**Investigating Cell Variety Lab**

Class Copy

**Objective:**

1. Recognize and draw identifying patterns and features of plant and animal cells.
2. Identify and label each cell part’s function
3. Describe characteristics that distinguish plant cells from animal cells.

**Introduction:**

The **Cell theory** states that the cell is the basic structural, functional, and developmental unit of life.

* If this theory is correct, then all living things should be made up of cells.
* It should also be true that the cells of different organisms should have some basic similarities.
* However, we should still expect there to be certain differences because of the obvious differences in cell function and type.

For this **formal lab** you will use the microscope to examine the cellular make up of different organisms- both plant and animal. Be sure to:

* Follow all lab drawing rules, and all formal lab write up rules.
* **Draw what you see!** Look for and draw patterns: this will help you identify the similarities and differences between the cells
* **Answer all questions**.

**Lab Packet Set Up:**

Lab Title

Your Name, Partner Name

Date

Period

Objectives:

Page 1: Cover sheet (should look like this)

Page 2: Divide and Label your page as you see below

Elodea Onion Skin

Questions: Questions:

Page 3: Divide and Label your page as you see below

Human Skin Amoeba Cell

Questions:

Analysis Process Grid

|  |  |  |  |
| --- | --- | --- | --- |
| Cell Type: | Examples from the lab | Parts + Pictures | Generalized picture |
| Plant |  | Plant only |  |
| both |
| Animal |  |  |
| Animal only |

Cell theory:

Page 4: Lab Analysis (should look like this)

**Plant Cells**

Work independently with your own slide. You are, however, encouraged to discuss and compare what you see with your lab partner.

**Elodea:** This green water plant will be found on the teacher’s front lab station. It must remain in water at all times except when you are removing a leaf. Examine it.

**Make a wet mount of a single leaf as follows:**

1. Put 1 or 2 drops of water on your slide first so that the leaf doesn’t have a chance to dry out.
2. Pick one green healthy-looking leaf from the tip of a sprig of Elodea and place it topside up in the water on the slide. The top-side of the leaf faces the small growing tip of the stem.
3. Add a cover slip as usual. Scan the cells in the leaf on 40X, then 100X
4. Focus clearly on 100X and then switch to 400X. If you carefully focus, up and down, you will notice that this leaf is made of two layers of cells. If you do not focus clearly on just the one layer of larger cells, you will see parts of both layers and this will confuse you. Focus on the layer of large cells.

**Draw 2 Elodea cells**. Follow lab drawing rules. In one cell, label all the parts in the list above that you were able to find.

You should be able to find and identify the following structures:

* **Cell Wall:** The thick outer layer covering of each cell
* **Chloroplasts:** Chloroplasts are the oval green bodies seen throughout the cell. **They capture light energy for use in making sugar in photosynthesis.**
* **Cytoplasm:** The clear appearing, water substance in which the chloroplasts are floating.
* **Cell Membrane:** This membrane will be pressed against the inside of the cell wall and will not be visible. Realize where it would be found, however.
* **Vacuole:** The vacuole is a large, clear, water-filled sac in the center of the cytoplasm of the cell. It fills much of the cell and is visible only when you focus up and down to find a focus level where the chloroplasts appear around the edge of the cell only. It appears this way because a water-filled vacuole is surrounded by the chloroplasts. With this in mind, try to find the vacuole. If you can’t see it go on.

Examine some cells near the vein of the leaf on 100X then 400X. In this area, one can usually observe the chloroplasts moving in most instances.

**Answer the following questions on the bottom of the page:**

1. Describe the movement of chloroplasts- If you saw them move. (If you did not see them move, say so.)
2. Which cell parts were you not able to find?

Use the green pencil at you lab station to color any colored structures that you see.

1. Chloroplasts cannot cause their own movement. They cannot swim or propel themselves in anyway. Offer a hypothesis that would explain what causes them to move within the cytoplasm of the Elodea cell.

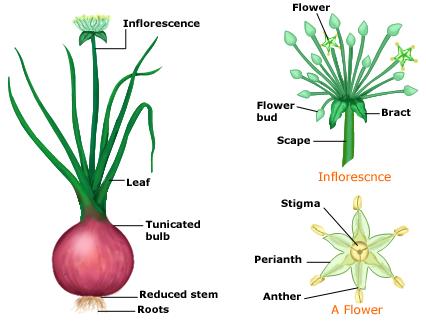
**Onion Skin Cells:** You will find sections of onion, in water, at your lab station.

