

Lab 1

Name _____



MICROSCOPY

OBJECTIVES:

- To learn how to use and care for the compound microscope.
 - To learn the names of the parts of the microscope.
 - To observe some interesting organisms and a human cell sample.
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We humans are highly visual creatures, obtaining much of our information about the world around them by using our eyes. To understand many things we need to *visualize* them: we must *see* them. Not surprisingly, then, some of the most useful tools in biology, and indeed in science in general, are those that allow us to visual objects, processes, and phenomena. This is one of the main advantages of the powerful computers of today, because their power allows us to visualize things, and thus explore them, as never before possible. But even that technology cannot replace one of the most fundamental tools of biology, the **microscope**. With the microscope we can see things that are otherwise too small for us to see, and therefore study them.

There are many different kinds of microscopes. The one we will be using will be the compound light microscope. In this lab we explore how to use and care for this most basic of biological tools.

Understanding the nature of cell structure and function is important to an understanding of living organisms. All organisms are composed of cells, whether they exist as single cells, colonies of cells, or in multicellular form. Cells are usually very small, and for this reason, microscopy has aided in the understanding of cellular and subcellular structure and function.

GENERAL

1. Work in pairs.
 - If you do not have experience with a compound microscope, pair up with someone who does.
 - If you have experience with a compound microscope, pair up with someone who does not.
2. Please pay careful attention to how you use and care for these instruments. Failure to properly handle the microscopes **may lead to a deduction of points from your lab score**. Microscopes are delicate and expensive optical instruments and must be handled properly and carefully. Prepared slides are also expensive and must be used thoughtfully as well.
3. Obtain microscopes from the microscope cabinets.
4. Calculating magnification:
 - Multiply the power (magnification) of the eyepiece by the power of the objective lens to obtain the total magnification
 - The power of the eye piece is 10x.
 - The power of the different objective lenses is written on them.
 - Always include in any sketches the TOTAL power or magnification under which you observed the specimen. Always include the "x" as part of the magnification (e.g., 10x, 400x).
5. Use lens paper ONLY to clean ocular and objective lenses!!
5. When finished, be sure that
 - the scope is turned off.
 - all slides are removed and returned to their proper container in the correct orientation.
 - the stage is wiped clean.
 - the scope is set with the lowest power (scanning) objective in place.
 - the stage is lowered (objectives raised) as much as possible.
 - the cord is properly wrapped and secured.
 - the scope is returned to the proper microscope cabinet.

PROCEDURES

1. Obtain slide with a newspaper letter "e" mounted on it.
 2. Determine how to use the microscope.
 - Leave the microscope on low power – that means having the smallest lens in place. It should already be set this way.
 3. What total magnification is this? (see instructions above for calculating magnification) _____
 - Answer the following questions to direct your exploration of the microscope. Don't worry about the names of the parts of the microscope yet -- for the "where" questions, we want you to find the actual location (be able to point to it).
 - 1) How do you turn the microscope on?
 - 2) What part of the microscope does the light come from?
 - 3) Where do you put the slide?
 - 4) Where do you look into the microscope?
 - 5) How do you focus? (Where are the focus knobs?)
 - 6) What happens on the microscope when you focus (**what actually moves**)?
 - 7) What do the two focus knobs do *differently*?
 - 8) Looking through the eyepiece, is the image of the "e" right-side up?
 - 9) How do you increase the amount of light? How do you decrease it?
 - 10) How do you move the slide around without touching it?
 - 11) If you move the slide to the right, which way does the image in the microscope move?
 - 12) If you move the slide to the left, which way does the image move?
 - 13) If you move the slide up (away from you), which way does the image move?
 - 14) If you move the slide down (towards you), which way does the image move?
 - 15) Does your microscope have a pointer that you see when you look through it?
 3. **STOP HERE** until instructed to continue. When everyone is ready, the instructor will go over what you have learned so far.
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4. The instructor will next instruct you on how to change the power of magnification on the microscope, and how to focus.

