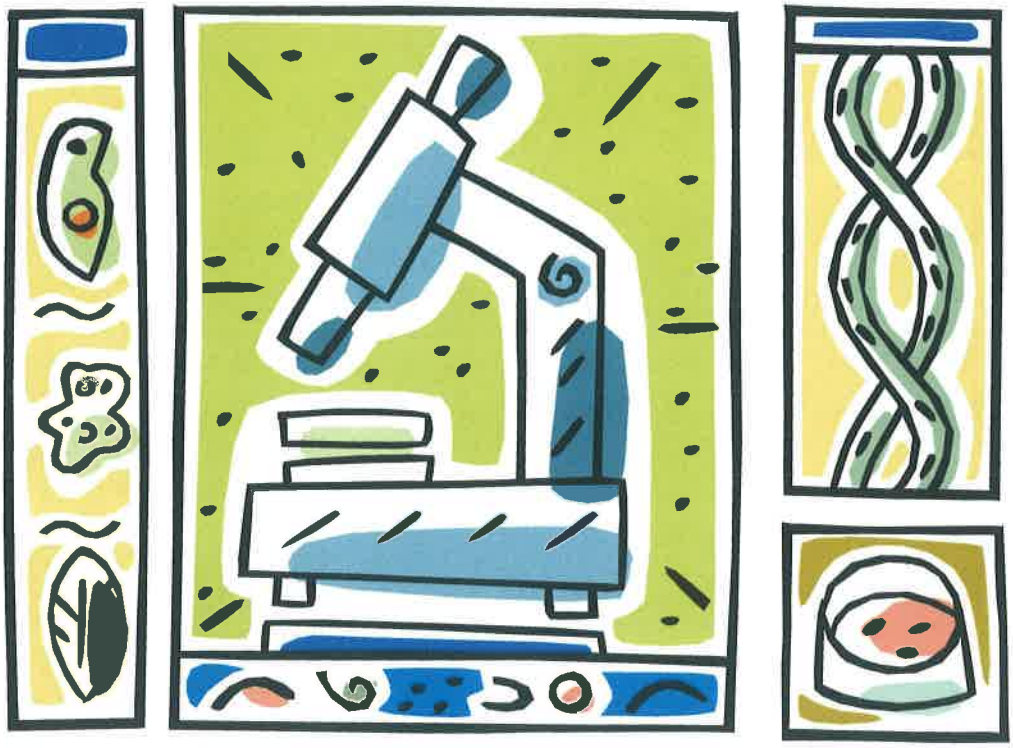
Unit Two:



Cells, Organelles and Cell Membrane

Name:

Is It Alive?!
A Study of the Life Functions

Introduction

It is very easy to recognize that animals are living organisms. However, animals are only a small fraction of all the living organisms in the world. What makes an organism alive? What makes you alive? How can you determine whether something is alive or not? These are questions you will attempt to answer during the course of this investigation. Living organisms carry out life processes. Some of the life processes include respiration, transport, regulation, nutrition, growth, excretion and reproduction. All of these processes are essential to life. Sometimes things may appear to carry out some life processes, but are not actually alive. Other times, things may not appear to carry out life processes, but are in fact alive.

Procedure

Using your senses, you will observe samples of living and nonliving things. You will record your observations in your data table in your lab notebook and use this information to determine if they are alive. However, DO NOT taste anything in the lab.

1. For each sample make a preliminary hypothesis before collecting any data.
2. Record the characteristics of each sample that you can see which can help you determine whether it is alive, dead or non-living under the column titled observations.
3. If you cannot directly observe a characteristic but you assume it is so without actual evidence, list it as an inference.
4. After reviewing your observations and inferences, determine with your lab partner whether each sample is alive, dead or non-living.

Analysis Questions

1. In the introduction, several processes essential to life were listed. Which ones could you observe any of your samples carrying out?
2. Which life processes can you observe your lab partner carrying out?
3. Did any of your original hypothesis change? Explain your answer.
4. Why is it difficult to determine if something is alive?
5. According to the dictionary, the definition of alive is "having life, not dead." After completing these laboratory observations, how would you define the word alive?
6. Viruses are a constant source of controversy in the scientific community. They have many of the same characteristics of living organisms but they cannot reproduce on their own. Viruses must be inside a host cell in order to reproduce. Reproduction is an essential life process. Based on what you learned in this lab, do you think a virus is living or non-living? Justify your answer.

