Micro-lab 1

Experiment 1- Title: Observing Bacteria and Blood Purpose: The purpose of this experiment is to learn how to use a compound microscope and an oil immersion lens while observing prepared bacterial slides. Additionally, it will be necessary to prepare slides so as to observe bacterial cultures from yogurt as well as to observe the composition of blood (i. e. red blood cells, white blood cells, and platelets). Procedure: Exercise 1: Viewing Prepared Slides To begin this lab experiment I first constructed my incubator using a small Styrofoam cooler and a standard 7 watt light bulb.

Next, I read and reviewed the Science Lab Safety Reinforcement Agreement and the instructions on care and use of the compound microscope and oil immersion lens. After setting up my lab station I cleaned the ocular lenses and began to view the six prepared slides with 10x and 40x objectives. For each slide the difference in the magnification was noticeable and the 40x magnification gave a clearer observation of the specimen. It took a bit of practice to learn the most effective way to adjust the focus and the best placement and adjustment of the stage and clips.

However, once I had practiced with the letter “ e” slide it was much easier to navigate the remaining slides in the set. One immediate observation of the letter “ e” slide was that it was the mirror image when viewed through the microscope. After completing the observations of the six prepared slides I then introduced the oil immersion lens to the experiment. What I observed immediately using the oil immersion lens was a great amount of magnification and clarity. The specimens were highly focused and it was possible to view individual cells. Exercise 2: Observing Bacteria Cultures in Yogurt

In preparation for viewing the yogurt slide it was necessary to place a teaspoon of yogurt in a container that could then be placed inside the incubator for 12-24 hours. When I removed the sample from the incubator I used a toothpick to remove a sample which was placed upon a slide. I viewed the slide under 10x, 40x, and 100x magnification. Under lower magnification it was very difficult to distinguish any particular cell types; however, with higher magnification it was possible to observe the various bacterial shapes. Exercise 3: Preparing and Observing a Blood Slide

In this portion of the lab experiment I used a droplet of blood that I prepared on a slide. Once the slide was set up I viewed the specimen with the 10x, 40x, and 100x oil immersion. Observations: | Amoeba | 10x- pink with a dark pink nucleus, | 40x- Larger in size, contained more | 100x- Large cytoplasmic shape with a large | | | some were grey- dead before | dark spots | pink nucleus | | | staining? no distinct shapes | | | | Paramecium | 10x- Double purple cells, pointed on | 40x- larger but same as 10x | 100x- Tri-layered membrane, light purple, | | | one end, dark purple nucleus | magnification- edges appeared smooth | darker pink in middle with 2 dark purple | | | | nucleus- division in center of specimen.

Hair| | | | like structures on the membrane | | Penicillium | 10x- green- smooth on one side and | 40x- small, many dark jagged ells | 100x- Very long threadlike (light green), | | | jagged on the other | separated from the smooth side by | changing to small spheres in chains (dark | | | | hair like structures | green) | | Bacteria | 10x-blue purple- few- appear non | 40x- dark purple spots inside the | 100x- short cube like, appear clear around | | Bacillus form | spherical | cells | the cell- purple in center- bacillus shaped | | | | | cells | |

Bacteria | 10x- purple deep- striated appearance| 40x- clear cytoplasmic appearance | 100x- many dark purple spheres- small size, | | Coccus form | | with deep purple center- many parts, | few larger dark purple spheres throughout | | | | edges are not smooth | | | Bacteria | 10x- dark red purple- many dots make | 40x- long cells- appear clumped | 100x- long, rounded edges, snakelike | | Spirillium form | up larger center (very dark) | together | appearance, many clumping together- spiral in| | | | | shape | | Yogurt | 10x- millions of small dots | 40x- millions of small elongated | 100x- staphylococci- groups of spheres in | | fresh | | cells – random darker clumps of cells| clusters | | | | throughout | | | Yogurt | 10x- small black spheres | 40x- jagged edges and dark in | 100x- appear in chains (streptococci), longer| | prepared | | appearance dark chains with smaller light chains | | | | throughout and some singular cocci were | | | | observed as well | | Blood | 10x- Small grey spheres- some oblong | 40x- thousands of small spheres with | 100x- distinct cell shapes- thousands of | | | in shape | larger grey/black masses in between | similar cells (red blood cells), circular in | | | | shape- darker grey center, a few observable | | | | white blood cells- non smooth edges with what| | | | appears to be a nucleus- cells did appear | | | | pinkish in color | Results/ Analysis: Upon completion of this lab and the 3 exercises I was able to utilize a compound microscope for viewing of prepared and fresh specimens. It took some practice to achieve competency with using the microscope; however, once this was accomplished it was much faster and easier to locate and focus on the desired specimen.

