**AP BIOLOGY 2021-22 September 29, 2021**

**Today’s Agenda (Day 31)**

1. Housekeeping Items

🡪 Request for Item: pH Household Activity

1. Homework Check:

🡪 Chapter 6 Reading Guide

1. Class Activity:

🡪 **TODAY: Microscopes!! AND Human Cheek Cells**

🡪THURSDAY: pH Lab

🡪FRIDAY: Chapter 6 PPT Review

1. Section 6.5 – Mitochondria and chloroplasts change energy from one form to another
2. Section 6.6 – The cytoskeleton is a network of fibers that organizes structures and activities in the cell

HOMEWORK:

* READ: Chapters 6 – 10
* COMPLETE: Chapter 7 Reading Guide
* STUDY: Ch 6 & 7 Test

Chapter 6 Vocabulary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Actin | Basal body | Cell fractionation | Cell wall | Central vacuole |
| Centrioles | Centrosome | Chloroplasts | Chromatin | Chromosomes |
| Cilia | Collagen | Communicating junctions | Contractile vacuoles | Cortex |
| Cristae | Cytoplasm | Cytoplasmic streaming | Cytoskeleton | Cytosol |
| Desmosomes | Dynein | Electron microscope | Electrons | Endomembrane system |
| Endoplasmic reticulum | Endosymbiont theory | Eukaryotic cell | Extracellular matrix | Fibronectin |
| Flagella | Glycoproteins | Golgi apparatus | Granum | Integrins |
| Intermediate filaments | Light microscope | Lysosome | Microfilaments | Microtubules |
| Middle lamella | Mitochondria | Mitochondrial matrix | Motor proteins | Myosin |
| Nuclear envelope  | Nuclear lamina | Nucleolus | Nucleus | Peroxisome |
| Phagocytosis | Plasma membrane | Plasmodesmata | Plastids | Primary cell wall |
| Prokaryotic cell | Proteoglycans | Pseudopodia | Ribosomes | Rough ER |
| Scanning electron microscope | Secondary cell wall | Smooth ER  | Stroma | Thylakoids |
| Tight junctions | Transmission electron microscope | Transport vesicles | vacuoles |  |

REMINDERS:

* Chapter 7 Reading Guide – Oct. 12
* TEST: Chapter 6 & 7 **🡪 Oct. 14**

**AP BIOLOGY 2021-22 ACTIVITY**

**Microscopes!**

**Introduction** The microscope was invented in the 1500’s and has been a major tool of biology ever since. By means of lenses, the microscope can magnify things too small to be seen by the naked eye. One type of microscope we have in the lab is a compound microscope. You are to learn the structures and functions of the parts of this microscope. See the diagram and descriptions below.

 

**Parts of a Microscope**

• **Eyepiece** magnifies the image ten times (10x). Do NOT remove it from the microscope because it will allow dirt into the body tube or you could drop and break it.

• **Body** tube keeps the eyepiece and objective lenses at standard distances.

• Low power **objectives** magnify the specimen 4x and 10x. ALWAYS START YOUR FOCUSING ON LOW POWER. Start with the 4x objective to scan the slide and then switch to the 10x objective. High power objective magnifies the object 20x on your microscopes. THE MICROSCOPE SHOULD ALWAYS BE LEFT ON LOW POWER WHEN PUTTING IT AWAY.

• **Stage** is the structure on which you place the slide. There are stage clips to hold the slide in place. The stage should be dry so you can easily move the slide to find whatever you are looking for.

• **Focus knob** is used to focus the specimen.

• **Diaphragm** is below the stage, is round and has holes. Some have more complicated structures. It allows you to adjust the amount of light coming up from the mirror. It works like the iris of your eye that controls the amount of light entering the pupil.

• **Illuminators** are built into these microscopes. The light is found under the stage to shine the light up through the specimen you are looking at

**Learn These Terms**

1. **Magnification** is the ability to enlarge an image (what you see looking through the eyepiece). The total magnification for the microscope is obtained by multiplying the magnification of the eyepiece times the magnification of the objective lens. The eyepiece on the microscope is 10x and the three objective lenses are 4x, 10x and 20x.

What is the total magnification using each of the objective lenses? 4x=\_\_\_\_\_\_\_\_ 10x=\_\_\_\_\_\_\_\_\_ 20x=\_\_\_\_\_\_\_\_\_

2. **The Field of view** is what is observed looking through the microscope. It is circular. The field of view on low power is larger than the field of view on high power.

3. **Transmitted light** is what goes through a thin specimen and is used in the compound microscope. Your specimen, therefore, has to be thin enough to allow light to go through it.

4. **Reflected light** is used in the stereo microscopes to observe large specimens. Light reflects off the surface so you can see the surface of the object, such as a flower.

**Materials**

• Slides • Plastic coverslips • Eyedroppers • Tweezers • Compound microscopes • letters from newsprint paper

**Procedure**

**Part I. Compound Microscope**:

1. Go to the table or desk where your teacher has placed the microscopes. The microscope should have been left with the low power lens in use.