- Increase magnification (power) to the next strongest. What magnification is this? _____
- Answer the following questions, again while still looking at the “e”:

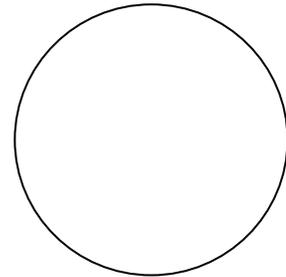
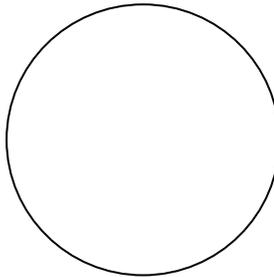
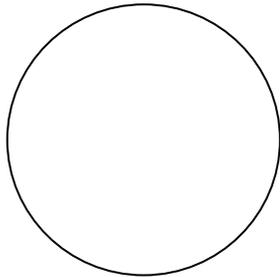
1) What are the names of the parts of the microscope that change the magnification?

2) After you increase magnification, which focus knob should you use? **Why?**

3) After you increase magnification, is the image still in focus?

4) Is it as bright as it was under lower power?

- Now increase the magnification one more time, and observe the “e”. Make three sketches of the “e”, one at each magnification.



Magnification _____

5. **STOP HERE** until instructed to continue. When everyone is ready, the instructor will go over what you have learned so far.

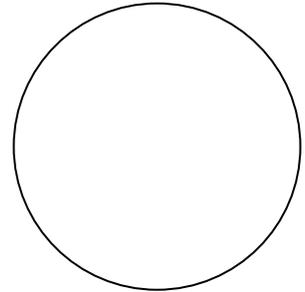
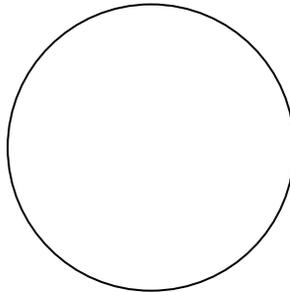
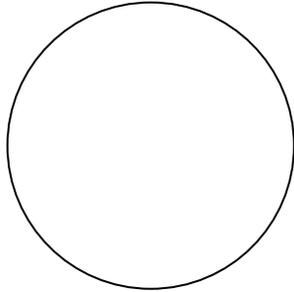
6. Return the “e” slide to its box, and obtain a “threads” slide.

- Observe under medium magnification. What magnification is this? _____ Are all three threads simultaneously in focus?
- Change the focus (remember, use only the fine focus knob!): focus in and out. What do you observe?
- What order are the threads in (which is lowest, middle, and highest?)
- How would focusing in and out help you to determine the three-dimensional structure of a specimen?

7. Return the slide.

8. **STOP HERE** until instructed to continue. When everyone is ready, the instructor will go over what you have learned so far.

9. Prepare a **wet mount** of pond water or other specimens, as instructed. Instructor will give instructions on preparing a wet mount slide. Sketch things you see. Using your text or class materials, try to identify what you see, but don't worry if you are unsure! Its ok, we are just looking around this time. Always include the magnification with your sketches.



Magnification _____

Identity of specimen(s) _____

- Do any of the pond water specimens locomote, or move? Which ones?
- Are protists **eukaryotic** or **prokaryotic**?

CLEAN-UP

10. When finished, clean up the compound microscope and prepare it to be put back in the cabinet, as instructed on the 1st page of this lab:
- the scope is turned off.
 - all slides are removed and returned to their proper container in the correct orientation.
 - the stage is wiped clean.
 - the scope is set with the lowest power objective in place.
 - the stage is lowered (objectives raised) as much as possible.
 - the cord is properly wrapped.
 - the scope is returned to the proper cubicle in the proper microscope cabinet.
11. Have the instructor come and take a look at your microscope to be sure you have correctly prepared it to be put away. If it is correctly prepared, the instructor will put his/her initials here:

12. After the instructor has checked you, you may put the microscope away.

From now on, your correct use and care of the microscope and of slides will be a part of your participation grade.

REVIEW

1. Be able to explain and demonstrate how to use the microscope, name its parts, and explain how to care for it.
2. Be able to describe how to prepare a wet mount slide.
3. Be able to recognize a human cheek cell and explain what "methylene blue" does, and what it binds to.

Compound Light Microscope

