

**Chapter 5** Eukaryotic microorganisms, Helminths, and Arthropod vectors

Chapter 7 and 8

1. At the completion of chapter 7, the student will:

a. Be able to define the following terms

nutrition  
autotroph (producer – photosynthesis)  
heterotroph (consumer)  
mesophile  
thermophile  
psychrophile  
halophile  
growth factor  
vitamin  
exoenzyme  
endoenzyme  
Aerobic  
Anaerobic  
Facultative anaerobe  
SOD  
Catalase

b. List the 6 essential chemical elements for microbial growth and an example of the type of compounds those elements are found in

c. Understand the bacterial growth curve and its four parts, being able to label the parts of the curve and describe the significance of each

d. Be able to discuss the non-nutritive environments affecting microbial growth: pH, temperature, osmotic strength (or pressure), hydrostatic pressure

e. Be able to describe the gas requirements of microbes. This should also include the manner in which microbes utilize oxygen: aerobes, microaerophile, facultative anaerobes, and anaerobes

f. Know at least 3 methods for measuring bacterial growth – direct plate count, turbidity measurement with spectrophotometer, direct cell count

g. Be able to illustrate differing osmotic environments (isotonic, hypotonic, hypertonic)

h. Know the differences in types of membrane transport (active, passive, facilitated, endocytosis, exocytosis)

2. At the completion of chapter 8, including the lecture and handouts, the student will

a. Be able to define the following and explain:

Cyclic metabolic pathway  
Linear metabolic pathway

Exoenzyme  
Endoenzyme  
Coenzyme  
TCA cycle  
anabolism  
catabolism  
glycolysis  
fermentation  
electron transport chain  
oxidation  
reduction  
chemiosmosis  
pentose phosphate pathway

- b. Explain in your own words the role of ATP in metabolism
- c. Describe the manner in which enzymes work, as well as explain the necessity of enzymes for cellular metabolism.
- d. Describe the three steps of aerobic metabolism, using glucose catabolism as an example, and giving the net energy obtained from each step.
- e. Be able to compare aerobic and anaerobic metabolism (particularly the final electron acceptor and amount of ATP)
- f. Describe fermentation, contrasting the energy gains with that of aerobic metabolism
- g. The student will be able to list 3 practical applications of biotechnology in the medical field citing specific products of genetic engineering that affect our everyday life. (also: refer to ch.9 and 10)

#### OBJECTIVES FOR MICROBIAL GENETICS, CHAPTERS 9 AND 10

- I. At the completion of these chapters, the student will be able to define or identify the following:
  1. Gene
  2. Genotype
  3. Phenotype
  4. Mutagen
  5. Plasmid
  6. mRNA
  7. rRNA
  8. tRNA
  9. Codon
  10. Anticodon
  11. Recombination
  12. Gene cloning
  13. DNA polymerase
  14. PCR – polymerase chain reaction (pg 293)
  15. Biotechnology
  16. Transposable elements
  17. Mutation

## II. The students will be able to

1. Describe the structure of DNA and RNA, giving the subunits of each
2. Understand and be able to illustrate how DNA replicates
3. Understand and illustrate how genes are expressed (transcription, and
4. Be able to describe and illustrate how transfer of genetic information in bacteria occurs via conjugation, transformation, and transduction
5. Understand and illustrate how the bacterial genome changes by mutation.
6. Understand and illustrate one example of the use of biotechnology and recombinant DNA
7. Explain DNA fingerprinting – pg 308
8. Explain the potential for “gene therapy” (problems too)
9. Explain in your own words the advantages and disadvantages of “Transgenic plants”

## III. Chapter 11, on unit one’s outside assignment

## IV. Chapter 12 Antimicrobial control

1. Define and/or explain
  - a. Chemotherapy
  - b. Broad spectrum
  - c. Narrow spectrum
  - d. Kirby-Bauer test
  - e. MIC test
  - f. Bacteriocidal
  - g. Bacteriostatic
  - h. Antibiotic
2. Describe (outline and explain) the 5 actions of Antimicrobial drugs
3. List the spectrum (broad, narrow, etc.) target group of microbes (antibacterial, fungal, viral, helminth, etc.) and mode of action (how the drug works) for the following antimicrobial drugs
  - a. Penicillin
  - b. Methicillin
  - c. Amoxicillin
  - d. Vancomycin
  - e. Tetracycline
  - f. Sulfonamides
  - g. Rifampin
  - h. Polymyxin
  - i. Miconazole
  - j. Amphotericin B
4. Give an example of an effective Antimicrobial drug for each of the following infections
  - a. Fungal
  - b. Viral
  - c. Protozoan
  - d. Helminth
5. Be able to explain how microbes acquire resistance (the mechanism mentioned in the text and the manner in which the drug resistant population is selected)
6. Be able to explain the problem with indiscriminate use of antibiotics and drug resistance