**Make a wet mount slide of red onion as follows:**

1. Remove one single scale of onion and return the rest of it to the water.
2. Hold this onion scale so that the concave surface is toward you.
3. Tear the scale in half and a transparent, paper thin layer of epidermis should become visible.
4. Remove the onion epidermis by pulling it off the concave side of the onion scale. It’s like peeling dead skin after a sunburn.
5. Place two drops of water on your slide,. THROW THE REMAINING SCALE IN THE GARBAGE AND DO NOT RETURN IT TO THE BOWL WITH THE OTHER ONION SCALES. Be careful not to let it dry out.
6. Place one or two drops of water on your slide, add your onion, and add a coverslip.
7. Examine the slide on 40X, then 100X.
8. Examine and scan many cells on 40X and 100X to find what seems to be a **typical cell.**

**Draw 3 typical onion cells**: Examine 2-3 typical cells on 400X and locate and lable each of the following:

* + - **Cell Wall**
    - **Nucleus**: the control center for the cell. It contains chromosomes, upon which genes are located. The **nucleus** controls all activities of the cell.
    - **Cytoplasm:** This will appear like the dots in your cell. Note its granular nature.
    - **Vacuole:** This area will be seen only indirectly as an absence of the “granular” cytoplasm in a large portion of the center of the cell.
    - **Cell membrane**: This will be pressed against the inside of the cell wall, and will not be visible; therefore you will not label it in your drawing.



**Edible bulb**

**Answer the following questions on your own paper:**

1. Make a list of the cell parts you could find on **100X.**
   * In the onion cells you should be able to see nuclei. They should appear as round dark stained objects, either in the middle of the cell or at the edge of the cell.

The picture to the right shows what part of a plant the edible bulb of an onion comes from.

1. Offer an explanation for **why the onion cells do not contain chloroplasts.**
   * Remember that the function of the chloroplasts is to aid in photosynthesis. Photosynthesis is the process whereby chloroplasts in plant cells absorb light and energy, which is used to make more plant cells.

**Animal Cells**

**Human skin cells:** You will use your own cells for this part! It is easy and painless to obtain epithelial skin cells from inside of the cheek.

**Make a Wet Mount of your Cheek Cells:**

1. Place a drop of water on a clean glass slide.
2. Scrape the inside of your cheek gently with a clean toothpick. The loose epithelial cells will come off onto the end of the toothpick.
   * You will not see them on the toothpick.
3. Place the toothpick end, with the cells, into the water on your slide.
   * Knock the toothpick against the slide and swirl it around in the water until the water becomes slightly cloudy.
4. Add 1 full drop of iodine and then add a cover slip.
5. Examine on 40X and 100X and scan to find various cheek cells. They will appear irregular in shape and some will be found in clusters. The nucleus will be stained darkest and will be very apparent.
6. Find a few typical cheek cells and examine them in more detail on 400X to find the following:

**Draw and label the parts of 3 different cheeks cells.** Lable all parts you can see, including:

* **Cytoplasm**
* **Nucleus**
* **Cell Membrane**- This is will be the outer covering in animal cells. Animal cells DO NOT HAVE a cell wall. Notice the cell membrane is much thinner than the cell wall of plant cells. The cell membrane controls the movements of molecules into and out of the cell. The cell membrane controls the movements of molecules into and out of the cell.

**Amoeba cells** (prepared slide)**:** At your lab station you will find a prepared slide. It is marked “Amoeba Proteus”. Report any damage to this slide before you begin. An Amoeba is a relatively large single-celled animal that lives in ponds and lakes. It has a very irregular shape. The Amoebas on this slide are stained various colors. The stain causes many of the cell structures to be more visible. Scan this slide on 40X and 100X to find the stained Amoebas. Disregard the other smaller stained cells and debris.

1. Examine at least **3** different typical Amoeba cells on 400X and

**Draw and label two typical Amoeba cells.** To see all parts of Amoeba cells, it will be important to focus with the fine adjustment continually while observing these cells because different cell parts are at different depths within the cell.

You should be able to find and label the following:

* **Cell membrane,**
* **Cytoplasm,**
* **Nucleus**
* In some cells **a small clear vacuole**.

Re read the previous paragraph to be sure you have accomplished each task that is required of you.

**Summary comparison of plant and animal cells**

The remaining portion of this lab can be completed outside of class. To complete the following portion you will need your drawings of all cells made earlier in this lab.

If you were to examine a hundred more plant cells, you would find, in general, that all plant cells share many characteristics, and look similar. The same is true of all animal cells. Use your drawings to identify these shared characteristics, and to create a generalized drawing of a plant and animal cell

**Analysis Process Grid:** Draw the table below into your journal. Copy the titles (bolded words) and follow the instructions (in italics)

* + Do not use the book or another resource to help you with this: use only the drawing you made.

|  |  |  |  |
| --- | --- | --- | --- |
| **Cell Type:** | **Examples from the lab**  *List which of the 4 cells you drew are considered either plant or animal* | **Parts + Pictures**  *Draw a picture of each cell part you were able to find, and label it* | **Generalized picture**  *Draw a generalized picture for each type of cell, including all organelles (cell parts) found in the cell type. This is a general drawing, and should not resemble one specific species!* |
| **Plant** |  | **Plant only**  *Draw organelles (parts) that you can* ***only*** *find in plants*  *-If you only found an organelle in one specific type of cell, say so!* |  |
| **Both**  *Draw organelles (parts) that you can find in* ***both plants and animals*** |
| **Animal** |  |  |
| **Animal only**  *Draw organelles (parts) that you can* ***only*** *find in animals*  *-If you only found an organelle in one specific type of cell, say so!* |

**Restate Cell Theory in your own words:**