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STUDY GUIDE

CHAPTER 17
Viruses and Monerans

Section 17–1 Viruses

(pages 355–360)

SECTION REVIEW

In this section you were introduced to the term *virus,* which is derived from the Latin word that means poison. You discovered that the structure of a typical virus is made up of a protein coat called the capsid and a core that contains nucleic acids (DNA or RNA). The core of a virus may contain DNA or RNA but never both. Bacteriophages, or viruses that infect bacteria, are made up of a head region containing the capsid and core, as well as a tail. The tail fibers are used by the virus to attach itself to a bacterium.

In order to reproduce, a virus must invade, or infect, a living cell in a host organism. Typically, a virus becomes attached to a host cell. The nucleic acids (DNA or RNA) within the viral core are injected into the host cell. What happens next depends on the type of virus and its life cycle. In a lytic infection, the nucleic acid from the virus takes over the host cell and uses the materials of the host cell to make thousands of copies of its own protein coat and nucleic acid. Soon the host cell is filled with viruses and the host cell bursts, or lyses, releasing the viruses to infect other cells in the host.

In a lysogenic infection, the virus does not reproduce immediately after infecting the host cell. Instead, the nucleic acid of the virus is inserted into the DNA of the host cell. The viral DNA may stay within the host DNA for quite some time. However, eventually it may become active, remove itself from the host DNA, and begin to direct the production of new viruses. As with a lytic infection, the viruses from a lysogenic infection will burst out of the host cell and are then freed to infect other cells.

Applying Definitions: Building Vocabulary Skills

Examine the accompanying illustration of a typical bacteriophage (virus that infects bacteria). In the lines provided, identify each part of the virus. Then, in your own words, write a definition for that part.

