

## CHAPTER

## 9

## ACTIVE READING

## DNA: The Genetic Material

## ► Section 9-1: Identifying the Genetic Material

Read the passage below, which is reproduced from page 188 of your textbook. Answer the questions that follow.

In 1928, bacteriologist Frederick Griffith tried to prepare a vaccine against the pneumonia-causing bacterium *Streptococcus pneumoniae*. A **vaccine** is a substance that is prepared from killed or weakened microorganisms and is introduced into the body to protect the body against future infections by the microorganisms.

Griffith worked with two strains of *S. pneumoniae*. The first strain was enclosed in a capsule made of polysaccharides. The capsule protected the bacterium from the body's defense systems; this helped make the microorganism **virulent**, or able to cause disease. The second strain of *S. pneumoniae* lacked the polysaccharide capsule and did not cause disease.

Griffith knew that mice infected with S bacteria grew sick and died, while mice infected with R bacteria were not harmed. To determine if the capsule on the S bacteria was causing the mice to die, Griffith injected the mice with dead S bacteria. The mice remained healthy. Griffith then prepared a vaccine of weakened S bacteria by raising their temperature until the bacteria were "heat-killed," meaning they could no longer reproduce.

When Griffith injected the mice with the heat-killed S bacteria, the mice still lived. He then mixed the harmless live R bacteria with the harmless heat-killed S bacteria. Mice injected with this mixture died. When Griffith examined the blood of the dead mice, he found that the live R bacteria had acquired polysaccharide capsules. Somehow, the harmless R bacteria underwent a change and became live virulent S bacteria. This phenomenon is now called **transformation**, a change in phenotype caused when bacterial cells take up foreign genetic material.

Read each question and write your answer in the space provided.

**SKILL:** Reading Effectively

1. What effect does a *vaccine* have on the body?

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2. What effect does a capsule made of polysaccharides have on a bacterium contained within the capsule?

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3. What does the Key Term *virulent* mean?

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4. What effect did an injection of dead *S* bacteria have on the mice Griffith studied?

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5. What effect did an injection of heat-killed *S* bacteria have on the mice Griffith studied?

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6. What effect did an injection of live *R* bacteria mixed with heat-killed *S* bacteria have on the mice?

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7. What did Griffith discover when he examined the blood of the dead mice?

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**Circle the letter of the phrase that best completes the statement.**

8. In order to determine whether the capsule on the *S* bacteria was causing mice to die, Griffith injected mice with
- a. dead *S* bacteria.
  - b. weakened *S* bacteria.
  - c. heat-killed *R* bacteria.
  - d. Both (a) and (b)

5. the first filial generation or first offspring of the parental generation
6. a. P  
b. F<sub>1</sub>  
c. F<sub>2</sub>  
d. cross-pollination  
e. self-pollination
7. c

### SECTION 8-2: MENDEL'S THEORY

1. by writing the first letter of the trait as a capital letter
2. by writing the first letter of the trait in lowercase
3. Two of the same alleles for seed color are present in the plant.
4. The plant possesses two different alleles for flower color.
5. Yy
6. pp
7. Pp
8. b

### SECTION 8-3: STUDYING HEREDITY

1. It defines the Key Term *Punnett square*.
2. They represent the possible gametes produced by each parent.
3. Each combination is formed by taking one allele along the top of the box and one allele along the side of the box.
4. the possible genotypes of offspring produced from these two parents
5. the number of plants expressing either purple flowers or white flowers
6. a. YY  
b. yy  
c. 1  
d. 1  
e. 2  
f. 1  
g. 3
7. d

### SECTION 8-4: PATTERNS OF HEREDITY CAN BE COMPLEX

1. It defines the Key Term *multiple alleles*.
2. It clarifies the term *blood groups*, which precedes it.
3. The letters refer to two carbohydrates on the surface of red blood cells.
4. Both  $I^A$  and  $I^B$  are dominant over the recessive allele  $i$ . But neither  $I^A$  nor  $I^B$  is dominant over the other.
5. Both  $I^A$  and  $I^B$  are present in the individual. Because they are codominant, the individual shows both forms of the trait.
6. d

## CHAPTER 9

### DNA: The Genetic Material

#### SECTION 9-1: IDENTIFYING THE GENETIC MATERIAL

1. It protects the body against future infections by the microorganisms from which it was prepared.
2. The capsule protects the bacterium from the body's defense systems.
3. able to cause disease
4. The mice remained healthy.
5. The mice still lived.
6. The mice died.
7. The live R bacteria had acquired polysaccharide capsules.
8. d

#### SECTION 9-2: THE STRUCTURE OF DNA

1. A double helix consists of two strands twisted around each other.
2. It provides a visual model of a double helix's structure.
3. Answers will vary. Possible responses include a coil of fencing material or railroad tracks that wind around a mountain.
4. Nucleotides are units, or parts, that form DNA, or a whole.
5. a phosphate group, a five-carbon sugar molecule, and a nitrogen base
6. It stands for deoxyribonucleic acid.
7. a

#### SECTION 9-3: THE REPLICATION OF DNA

1. the process by which a copy of DNA is made
2. during the synthesis (S) phase of the cell cycle before a cell divides
3. the double helix must unwind
4. **Part a:** The two original DNA strands separate.  
**Part b:** DNA polymerases add complimentary nucleotides to each strand.  
**Part c:** When both strands are completely copied, all enzymes detach. Each new and old strand twists to form a double helix.
5. c

## CHAPTER 10

### Gene Expression

#### SECTION 10-1: FROM GENES TO PROTEINS

1. a. R  
b. B  
c. D  
d. R  
e. R  
f. B  
g. D  
h. B
2. c