Forbes: Bailey & Scott's Diagnostic Microbiology, 12th Edition

Test Bank

Chapter 2: Bacterial Genetics, Metabolism, and Structure

MULTIPLE CHOICE

1. Pieces of DNA that move from one genetic element to another and contain genes for movement as well as genes for other features are called
a. transposons.
b. insertion sequences.
c. plasmids.
d. chromatoids.

ANS: A
Insertion sequences only code for movement.

REF: Text Reference: p. 8 OBJ: Level: Knowledge

2. "Miniature" chromosomes composed of several genes in double-stranded, closed, circular structures are called
a. transposons.
b. insertion sequences.
c. plasmids.
d. chromatoids.

ANS: C
Plasmids can be separate entities, but transposable elements (transposons and insertion sequences) cannot.

REF: Text Reference: p. 6 OBJ: Level: Knowledge

3. A DNA sequence that encodes for a specific product (RNA or protein) is defined as a
a. gene.
b. genome.
c. nucleotide.
d. deoxyribonucleic acid.

ANS: A
The genome is the collection of all the genes of an organism. Nucleotides and deoxyribonucleic acid are building blocks of genes.

REF: Text Reference: p. 6 OBJ: Level: Knowledge

4. The enzymes that add nucleotide bases to each growing daughter strand in the replication process are called
a. replication enzymes.
b. DNA polymerases.
c. insertion sequence enzymes.
d. transcriptases.

ANS: B
DNA polymerase is a specific type of replication enzyme.

REF: Text Reference: p. 8 OBJ: Level: Knowledge

5. Genetic change in bacteria is accomplished by
a. mutation.
b. genetic recombination.
c. gene exchange between bacteria.
d. All of the above are correct.

ANS: D
All choices give ways that genetic change occurs in bacteria.

REF: Text Reference: pp. 14-16 OBJ: Level: Knowledge

6. Teichoic acids, mycolic acids, peptidoglycan, and disaccharide-pentapeptide subunits are all building blocks of which bacterial structure?
a. Outer cell membrane
b. Flagella
c. Inner cell membrane
d. Cell wall

ANS: D
These elements are all part of the cell walls of some types of bacteria.

REF: Text Reference: p. 23 OBJ: Level: Knowledge

7. The major difference between the cell walls of gram-positive and gram-negative bacteria is that
a. the peptidoglycan layer in gram-positive bacteria is substantially thicker.
b. the cell wall of gram-positive bacteria contains mycolic acids.
c. gram-positive bacteria contain a cytoplasmic membrane.
d. gram-positive bacteria may have a polysaccharide capsule as a covering.

e. All of the above are correct.

ANS: A
Although both types of bacteria have cell walls that contain peptidoglycan, the layer in gram-positive bacteria is substantially thicker than that of gram-negative bacteria.

REF: Text Reference: p. 23 OBJ: Level: Knowledge

8. In gene regulation and control, *repression* is defined as
a. an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.
b. the mechanism in which genes are induced only when the substrate to be degraded by enzymatic action is present.
c. the change of the bacterial genotypes through the exchange of DNA from one cell to another.
d. the mechanism of genetic control in which genes are not transcribed and therefore are not expressed in the presence of those target products in sufficient supply.

ANS: D
To avoid waste and overproduction in the cell, some genes are "turned off" by the presence of the product of that gene expression.

REF: Text Reference: pp. 12-13 OBJ: Level: Knowledge

9. In gene regulation and control, *induction* can be defined as
a. the mechanism of genetic control in which genes are induced only when the substrate to be degraded by enzymatic action is present.
b. the uptake of free DNA from the environment and recombination with the recipient's homologous DNA.
c. the mechanism of genetic control in which genes are not transcribed and therefore are not expressed in the presence of those target products in sufficient supply.
d. the change of the bacterial genotypes through the exchange of DNA from one cell to another.

ANS: A
To avoid waste and overproduction of enzymes in the cell, some genes are "turned on" only by the presence of the substrate of that gene expression.

