Using the Compound Light Microscope

Possibly the most important instrument used by biologists is the microscope. A microscope aids scientists by allowing them to investigate the worlds that otherwise are too small to be seen. A compound light microscope magnifies objects up to approximately 1500 times their natural size.

Two types of slides are used with the compound light microscope: prepared slides and temporary wet mounts. Prepared slides are made to last permanently; temporary wet mount slides are not. Many of the slides you will use will be wet mounts, and you will make these slides yourself.

Materials:

microscope	100 ml beaker	pipette
microscope slide	coverslip	newspaper
scissors	thread	cotton
scalpel	forceps	potato

Part A – the letter "e":

1. Retrieve a microscope from the cabinet and correctly carry it to your lab table.
2. Clean your lenses with lens paper.
3. Collect a microscope slide, coverslip, piece of newspaper, forceps, cup of water and pipette.
4. Find and cut out a phrase or word with the letter "e" in it. Make a wet mount according to the directions on your "How To" paper.
5. Click the low-power objective into viewing position. ***NOTE:*** *Always locate an object first with low-power magnification even if a higher magnification is required for better viewing.*
6. Place the wet mount of the newspaper on the stage of your microscope. Position the slide so that the "e" is directly over the center of the stage opening.
7. While looking through the eyepiece with both eyes open, slowly turn the coarse adjustment until the "e" is in focus. Use the fine adjustment to make the image even clearer.
8. Move the slide to the right/left and up/down and then reposition it in the center of the view.
9. Answer questions 1 and 2 in the analysis section **on your own paper!**
10. Make your first drawing of the "e" at this magnification on your computer paper according to the directions on your "How To" paper. ***Be careful to include the name and magnification in the proper places and to draw and color it EXACTLY as you see it in the eyepiece.***
11. Change the objective to medium power. Use the fine adjustment to bring the newsprint into focus.
12. Make your second drawing of the "e" at this magnification on your computer paper. Follow the directions on your "How To" paper.
13. Change the objective to high power. Use the fine adjustment to bring the newsprint into focus.
14. If you are unable to find the "e," move the slide slowly around on the stage until you find it again or move back to the medium power, position the "e" in the middle of the view, and try again.
15. Make your final drawing of the "e" at this magnification.

Part B – cotton:

1. Prepare a wet mount of a few strands of absorbent cotton.
2. Observe the cotton fibers under low power. Bring them into focus using the coarse and fine adjustments.
3. While looking through the microscope, change the amount of light entering the microscope by adjusting the diaphragm.
4. Change to high power and focus the cotton fibers. Again, readjust the amount of light entering the microscope.
5. Answer questions 3 and 4 in the analysis section **on your own paper!**

Part C – thread:

1. Cut a very short strand of two different colored threads.
2. Add a drop of water to a microscope slide.
3. Cross the two strands to form an X in the drop before adding the coverslip.
4. Locate the strands under low power. Center the slide so you are looking at the point where the strands cross. Adjust the diaphragm for proper lighting and use the adjustment knobs to focus.

5. Make your first drawing of the threads under low power on your computer paper.
6. Change to medium power and observe both strands at the point where they cross. Focus.
7. Make your second drawing on your computer paper.
8. Change to high power and observe both strands at the point where they cross. Focus.
9. Make your third drawing on your computer paper.
10. The lens system of your microscope allows you to see clearly only one depth at a time under high power. In order to see objects at different depths, turn the fine adjustment back and forth by a quarter of a turn while looking through the eyepiece.
11. Answer questions 5 and 6 in the analysis section **on your own paper!**

Part D – potato scrapings:

1. With a scalpel, gently scrape the edge of a peeled potato. *Caution: Scrape away from your fingers.*
2. Add a drop of water to a glass slide. Mix the potato scrapings with the water. Add a coverslip.
3. View the wet mount with low power. You are looking at starch grains.
4. Make your first drawing of the grains on your computer paper.
5. Remove the slide from the microscope.
6. Add a drop of iodine solution to your slide along one edge of the coverslip. Refer to your "How to" for pictures. Do not get any iodine on top of the coverslip. If iodine spillage occurs, wash with water.
7. Place a piece of tissue paper along the edge of the coverslip opposite the iodine solution. Allow the tissue paper to touch the water of the wet mount. Water will soak into the tissue paper, drawing the iodine stain under the coverslip and into contact with the starch grains.
8. Observe the stained starch grains under low power.
9. Make a second drawing of the grains on your computer paper.
10. Observe the starch grains under high power and make your third drawing.
11. Move the slide to a less crowded area of starch grains near the outer edge of the coverslip.
12. Examine the stained slide with low power. Count and record the number of grains observed under low power as an answer to analysis question #7 **on your own paper!**
13. Without moving the slide, examine the stained starch grains under high power. Count and record the number of grains observed under high power as an answer to analysis question #8 **on your own paper**
14. Answer question #9 under analysis **on your own paper!**

Analysis Questions: Answer these questions on your own paper and attach to your drawings.

1. How does the orientation of the "e" viewed through the eyepiece compare with its orientation on the stage?
2. In what direction does the "e" move when you move the slide to the right? To the left? Up? Down?
3. Under what diaphragm setting (maximum, medium or little light) are the cotton fibers the sharpest on the low objective?
4. Under what diaphragm setting (maximum, medium or little light) are the cotton fibers the sharpest on the high objective?
5. Can both strands be observed clearly at the same time under low power?
6. Can both strands be observed clearly at the same time under high power?
7. How many starch grains can you observe under low power?
8. How many starch grains can you observe under high power?
9. a. How does the number of grains observed under low power compare with the number under high power?
   b. How does that relate to the area you observe under low power as compared to the area observed under high power?