a. _____

_____

b. _____

_____

c. _____

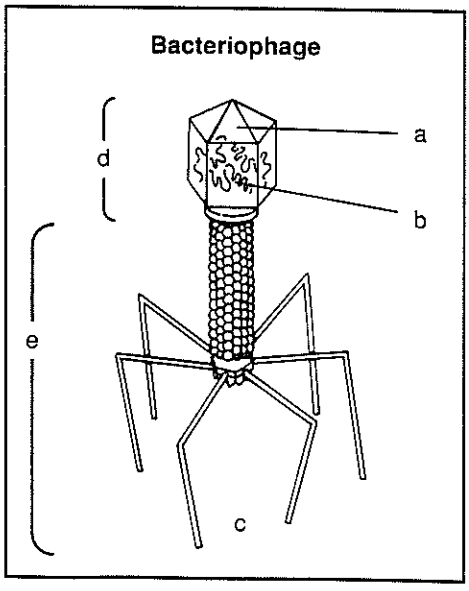
_____

d. _____

_____

e. _____

_____



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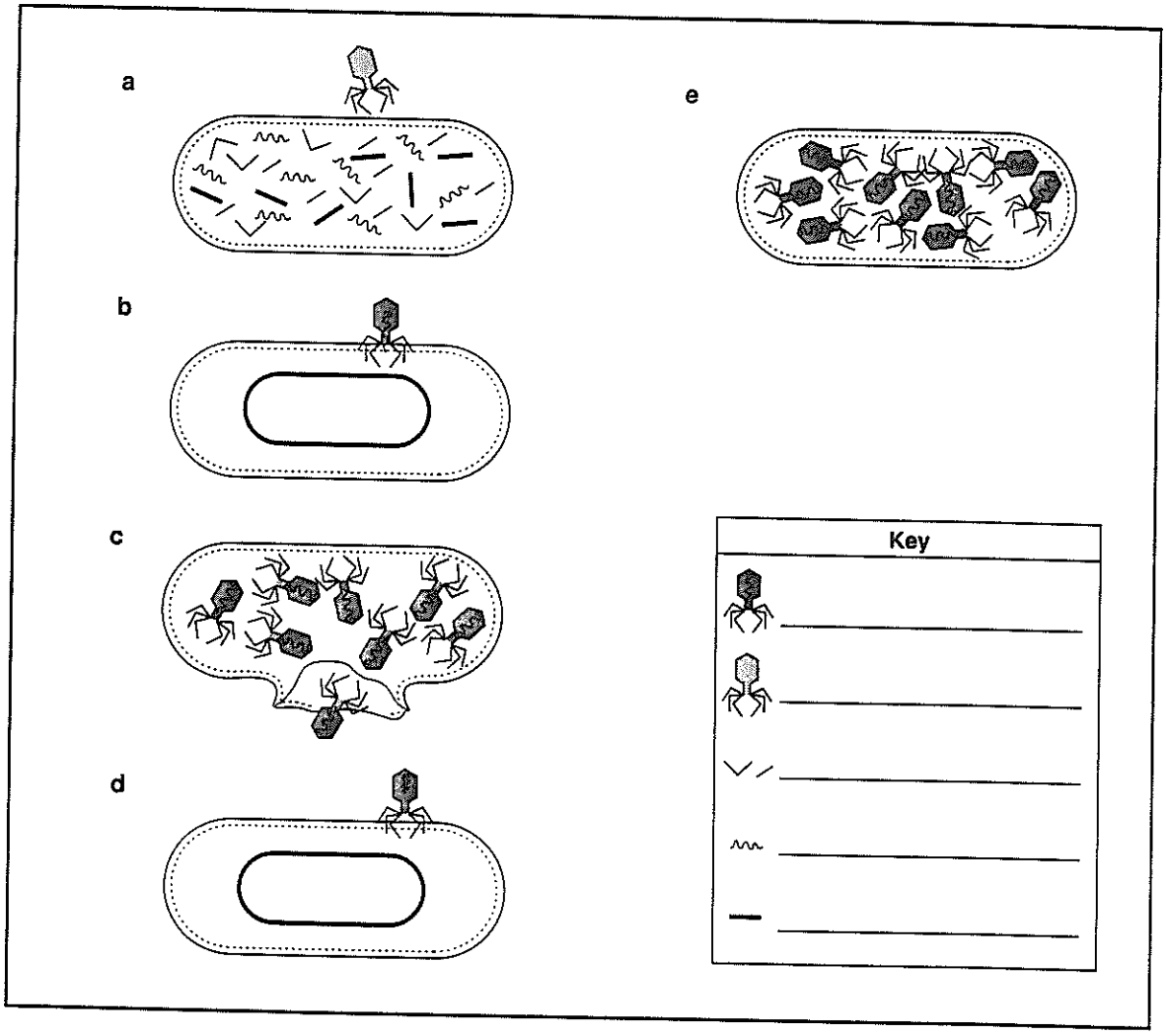
Sequencing Events: Finding the Main Ideas

The stages in the life cycle of a lytic virus are scrambled in the accompanying illustration. Examine the illustration carefully. Complete the key by filling in the name of the structure on the line next to each illustration in the key.



Determine the correct order of the stages in the illustration. Put the letter of the first stage next to the line labeled Stage One. Follow the same procedure for each of the other four stages. Then describe what is occurring in each stage. When you are done, you will have correctly ordered and described the stages of a lytic infection.

Stage One (_____) _____

_____

_____

_____

_____

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Stage Two (_____) _____

Stage Three (_____) _____

Stage Four (_____) _____

Stage Five (_____) _____

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 17–1 and how you would organize them into a concept map. Now look at the concept map for Chapter 17 on page 168. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 17–1. When you have finished the chapter, you will have a completed concept map.

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Section 17–2 Monerans—Prokaryotic Cells *(pages 360–372)*

SECTION REVIEW

In this section you were introduced to the bacteria, the single-celled prokaryotic organisms that make up the kingdom Monera. Bacteria are divided into four phyla: Eubacteria, Cyanobacteria, Archaebacteria, and Prochlorobacteria. Bacteria are often identified by their shape. Bacteria can also be identified by the way in which their cell wall is colored by Gram staining.

Bacteria obtain energy in a variety of ways. Some bacteria are autotrophs, which use a source of energy such as sunlight or chemicals to produce food (organic molecules) from simple inorganic molecules. Other bacteria are heterotrophs, which cannot make their food and instead obtain energy from the organic molecules that they eat.

The energy stored in food molecules is made available for use when the food molecules are broken down. Bacteria use the processes of respiration and fermentation to release the energy in food. Because bacteria release energy in various ways, their need for and tolerance of oxygen also varies.