REF: Text Reference: p. 13 OBJ: Level: Knowledge

10. Mutation is defined as
a. the change of the bacterial genotypes through the exchange of DNA from one cell to another.

b. an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.
c. the process by which genetic elements such as plasmids and transposons excise from one genomic location and insert into another.
d. the uptake of free DNA from the environment and recombination with the recipient's homologous DNA.

ANS: B
Mutation occurs as an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.

REF: Text Reference: p. 14 OBJ: Level: Knowledge

11. *Recombination* is defined as
a. the change of the bacterial genotypes through the exchange of DNA from one cell to another.
b. an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.
c. the process by which genetic elements such as plasmids and transposons excise from one genomic location and insert into another.
d. the uptake of free DNA from the environment and recombination with the recipient's homologous DNA.

ANS: A
Recombination is an event that occurs frequently in many varieties of bacteria and is a major means by which bacteria may achieve genetic diversity.

REF: Text Reference: p. 14 OBJ: Level: Knowledge

12. Transformation is defined as
a. the change of the bacterial genotypes through the exchange of DNA from one cell to another.
b. an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.
c. the process by which genetic elements such as plasmids and transposons excise from one genomic location and insert into another.
d. the uptake of free DNA from the environment and recombination with the recipient's homologous DNA.

ANS: D
Transformation involves recipient uptake of DNA that is free in the environment when another bacterial cell dies and undergoes lysis.

REF: Text Reference: pp. 15-16 OBJ: Level: Knowledge

13. *Transduction* is defined as
a. the change of the bacterial genotypes through the exchange of DNA from one cell to another.
b. an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.
c. the process by which genetic elements such as plasmids and transposons excise from one genomic location and insert into another.
d. a mechanism that is mediated by viruses, by which DNA from two bacteria may come together in one cell, thus allowing for recombination.

ANS: D
Bacteriophages, viruses that infect bacteria, integrate their DNA into the bacterial cell's chromosome, where viral DNA replication and expression is directed, thus the DNA is dispersed to another bacterium when other cells are infected.

REF: Text Reference: p. 16 OBJ: Level: Knowledge

14. The mechanism for ATP production in which high-energy phosphate bonds produced by the central metabolic pathways are donated to adenosine diphosphate (ADP) to form ATP is
a. substrate level phosphorylation.
b. fermentative metabolism.
c. oxidative phosphorylation.
d. aerobic respiration.
e. anaerobic respiration.

ANS: A
Fermentative metabolism is one form of substrate-level phosphorylation that does not require oxygen. Oxidative phosphorylation is an electron transport system that can either use oxygen as the terminal electron acceptor (aerobic respiration) or acceptors other than oxygen (anaerobic respiration).

REF: Text Reference: p. 18 OBJ: Level: Knowledge

15. A pathway that generates ATP by substrate level phosphorylation that does not require oxygen and produces various end products, including alcohols, acids, carbon dioxide, and hydrogen, is
a. substrate level phosphorylation.
b. fermentative metabolism.
c. oxidative phosphorylation.
d. aerobic respiration.
e. anaerobic respiration.

ANS: B
Fermentative metabolism is one form of substrate-level phosphorylation that does not require oxygen. Oxidative phosphorylation, including both aerobic respiration and anaerobic respiration, is an electron transport system.

REF: Text Reference: p. 18 OBJ: Level: Knowledge

16. The pathway of metabolism that involves a series of electron transfers from reduced carrier molecules such as $NADH_2$ and $NADPH_2$ to a terminal electron acceptor is
a. substrate level phosphorylation.
b. fermentative metabolism.
c. oxidative phosphorylation.
d. aerobic respiration.
e. anaerobic respiration.

ANS: C
Fermentative metabolism is one form of substrate-level phosphorylation. Oxidative phosphorylation is an electron transport system that can either use oxygen as the terminal electron acceptor (aerobic respiration) or acceptors other than oxygen (anaerobic respiration).

REF: Text Reference: p. 20 OBJ: Level: Knowledge

17. The term used when oxidative phosphorylation uses oxygen as the terminal electron acceptor is
a. substrate level phosphorylation.
b. fermentative metabolism.
c. oxidative phosphorylation.
d. aerobic respiration.
e. anaerobic respiration.

