

CHAPTER 13.3—13.5: Prokaryotic Genetics

1. Most bacteria are not pathogenic. Identify several important roles they play in the ecosystem and human culture.

2. How do variations arise in bacteria considering they reproduce mostly by asexual means?

3. Define bacterial transformation.

4. How does transduction differ from transformation?

5. What is a plasmid and identify its role in bacterial conjugation?

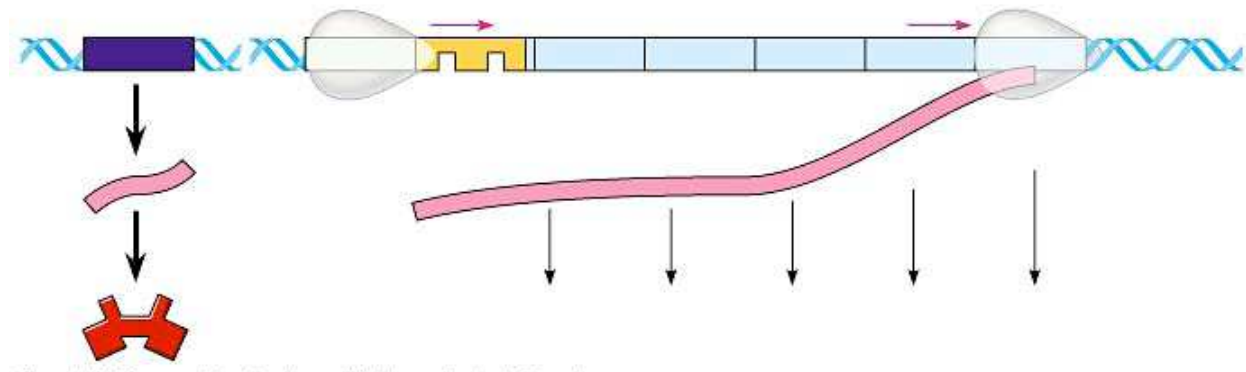
6. What is the major method utilized by bacteria to pass along resistance to antibiotics?

7. What is a transposable element? What is a transposon?

8. Describe potential problems caused by transposons.

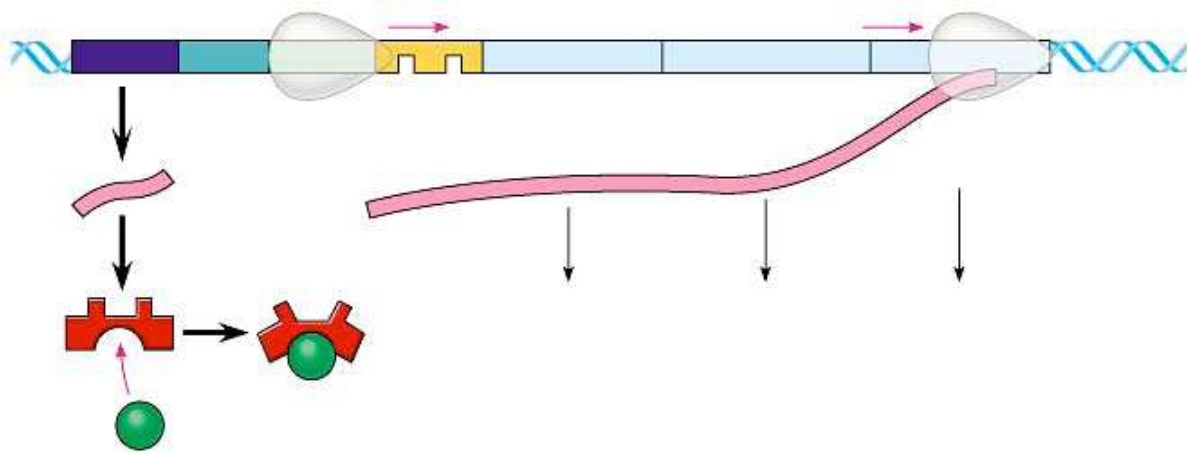
9. E. coli use a regulatory system called an operon. Identify the components with their functions of the operon.

10. Use the diagram (from the class notes) of the Trp operon to outline how it regulated tryptophan levels.



11. Describe how the trp operon is a repressible operon.

12. Use the diagram (from the class notes) of the lac operon to outline how it regulates glucose levels.



13. Does the diagram above represent the condition for the absence or presence of lactose?

14. Describe what happens when lactose is absent.

15. How is the lac operon an inducible system?

16. Summarize how the presence and absence of glucose influences the lac operon.

END OF CHAPTER 13 MULTIPLE CHOICE

1. Which of the following statements about the lac operon is not true?
 - A) When lactose binds to the repressor, the repressor can no longer bind to the operator.
 - B) When lactose binds to the operator, transcription is stimulated.
 - C) When the repressor binds to the operator, transcription is inhibited.
 - D) When lactose binds to the repressor, the shape of the repressor is changed.
 - E) When the repressor is mutated, one possibility is that it does not bind to the operator.

2. Which of the following is not a type of viral reproduction?
 - A) DNA virus in a lytic cycle
 - B) DNA virus in a lysogenic cycle
 - C) RNA virus by a double-stranded RNA intermediate
 - D) RNA virus by reverse transcription to make cDNA
 - E) RNA virus by acting as tRNA

3. In the lysogenic cycle of bacteriophage λ ,
 - A) a repressor, cI , blocks the lytic cycle.
 - B) a bacteriophage carries DNA between bacterial cells.
 - C) both early and late phage genes are transcribed.
 - D) the viral genome is made into RNA, which stays in the host cell.
 - E) many new viruses are made immediately, regardless of host health.

4. An operon is
 - A) a molecule that can turn genes on and off.
 - B) an inducer bound to a repressor.
 - C) a series of regulatory sequences controlling transcription of protein-coding genes.
 - D) any long sequence of DNA.
 - E) a promoter, an operator, and a group of linked structural genes.

5. Which statement is true of both transformation and transduction?
 - A) DNA is transferred between viruses and bacteria.
 - B) Neither occurs in nature.
 - C) Small fragments of DNA move from one cell to another.
 - D) Recombination between the incoming DNA and host cell DNA does not occur.
 - E) A conjugation tube is used to transfer DNA between cells.

6. Plasmids
 - A) are circular protein molecules.
 - B) are required by bacteria.
 - C) are tiny bacteria.
 - D) may confer resistance to antibiotics.
 - E) are a form of transposable element.

7. The minimal genome can be estimated for a prokaryote
 - A) by counting the total number of genes.
 - B) by comparative genomics.
 - C) as about 5,000 genes.
 - D) by transposon mutagenesis, one gene at a time.
 - E) by leaving out genes coding for tRNA.

8. When tryptophan accumulates in a bacterial cell,
 - A) it binds to the operator, preventing transcription of adjacent genes.
 - B) it binds to the promoter, allowing transcription of adjacent genes.
 - C) it binds to the repressor, causing it to bind to the operator.
 - D) it binds to the genes that code for enzymes.
 - E) it binds to RNA and initiates a negative feedback loop to reduce transcription.

9. The promoter in the lac operon is
 - A) the region that binds the repressor.
 - B) the region that binds RNA polymerase.
 - C) the gene that codes for the repressor.
 - D) a structural gene.
 - E) an operon.

10. The CRP–cAMP system
 - A) produces many catabolites.
 - B) requires ribosomes.
 - C) operates by an operator–repressor mechanism.
 - D) is an example of positive control of transcription.
 - E) relies on operators.