Name_____ Date_____

Mighty Microbes

Microbiology is the study of microorganisms. Micro means small. There is a variety of organisms, but we will focus on bacteria. Bacteria are composed of single, **prokaryotic** cells. Prokaryotic cells are characterized by their lack of a nucleus. Prokaryotic cells also have a cell wall in addition to a cell membrane. Many prokaryotic cells are motile, which means they can move. This is usually done by way of **flagella**. Flagella are whip-like structures that may be scattered over the surface of a cell or concentrated at the ends.

One of the most valuable ways to identify specific bacteria is to study their Gram reaction. **Gram staining** is a method used to place bacteria into one of two categories: **Gram-positive** or **Gram-negative**. This method of staining requires a series of steps and the application of two different dyes, but the end result is that Gram-positive bacteria are stained purple while Gram-negative bacteria are stained pink. The reason the bacteria take the stains differently and ultimately are stained purple or pink is based on the composition of their cell wall. Bacterial cell walls contain a unique material called **peptidoglycan**, which is made of both sugars and protein. Gram-positive bacteria have simpler walls with large amounts of peptidoglycan. Gram-negative bacteria are more complicated with less peptidoglycan.

Another characteristic that microbiologists use to classify bacteria is the shape of the cells. Bacteria must first be stained and then viewed under a microscope so individual cells can be seen. The most common bacterial cell shapes are **round** (cocci), **rods** (bacilli), and **spirals**. Many bacterial names reflect the shape of their cells. For example, *Streptococcus* bacteria have round cells.

Microbiologists grow cultures of bacteria in the laboratory using either liquid or solid **media**. The particular ingredients of the media are chosen depending on the nutritional requirements of the bacteria. Liquid media is called **broth** while solid media is called **agar**. Microbiologists apply bacteria to sterile agar in Petri dishes, sometimes just a single cell, and then incubate them in the lab under ideal temperature conditions. After a few days of growth on solid media, bacterial **colonies** made of many cells are visible to the naked eye. These colonies are studied based on their size, shape, texture, color, and nutritional requirements.

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Questions

1. Bacteria are composed of single, _____ cells.

2. True or False: Prokaryotic cells do not have a nucleus.

3. Gram-positive bacteria stain _____ while gram-negative bacteria stain _____.

4. Different gram-staining reactions are based on differences in bacterial _____.
   a. cell walls
   b. cell membranes
   c. nuclei
   d. flagella

5. _____ is the unique material found in bacterial cell walls.

6. The most common bacterial cell shapes are round, rod, and _____.

7. Bacteria with bacilli in their name would have _____ shaped cells.

8. *Streptococcus* bacteria have _____ shaped cells.

9. Liquid media is called _____.
   a. agar
   b. Petri dish
   c. broth
   d. inoculate

True or False: Bacterial colonies composed of many bacterial cells can be seen with the naked eye.

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Answer Key

1. Bacteria are composed of single, **prokaryotic** cells.

2. **True** or False: Prokaryotic cells do not have a nucleus.

3. Gram-positive bacteria stain **purple** while gram-negative bacteria stain **pink**.

4. Different gram-staining reactions are based on differences in bacterial _____.
   - **a. cell walls**
   - b. cell membranes
   - c. nuclei
   - d. flagella

5. **Peptidoglycan** is the unique material found in bacterial cell walls.

6. The most common bacterial cell shapes are round, rod, and **spiral**.

7. Bacteria with bacilli in their name would have **rod** shaped cells.

8. *Streptococcus* bacteria have **round** shaped cells.

9. Liquid media is called _____.
   - a. agar
   - b. Petri dish
   - **c. broth**
   - d. inoculate

10. **True** or False: Bacterial colonies composed of many bacterial cells can be seen with the naked eye.