DATA TABLE:

Item #: Name of Item:	1	2	3	4	5
Hypothesis: Living or Nonliving					
Organized into one or more cell? +/-/?					
Adaptation present (Name)					
Reproduces					
Grows					
Responds to Stimuli					
Moves					
Gets Food					

Name_____ Lab #_____

Observing Common Microorganisms

Background:

Single-celled microorganisms are more common in the environment than you think! You can find microorganisms for each of the six Kingdoms we've discussed. List the six Kingdoms below.

_____ _____ _____ _____ _____ _____

In lab today, you will observe microbes from Kingdom Protista, and possibly others. The cellular structure of these organisms is complex, or eukaryotic, exhibiting a nucleus as well as many other complex cell organelles. Some protists exhibit animal-like characteristics, while others show similarities to plants (ex. Photosynthetic). As you view these samples under the microscope, think about the lifestyle of each organism. Do you think it makes it own food or eats other organisms to survive? Do you think it is a protest or some other type of organism? Which of the 8 life processes are being exhibited?

Procedure:

1. Obtain a microscope (work in pairs)
2. Obtain 3 samples from your instructor
3. Create 6 circles in your lab notebook to represent 6 fields of view (7 cm diameter each!!)
4. Record its name and the magnification you are using under your sketch (you must include 2 sketches for each organism, under two different magnifications (scanning & low, or low and high)
5. Label any cell parts you can identify (at least 2)
6. Write 3 or 4 descriptive sentences under each set of sketches which describe your observations of its appearance and behavior (shape, color, swimming direction, mechanism of movement, interaction with other objects or organisms on the slide)

Notes:

- Clean your microscope with lens paper before you begin
- If using live samples, do not cross-contaminate the culture bottles with pipettes
- A single drop of liquid from the culture is enough

Analysis Questions:

1) Write a paragraph (at least 4 sentences) which describes how evidence you collected supports the conclusion that these organisms are alive (mention at least 4 of the 8 life functions!)
2) Which kingdoms were represented by your samples? Explain how behaviors/structures you observed led you to this conclusion.

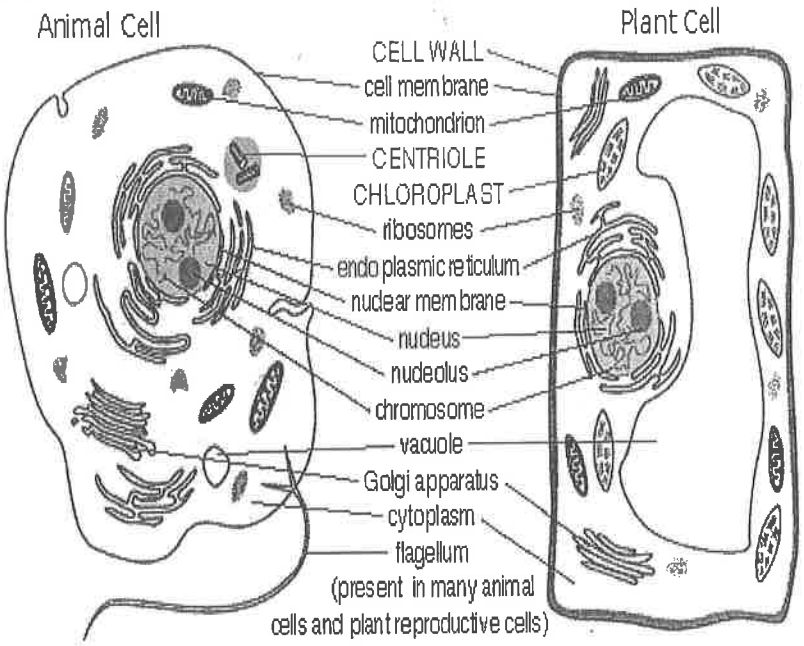
Name: Lab #_____

Comparing Plant and Animal Cells

Purpose: To use the compound light microscope to observe and compare plant and animal cells

Background Information:

Plant and animal cells are both eukaryotic, complex structures with many well organized organelles, as shown to the right. Although many organelles are shared by both types, only plant cells possess a large central vacuole for water storage, a cell wall, as well as chloroplasts photosynthesis. Animal cells possess centrioles, which are utilized in cell division. In this lab, you will examine the difference between a plant cell and a human cheek cell.