Bacteria reproduce by binary fission. Some bacteria also undergo other processes, such as conjugation and spore formation. During conjugation, genetic material is transferred from one bacterium to another, thus creating new combinations of genes. During one type of spore formation, a bacterium encloses its DNA with a thick internal wall to form a spore. The spore can survive harsh conditions that would kill the bacterium in its active form.

Bacteria fit into the world in many ways. For example, some bacteria help animals digest their food. Some are used in food production and industry. Others convert nitrogen gas into a form that can be used by plants. Still others break down dead material and thus help recycle nutrients in the environment.

Finding the Oddball: Building Vocabulary Skills

For each of the following sets of terms, determine the characteristic common to three of the terms. Then identify the term that does not belong.

1. spirillum, coccus, methanogen, bacillus: _____

2. prokaryote, nitrogen fixation, saprophyte, symbiosis: _____

3. Eubacteria, Cyanobacteria, Archaebacteria, Azotobacteria: _____

4. cell wall, nucleus, flagellum, cytoplasm: _____

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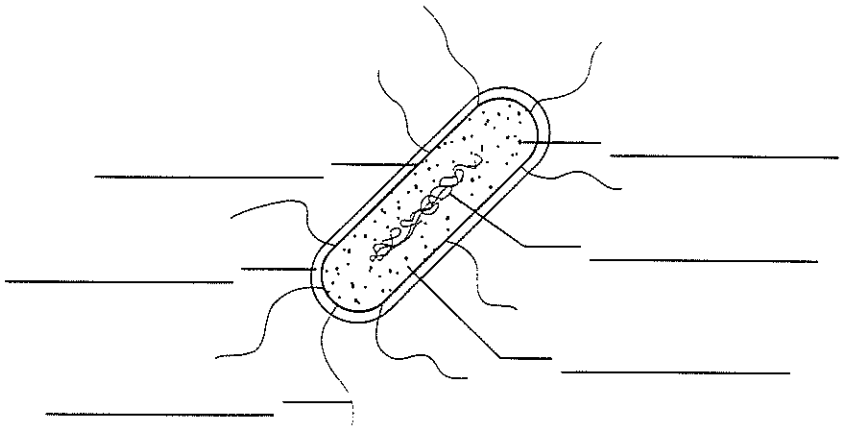
Labeling Diagrams: Using the Main Ideas

Label the diagram of a typical bacterium using the following terms: cell membrane, cell wall, cytoplasm, flagellum, genetic material, ribosome. Then answer the questions that follow the diagram.



1. Is the bacterium in the diagram a bacillus, coccus, or spirillum? Explain.

_____

2. How would you expect this bacterium to move? _____

3. Suppose that this bacterium was a streptobacillus. What kind of colonies would you expect it to form? _____

4. This bacterium is Gram-negative. What happens when it is subjected to Gram staining?

_____

_____

5. This bacterium is a facultative aerobe. What process or processes would you expect it to use to break down food? Explain. _____

_____

_____

_____

_____

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 17–2 and how you would organize them into a concept map. Now look at the concept map for Chapter 17 on page 168. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 17–2. When you have finished the chapter, you will have a completed concept map.

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Section 17–3 Diseases Caused by Viruses and Monerans *(pages 372–375)*

SECTION REVIEW

In this section you learned that only a small number of viruses and bacteria are capable of producing disease in humans. You also read about ways in which viral and bacterial diseases can be treated and prevented.

Viruses cause human diseases such as polio, measles, AIDS, and the common cold. Some viruses cause cancers in animals. Many viral diseases are prevented with vaccines. Most viral infections cannot be cured with medicines, although medicines may help treat the symptoms of a viral disease. Scientists are currently studying interferons, proteins produced by virus-infected cells that make it difficult for the viruses to infect other cells. It is possible that many viral diseases may someday be cured using interferons.

Bacteria cause human diseases such as tuberculosis, syphilis, and tetanus. Bacterial diseases can also be treated with drugs such as antibiotics. Bacterial infections can be prevented by controlling bacterial growth through sterilization and proper food processing.

Defining Terms: Building Vocabulary Skills

In your own words, define each of the following terms.

1. Antibiotic: _____

2. Disinfectant: _____

3. Interferon: _____

4. Pathogen: _____

5. Sterilization: _____

6. Vaccine: _____

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 17–3 and how you would organize them into a concept map. Now look at the concept map for Chapter 17 on page 168. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 17–3. When you have finished the chapter, you will have a completed concept map.