2. Obtain a clean slide and coverslip. If the slide is not clean, use a paper towel and water to clean it.

3. Place a piece of newspaper under the objective lens and find a letter “e” in a word. You do not need to use a slide for this. Do not use the capital “E.” Make sure the “e” is in a normal position to your naked eye.

4. With a pencil, sketch the letter as you see it while looking through the microscope.

5. Compare how the “e” looks under the microscope to how it looks with the naked eye.

6. Switch to high power.

7. Now how does the “e” look?

8. Get a piece of colored paper. Put it on the stage without a slide and look through the microscope. Describe what you see under the microscope compared to what you see with your naked eye:

**Observe a couple of strands of pond algae, or a drop from a hay infusion.**

Take the algae from the container with a tweezers and place the strands on the slide. TAKE ONLY A COUPLE OF STRANDS or t. will look like a pile of junk under the microscope.

• Add a drop of pond water and a coverslip. You might also need to use Protoslo, if you are using hay infusion, to slow down the creatures in the drop.

• Wipe any water from under the slide with a piece of paper towel.

• Place the slide on the stage and observe under LOW POWER (4x and then 10x)

• Sketch what you see under LOW POWER

9. Switch the microscope to HIGH POWER (20X) and observe the algae very carefully. Make another sketch of what you see under HIGH POWER.

**AP BIOLOGY 2021-22 ACTIVITY**

**Microscopes: Human Cheek Cell**

1. To view cheek cells, gently scrape the inside lining of your cheek with a toothpick. DO NOT GOUGE THE INSIDE OF YOUR CHEEK!

2. Gently roll & tap the toothpick onto the center of a glass slide with a single drop of water. Some of the cheek cells will fall onto the slide.

3. Cover with a cover slip using proper procedure.

4. Observe the cheek cells under scanning, low and high power of your microscope.

5. Add a drop of methylene blue stain or iodine. This is done by placing a drop on the side of the cover slip and placing a paper towel on the opposite edge of the coverslip. This should draw the stain through and color the cells.

6. Observe the cheek cells under low and high power of your microscope (at the minimum you should observe the cell membrane, nucleus, and cytoplasm).

 

**BIOLOGY 2021-22 ACTIVITIES**

**pH in the Kitchen**



**PURPOSE**:

Students will be able to determine the pH of various kitchen products by using both pH paper and a natural indicator.

**MATERIALS:**

1. pH paper
2. 6 test tubes
3. permanent marker
4. transfer pipets
5. water
6. vinegar
7. lemon juice

8. milk

9. milk of magnesia

10. floor cleaner

11. red cabbage juice in beaker

12. waste container

13. Paper towel

14. Stirring Rod

**SAFETY:**

You will need:

1. Goggles b. Lab Aprons c. Closed-toed shoes

**PROCEDURE:**

1. Label each test tube A, B, C, D, E, or F..
2. Using the transfer pipet provided with each kitchen product, place the following amounts of each product into their respective test tubes as listed in the table below:

**\*\* PLEASE DO NOT MIX UP THE PIPETS\*\***

|  |  |  |
| --- | --- | --- |
| **Test Tube** | **Substance** | **Amount** |
| A | Lemon Juice | One full dropper |
| B | Vinegar | One full dropper |
| C | Milk | One full dropper |
| D | Water | One full dropper |
| E | Milk of Magnesia | One full dropper |
| F | Floor Cleaner | One full dropper |

1. Take your strip of pH paper and tear it into 6 equal pieces.
2. On a piece of paper towel, lay out the 6 pieces of pH paper and under each piece, label them A, B, C, D, E, and F.
3. Dip the end of a stirring rod into test tube A. Gently touch the tip to the piece of pH paper labeled A. Observe and record what happens in the data table.
	1. The color changes can be EXTREMELY fast- be watchful!
4. Repeat step 5 with test tubes B-F and record your observations in your data table.
5. After you have tested the pH of each substance with pH paper, place one full dropper of red cabbage juice into each test tube.
6. Observe and record what happens in your data table.

**DATA:**

|  |
| --- |
| **pH Paper Observations** |
| **Test Tube** | **Substance** | **Color of pH paper** | **Approximate pH** |
| A | Lemon Juice |  |  |
| B | Vinegar |  |  |
| C | Milk |  |  |
| D | Water |  |  |
| E | Milk of Magnesia |  |  |
| F | Floor Cleaner |  |  |
| **Red Cabbage Juice Observations** |
| **Test Tube** | **Substance** | **Color of Solution** | **Acidic or Basic?** |
| A | Lemon Juice |  |  |
| B | Vinegar |  |  |
| C | Milk |  |  |
| D | Water |  |  |
| E | Milk of Magnesia |  |  |
| F | Floor Cleaner |  |  |

**ANALYSIS AND CONCLUSION**: *PLEASE ANSWER IN COMPLETE SENTENCES!! ☺*

1. If the pH paper turns red, is the substance acidic, basic, or neutral? Does the red cabbage juice test agree with the pH paper or not?

2. If the pH paper turns blue, is the substance acidic, basic, or neutral? Does the red cabbage juice test agree with the pH paper or not?