Materials:

compound light microscope for you and your partner, 2 glass slides, iodine stain, methylene blue stain, two cover slips, a plant sample, a toothpick, small beaker of water, eyedropper

Procedure:

Plant Sample:

1) Make sure that your sample is thin enough for light to pass through, and flat enough that the cover slip will be secure
2) Place your plant sample on a glass slide and create a wet mount by adding 1-2 drops of water and your cover slip (☆Remember to slowly drag your cover slip toward the sample at a 45 degree angle. Once it makes contact with water, drop it on your sample to minimize air bubbles. Do NOT push down the cover slip with your finger!) Absorb any excess water carefully with a paper towel.
3) Your plant sample may need to be stained. If so, apply a small amount of stain to one edge of the cover slip, while at the same time, using a paper towel to absorb water from the opposite edge of the cover slip. Continue in this manner until the stain has visibly passed across your sample.
4) Observe your plant sample under both low and high power. In your lab notebook, draw 2 circles with 7cm diameter to represent these fields of view. Within these circles, draw what you observe, labeling the nucleus, cell wall, cytoplasm and cholorplasts (when present) of one cell in each magnification.

Cheek (Animal) Sample:

1) Place 1 drop of clean water on a clean slide.
2) To prepare cheek cells for observation, gently rub the inside lining of your cheek with a toothpick. Be careful not to gouge the inside of your cheek!
3) Gently swirl the toothpick into the center of the water droplet. Some of your cheek cells should transfer onto the slide.
4) Use the wet mount techniques described above to apply a cover slip, and add stain.
5) Observe your cheek sample under both low and high power. In your lab notebook, draw 2 circles with 7cm diameter to represent these fields of view. Within these circles, draw what you observe, labeling the nucleus, cell membrane, and cytoplasm of one cell in each magnification.

Analysis:

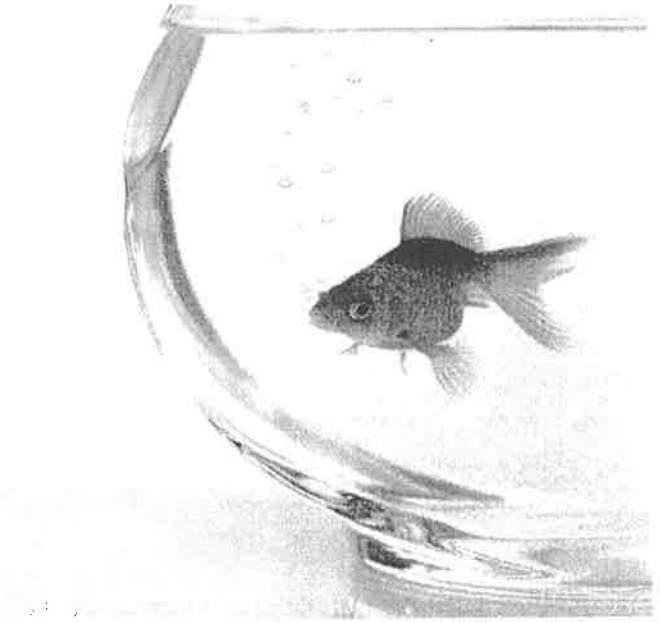
1) Complete the following chart in your lab notebook.

Cell Organelle	Plant/Animal/Both	Function
1)		
2)		
3)		
4)		
5)		
6)		
7)		

2) What is the function of staining specimens?
3) Why must the specimen be flat and thin?
4) What type of plant sample did you observe? Did it have chloroplasts? Why do you think some plant cells may lack chloroplasts? (Hint: Do all plant cells exist above ground?)
5) How are cell organelles similar to the organs of a human body?

Name: Date:

IS THE CELL MEMBRANE LIKE A BUBBLE?
A Study of the Fluid Mosaic Model



INTRODUCTION
Cell membranes are found in all cells. Aside from serving as a barrier, they are also very important in controlling the passage of materials into and out of the cell. Small molecules like water, glucose, carbon dioxide and oxygen can pass through the cell membrane. Large molecules, like starch, cannot.

