Name _____ Date _____ Class _____

Real-World Biology: Analysis

CHAPTER 7 Extending Our Senses

In the 1600s, modern science was just beginning. Many people believed that Earth was at the center of the universe and that diseases were caused by evil spirits. Anton van Leeuwenhoek was born in the Netherlands in 1632. He had no higher education and made a living as a fabric merchant, a janitor, and a lens grinder. After reading a book about Robert Hooke's discoveries, van Leeuwenhoek made his own microscope and used it to examine pond water and other substances. With his microscopes, he succeeded in making some of the most important discoveries in the history of biology.

Early compound microscopes did not magnify objects more than 20 or 30 times their natural size. However, van Leeuwenhoek's microscopes magnified more than 200 times, with clearer and brighter images than any of his colleagues could achieve. Among the things he discovered with his microscopes were bacteria, sperm cells, and blood cells.

Part A: Microscope Parts and Functions

Van Leeuwenhoek's simple microscope consisted of one lens mounted in a tiny hole in a metal plate. The specimen was mounted on a sharp point in front of the lens. Its position and focus could be adjusted by turning two screws that moved up and down. The entire instrument was only 5 to 7.6 cm long and had to be held close to sunlight or candlelight.

Figure 1 is a picture of a compound microscope like the ones used in school laboratories today. This type of microscope incorporates more than one lens so that the image magnified by one lens can be further magnified by another.

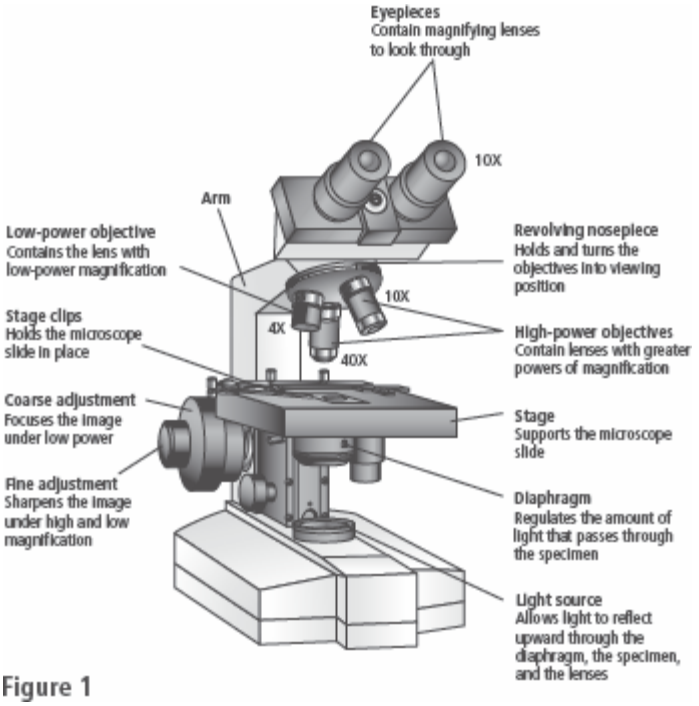

Figure 1

Analyze and Conclude

*Use **Figure 1** to respond to the following statement.*

1. **Calculate** the microscope's magnifying power if using the eyepiece and the 40x objective.

_____

2. **Compare** The table below lists functions of parts of the microscope. In the second and third columns, list descriptions of the microscope parts that perform each function.

Function	Van Leeuwenhoek's Microscope	Modern Compound Microscope
Magnification		
Specimen mounting		
Position/focus of specimen		
Light source		

Part B: Using Microscopes to Examine Evidence

The Student Council room at Central High has been set up for a crime scene investigation. Three weeks ago, Mrs. Sarah Roberts, the biology teacher, was writing a test in the lab. Her lunch was on the table where she was working. Suddenly, the fire alarm rang. Mrs. Roberts promptly left the building and, in her haste, left the lab door open. She was surprised to see a large group of people outside the building, most of them with animals. She thought this was a little unusual but soon forgot about it. When Mrs. Roberts returned to the lab, she found that her lunch was missing. She looked around the room and saw some things that had not been there when she left. There was some kind of debris on the floor. A small piece of human skin was stuck to a broken beaker. Nearby was a trail of blood. The security chief arrived, collected the three pieces of evidence, and ordered laboratory reports on each. The laboratory used microscopes to examine the skin and blood samples. The security chief then apprehended four suspects. All were in the vicinity of the building on the day of the theft. The following information is listed on the evidence bulletin board. You must use this information to determine who stole the lunch bag.

Background Information
Red blood cells of mammals do not have nuclei.
Red blood cells of nonmammals have nuclei.
Cancer cells lack contact inhibition. They continue to grow, forming layers of cells. The cells grow randomly in culture.
Normal skin cells grow in culture until they physically come in contact with each other. Growth then stops. This is called contact inhibition. The cells do not grow randomly, but are oriented in a particular direction.

Laboratory Test Results
Debris from the floor: sand and hay
Blood sample: Red blood cells have nuclei.
Skin sample: Was cultured; cells were found to have contact inhibition and be oriented in a particular direction.

Suspects
Suspect 1 • Spends weekends on the beach • Works as a dishwasher • Is being treated for skin cancer • Has a poodle named Fifi with a bandaged leg
Suspect 2 • Works in a stone quarry • Doesn't go anywhere without his pet frog, Croak, last seen with a bandaged webbed foot
Suspect 3 • Lives on a farm • Recently spent a week at the shore • Never goes anywhere without her bird, Polly, last seen nursing a hurt wing
Suspect 4 • Lives on Main Street above the bagel shop • Said he shaves hourly • Has a pet iguana that he recently took to the vet

(Adapted from Surmacz, C., Association for Biology Laboratory Education)

Analyze and Conclude

Respond to the following statement.

1. **Deduce** After reviewing the evidence information, deduce the identity of the thief. Explain how you arrived at your answer.

CAREERS IN BIOLOGY

Cell Biology Research information on cell biologists. What are the responsibilities of a cell biologist?