It also took practice in adjusting the light source so as to have the proper contrast and brightness. In the end the practice using the prepared slides

allowed for clear observation of the various bacterial cell shapes such as cocci, bacillus, and spirillium. These shapes were more easily identified in the prepared slides and this knowledge was used to view similar structures in the fresh yogurt slide. Finally, analysis of a blood smear was interesting because it was initially very hard to focus due to the cell mobility. This proved to be the result of too much pressure amongst the slide when using the oil immersion lens and after some practice it was fascinating to view the thousands of red blood cells under the microscope.

There were no nuclei present in the red blood cells but the concave nature of the cells did provide for a deeper colored center. Questions: Exercise 1: Viewing Prepared Slides A. A. Eyepiece H. Coarse focus adjustmentB. Body tube I. Fine focus adjustmentC. Revolving nose piece J. ArmM. Low power objective K. Stage clipsD. High power objective E. Stage N. Inclination point F. Diaphragm L. BaseG. Mirror J- Arm- attaches the eyepiece and body tube to the base L- Base- supports the microscope B- Body tube- tube that supports the eyepiece H- Coarse focus adjustment- knob that makes adjustment to the focus F- Diaphragm- Adjustable opening under the stage that allows various amounts of light to pass A- Eyepiece- where you place your eye

I- Fine focus adjustment- knob that makes small adjustments to the focus D- High-power objective- large lens with high magnifying power N- Inclination joint- adjustable joint that lets the arm tilt at various angles. M- Low power objective- small lens with low magnifying power G- Mirror- directs the light upward onto the slide C- Revolving nosepiece- rotating device that holds the objectives E- Stage- platform on which the slide is placed K- Stage clips-

metal clips that hold a slide securely on the stage B. Define the following microscopy terms: • Focus: A means of moving the specimen closer or further away from the objective lens to reduce a blurry image into a sharp image. • Resolution: The ability of a lens system to show fine details of the object being observed. Contrast: The difference in lighting between adjacent areas of the specimen. (Darkness of the background relative to the specimen. C. What is the purpose of immersion oil? Why does it work? The purpose of immersion oil is to eliminate any loss of light. This is achieved because light is not allowed to escape into the surrounding air and a narrow cone of light is maintained. Preventing the loss of light using oil allows for increased resolution of the specimen. Exercise 2: Observing Bacteria Cultures in Yogurt A. Describe your observations of the fresh yogurt slide. The fresh yogurt slide had many clusters or groups of cocci cells- staphlococci. There were many cells present. B.

Where there observable differences between your fresh yogurt slide and the prepared yogurt slide? If so, explain. The observable differences between the fresh yogurt slide and the prepared yogurt slide were the types of bacteria cell formation. In the prepared slide I observed many more chains of bacterial cells whereas in the fresh yogurt slide I notice many more clusters of cells. C. Describe the four main bacterial shapes. The four main bacterial shapes are: 1-cocci- a spherical bacterium, 2- bacillus- any rod shaped bacterium, 3- spirillium- a spiral or corkscrew shaped bacterium, and 4- vibros- curved or comma shaped bacterium. D. What are the common arrangements of bacteria?

The common arrangements of bacterium of the cocci bacterial shape are: cocci (single spheres), diplococci (paired spheres), streptococci (spheres linked in chains), and staphlococci (spheres grouped in clusters) The common arrangements of bacterium of the bacillus bacterial shape are: bacillus (single rods), diplobacillus (rods occurring in pairs), and streptobacillus (rods occurring in chains). E. Were you able to identify specific bacterial morphologies on either yogurt slide? If so, which types? I was able to observe clusters of cocci cells (staphlococci) within the fresh yogurt slide. I was able to observe chains of cocci cells (streptococci) within the prepared yogurt slide.

Exercise 3: Preparing and Observing a Blood Slide A. Describe the cells you were able to see in the blood smear. Within the blood smear I was able to observe both red and white blood cells. The red blood cells were concave cells that gave a darker inner appearance. The white blood cell was odd in shape and appeared to have a distinct nucleus. B. Are the cells you observed in your blood smear different than the bacterial cells you have observed? Why or why not? Yes, the cells observed in the blood smear are different than the bacterial cells that were observed because they are not arranged in any particular manner and they are of a common shape.

The red blood cells also provide a natural, unstained color that is visible. Conclusions: This lab taught me the importance of understanding how to properly use a microscope for viewing specimens on a slide. If I had not learned the proper techniques for adjusting and focusing the microscope I would not have been able to view the specimens. Of utmost importance I understood how to utilize the oil immersion lens which provided more

detailed magnification. It was important to understand that the oil creates a type of light diffusion to allow for added magnification. Utilizing the oil immersion lens I was able to observe cell types and arrangements that I was unable to conclusively distinguish at lower magnifications.