In this activity, you will explore some of the properties of the cell membrane using soap bubbles. It may not seem like soap and the cell membrane have much in common, but they share many of the same features.

SAFETY
The floor may become slippery of soapy water is spilled on it. Please take care not to spill soapy water on the floor. Make sure to have paper towels at your lab station, in the event of a spill.

MATERIALS
- 1 tray
- 1 bubble frame
- 1 rubber band
- 2 toothpicks (keep one dry)

PROCEDURE:
ALL QUESTIONS ARE TO BE ANSWERED IN FULL SENTENCES IN YOUR LAB NOTEBOOK

1. Soak the bubble frame in bubble solution and make sure the entire frame is wet. Please wet your hands before handling the frame.

2. Flex and bend the bubble frame with the handles.
   - *Describe the properties of the bubble membrane. Does it break easily?*
   - *Why do you think it is important for cell membranes to have the same properties?*

3. With a bubble in the frame, hold the frame up to the light and look at the membrane.
   - *What observations can you make about the membrane?*

4. Place the rubber band in the solution. Remove it and place it on the bubble membrane. Gently pop the bubble membrane that is on the inside of the rubber band. Using a pen or pencil, move the rubber band around.
    - *What part of the cell membrane does the popped circle represent? Hint: try passing an object through the circle.*

5. Soak a toothpick in the solution and gently remove the circle of thread using the wet toothpick.
    - *What happened to the hole?*
    - *Why is this important for the cell?*

6. Dip the frame into the solution again. Take a dry toothpick and try to pass it through the membrane.
    - *What happened to the membrane?*

7. Dip the frame into the solution again. Take a wet toothpick and try to pass it through the membrane.
    - *What happened to the membrane?*
    - *Compare the results for the wet toothpick and the dry toothpick. Explain why you think these results happened this way.*

8. Insert a pencil through the membrane and move it around. If the bubble broke, make a new membrane and try it again.
    - *What does this tell you about how molecules within the membrane move around (Hint: think of the "fluid mosaic" model)?*

9. Compare the bubble membrane to the cell membrane. *Write down one similarity and two differences.*

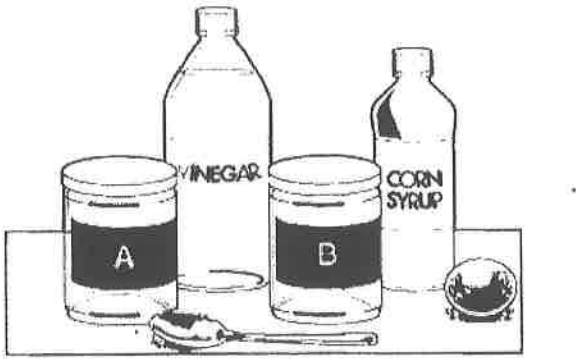
Observing Osmosis

It is difficult to see osmosis occurring in cells because of the small size of the cell. However, there are a few cells that can be seen without the aid of a microscope. Try this activity to see how osmosis occurs in a large cell.

Problem: How does osmosis occur in an egg cell?

Materials

- Raw egg
- 500 ml beaker
- 250 ml vinegar
- 250 ml corn syrup
- 250 or larger graduated cylinder
- parafilm (or saran wrap)
- water



Day 1

____ Place the egg into the 500 ml beaker. Pour 250 ml of vinegar over the egg. Cover the beaker

____ After 30 minutes, record your observations in the data table

____ Let stand for two days

Day 2

____ Record the appearance of the egg in the data table.

____ Carefully pour the vinegar into a graduated cylinder, record the amount you now have in the data table.

____ Rinse the egg off and pour 250 ml of the corn syrup over the egg and cover. Let stand for two days.

Day 5

____ Record the appearance of the egg in the data table.

____ Carefully pour the corn syrup into a graduated cylinder. Record the amount in the data table.

____ Rinse off the egg and pour 250 ml of water over the egg. Cover and let stand for two days.

Day 7

____ Record the appearance of the egg in the data table

____ Carefully pour the water into a graduated cylinder and record the amount in the data table.

____ Dispose of your egg.

Data Table

	Record the amount of liquid in the beaker in ml	Observations
Day 1		
Day 3		
Day 5		
Day 7		