3. If the pH paper does not change color or the red cabbage juice does not change color, what does this tell you about the substance that was tested?

4. Which substance was the most acidic and what was its pH reading? Which was most basic and what was its pH reading?

5. Which is more accurate- the pH paper or the red cabbage juice and why?

6. Did anything in this lab surprise you? Why?

**AP BIOLOGY 2021-22 READING GUIDE**

# Chapter 7: Membrane Structure and Function

## Concept 7.1 Cellular membranes are fluid mosaics of lipids and proteins

1. The large molecules of all living things fall into just four main classes. Name them.

1. Explain what is meant when we say a molecule is amphipathic.

1. In the 1960s, the *Davson-Danielli model* of membrane structure was widely accepted. Describe this model and then cite two lines of evidence that were inconsistent with it.

1. Who proposed the ***fluid mosaic model*** of membrane structure? When? Describe this model.

1. What is meant by ***membrane fluidity***? Describe the movements seen in the fluid membrane.

1. Describe how each of the following can affect membrane fluidity:

* 1. decreasing temperature

* 1. phospholipids with unsaturated hydrocarbon chains

* 1. cholesterol

1. Membrane proteins are the ***mosaic*** part of the model. Describe each of the two main categories:

 ***integral proteins***

***peripheral proteins***

1. Use Figure 7.9 to briefly describe major functions of membrane proteins.

|  |  |
| --- | --- |
| **Function**  | **Description**  |
| Transport  |   |
| Enzymatic activity  |   |
| Signal transduction  |   |
| Cell-cell recognition  |   |
| Intercellular joining  |   |
| Attachment to cytoskeleton and ECM  |   |

1. Membrane carbohydrates are important in cell-cell recognition. What are two examples of this?
2. Distinguish between ***glycolipids*** and ***glycoproteins***.

1. Label the following structures:

**glycolipid glycoprotein integral protein**

**peripheral protein cholesterol phospholipid**

**ECM fibers cytoskeleton microfilaments**

## integrins



### **Concept 7.2 Membrane structure results in selective permeability**

1. Distinguish between ***channel proteins*** and ***carrier proteins*.**

1. Are transport proteins specific? Cite an example that supports your response.

1. Peter Agre received the Nobel Prize in 2003 for the discovery of ***aquaporins***. What are they?

1. Consider the following materials that must cross the membrane. For each, tell how it is accomplished.

|  |  |
| --- | --- |
| **Material**  | **Method**  |
| CO2  |   |
| glucose  |   |
| H+  |   |
| O2  |   |
| H2O  |   |

### **Concept 7.3 Passive transport is diffusion of a substance across a membrane with no energy investment**

1. Define the following terms:

 **diffusion concentration gradient passive transport osmosis isotonic hypertonic hypotonic turgid flaccid plasmolysis**

1. Use as many words from the list above to describe why a carrot left on the counter overnight would become limp. Underline each word you use.
2. What is ***facilitated diffusion***? Is it active or passive? Cite two examples.

1. Label the ***hypotonic solution***, ***isotonic solution***, and ***hypertonic solution***. What is indicated by the *blue arrows*? Label them. Which cell is ***lysed***? ***Turgid***?***Flaccid***?***Plasmolyzed***? Apply all these labels.



1. Why doesn’t the plant cell burst?

### **Concept 7.4 Active transport uses energy to move solutes against their gradients**

1. Describe ***active transport***. What type of transport proteins are involved, andwhat is the role of ATP in the process?

1. The ***sodium-potassium pump***is an important system for you to know. Use the following diagram to understand how it works. Use the following terms to label these figures, and briefly summarize what is occurring in each figure:

***extracellular fluid*, *cytoplasm*, *Na+*, *K+*, *ATP*, *ADP*, *P*, *transport protein*.**

##  Summary

1.



2

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3

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4

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5

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6

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1. On the diagram below, add these labels: ***facilitated diffusion with a carrier protein***, ***facilitated diffusion with a channel protein***, ***active transport with a carrier protein***, ***simple diffusion***. For each type of transport, give an example of a material that is moved in this manner.

 

1. What is ***membrane potential***? Which side of the membrane is positive?

1. What are the two forces that drive the diffusion of ions across the membrane? What is the combination of these forces called?

1. What is ***cotransport***? Explain how understanding it is used in our treatment of diarrhea.

***Concept 7.5 Bulk transport across the plasma membrane occurs by exocytosis and endocytosis***

1. Define each of the following and give a specific cellular example.

**endocytosis**

**phagocytosis**

**pinocytosis**

**exocytosis**

## receptor-mediated endocytosis

1. What is a ***ligand***? What do ligands have to do with receptor-mediated endocytosis?

1. Are the processes you described in question 23 active or passive transport?

 Explain your response.

*Testing Your Knowledge: Self-Quiz Answers*

Now you should be ready to test your knowledge. Place your answers here:

1.\_\_\_\_\_\_\_ 2.\_\_\_\_\_\_\_ 3.\_\_\_\_\_\_\_ 4.\_\_\_\_\_\_\_ 5.\_\_\_\_\_\_\_

Reproduce the diagram for question 6, and draw arrows as instructed.