ANS: D
Oxidative phosphorylation is an electron transport system that can either use oxygen as the terminal electron acceptor (aerobic respiration) or acceptors other than oxygen (anaerobic respiration).

REF: Text Reference: p. 20 OBJ: Level: Knowledge

18. The term used when oxidative phosphorylation uses final electron acceptors other than oxygen is
a. substrate level phosphorylation.
b. fermentative metabolism.
c. oxidative phosphorylation.
d. aerobic respiration.

e. anaerobic respiration.

ANS: E
Oxidative phosphorylation is an electron transport system that can either use oxygen as the terminal electron acceptor (aerobic respiration) or acceptors other than oxygen (anaerobic respiration).

REF: Text Reference: p. 20 OBJ: Level: Knowledge

19. Teichoic acids are
a. waxy substances that are found in some bacterial cell walls that make their cells resistant to toxic substances, including acids.
b. glycerol or ribitol phosphate polymers that are combined with various sugars, amino acids, and amino sugars, which are a part of the cell wall of gram-positive bacteria.
c. high–molecular-weight polysaccharides that coat some bacterial cells and protect the bacteria from attack by cells of the human defense system.
d. hairlike, proteinaceous structures that extend from the cell.

ANS: B
Teichoic acids, mycolic acids, peptidoglycan, and disaccharide-pentapeptide subunits are all building blocks of the bacterial cell wall.

REF: Text Reference: p. 23 OBJ: Level: Knowledge

20. Pieces of DNA that move from plasmid to chromosome or vice versa but are not found as separate entities are called
a. DNA polymerase.
b. transposable elements.
c. plasmids.
d. chromatoids.

ANS: B
Plasmids can be separate entities, but transposable elements cannot.

REF: Text Reference: p. 28 OBJ: Level: Knowledge

21. All genes within an organism comprise that organism's
a. chromosome.
b. genome.
c. nucleotide.
d. deoxyribonucleic acid.

ANS: B
Chromosomes are elements of the genome. Nucleotides and deoxyribonucleic acid are building blocks of genes.

REF: Text Reference: p. 6 OBJ: Level: Knowledge

22. The change of the bacterial genotypes through the exchange of DNA from one cell to another is known as
a. mutation.
b. transduction.
c. transformation.
d. recombination.

ANS: D
Recombination is an event that occurs frequently in many varieties of bacteria and is a major means by which bacteria may achieve genetic diversity.

REF: Text Reference: p. 14 OBJ: Level: Knowledge

23. An internal change in the original nucleotide sequence of a gene or genes within an organism's genome is known as
a. mutation.
b. transduction.
c. transformation.
d. induction.

ANS: A
Mutation occurs as an internal change in the original nucleotide sequence of a gene or genes within an organism's genome.

REF: Text Reference: p. 15 OBJ: Level: Knowledge

24. The uptake of free DNA from the environment and recombination with the recipient's homologous DNA is known as
a. mutation.
b. transduction.
c. transformation.
d. induction.

ANS: C
Transformation involves recipient uptake of DNA that is free in the environment when another bacterial cell dies and undergoes lysis.

REF: Text Reference: pp. 15-16 OBJ: Level: Knowledge

25. The mechanism of genetic control in which genes are induced only when the substrate to be degraded by enzymatic action is present is called
a. repression.
b. mutation.
c. transduction.
d. induction.

ANS: D
To avoid waste and overproduction of enzymes in the cell, some genes are "turned on" only by the presence of the substrate of that gene expression.

REF: Text Reference: p. 13 OBJ: Level: Knowledge

26. The mechanism of genetic control in which genes are not transcribed and therefore are not expressed in the presence of those target products in sufficient supply is called
a. repression.
b. mutation.
c. transduction.
d. induction.

ANS: A
To avoid waste and overproduction in the cell, some genes are "turned off" by the presence of the product of that gene expression.

REF: Text Reference: pp. 12-13 OBJ: Level: Knowledge