• Be sure to put **your name** on the **mark-sense sheet**.

• **Be sure to indicate the version (A, B, C, or D) on the mark sense sheet.**

• Put your name on the **exam booklet**. Both the exam booklet and the mark-sense sheet must be turned in at the end of the period.

• You may write in the exam booklet, but only the mark-sense sheet will be graded. No other paper, scratch paper, etc. may be used.

• Students must turn in the exam before leaving the room for any reason. A student may not continue working on the exam after having left the room.

50 Multiple Choice Questions, 2 pt each

1. Which of the following are general properties of the genus *Streptococcus*?

   (a) Catalase positive, gram-positive cocci in chains or pairs
   (b) Catalase negative, gram-positive cocci in chains or pairs
   (c) Catalase positive, gram-negative cocci in chains or pairs
   (d) Catalase negative, gram-negative cocci in chains or pairs
   (e) Catalase negative, gram-positive rods

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The following choices are used for questions 2 – 6.

(a) Alpha hemolysis
(b) Beta hemolysis
(c) Gamma reaction

2. **[b]** This is complete breakdown of erythrocytes and hemoglobin, resulting in a clear zone around the colony on blood agar.

3. **[a]** This is partial breakdown of erythrocytes and hemoglobin, resulting in a greenish-colored zone around the colony on blood agar.

4. **[c]** This is the absence of a hemolysis.

5. **[b]** This is the type of hemolysis characteristic of *Streptococcus pyogenes*.

6. **[b]** This is the type of hemolysis characteristic of group A streptococcus.
7. The Lancefield groups of streptococci

(a) are distinguished by serological tests, biochemical tests, and antibiotic resistance.
(b) are designated by letters of the alphabet: group A, B, C, and so on.
(c) include the pathogenic species *Streptococcus pyogenes* and *Streptococcus pneumoniae*.

(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b) and (c) are all true.

8. *Streptococcus agalactiae*

(a) belongs to Lancefield group B.
(b) is nonpathogenic in humans.
(c) is always beta hemolytic in all its strains.
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b) and (c) are all true.

9. Members of the genus *Enterococcus*

(a) are fecal streptococci.
(b) belong to Lancefield group D.
(c) are occasionally pathogenic, especially in urinary tract infections.
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b) and (c) are all true.

10. The erythrogenic toxin produced by some strains of *Streptococcus pyogenes* is responsible for

(a) the formation of heart lesions.
(b) the skin rash of scarlet fever.
(c) the kidney damage that complicates streptococcal infections.
(d) ulceration in the gastrointestinal tract.
(e) blockage of nerve impulses at motor neuron end plates.

11. The first symptoms commonly felt in an airborne *Streptococcus pyogenes* infection are

(a) Lymph node swelling and the formation of buboes.
(b) Formation of a leathery pseudomembrane in the mouth and throat.
(c) Upper respiratory tract infection and severe pharyngitis.
(d) Septicemia and glomerulonephritis.
(e) Gastroenteritis and diarrhea.
The following choices are used for questions 12 - 16.

(a) necrotizing fasciitis  
(b) glomerulonephritis  
(c) rheumatic fever  
(d) erysipelas  
(e) puerperal sepsis

12. (c) This is a complication in which the immune response to a *Streptococcus pyogenes* infection causes damage to the cardiovascular system, especially the heart valves.

13. (a) This is a complication in which muscle tissue is destroyed by hydrolytic enzymes produced by some strains of *Streptococcus pyogenes*.

14. (b) This is a complication in which the immune response to a *Streptococcus pyogenes* infection causes damage to the kidney tubules.

15. (e) This is a serious form of streptococcal septicemia in women who have just given birth to a child.

16. (d) This is a streptococcal skin infection.

17. A patient is observed to have a severe upper respiratory tract with a loose, membranous tissue covering the back of the throat. Which of the following tests is indicated?

(a) a Weil-Felix test to detect *Rickettsia*  
(b) acid-fast stain of the material from a throat swab  
(c) a methylene blue simple stain to test for bacteria having metachromatic granules and coryneform arrangement  
(d) a biochemical test to distinguish *Salmonella* from other Enterobacteriaceae  
(e) staining the material from a throat swab with fluorescent antisera to detect a spirochete

18. The cause of diphtheria, *Corynebacterium diphtheriae*,

(a) reproduces by “snapping division,” in which the gram-positive rods snap in the middle but remain connected.
(b) is arranged in a coryneform arrangement, with cells in V- and L-shaped patterns.
(c) is a member of the family Enterobacteriaceae.
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b) and (c) are all true.
19. The cytotoxin of \textit{Corynebacterium diphtheriae} (a) blocks synaptic transmission at motor neuron end plates. (b) inhibits the action of cholinesterase. (c) inhibits protein synthesis. (d) Both (a) and (b) are true, but (c) is false. (e) (a), (b) and (c) are all true.

20. The presence of gram-negative cocci, arranged in pairs, in the spinal fluid indicates (a) \textit{Haemophilus influenzae} meningitis (b) meningococcal meningitis (c) miliary tuberculosis (d) septicemic plague (e) tetanus

21. \textit{Hemophilus influenzae} is recognized as an important cause of (a) meningitis in young children. (b) cervical tumors. (c) renal failure in patients with suppressed immune systems. (d) skin ulcers in patients from tropical regions. (e) chancroid.

22. Chocolate agar (a) is useful in the culture of \textit{Treponema pallidum}. (b) is useful in the culture of \textit{Haemophilus influenzae}. (c) is made from an extract of the cocoa plant. (d) Both (a) and (b) are true, but (c) is false. (e) (a), (b) and (c) are all true.

23. Which of the following indicates a possible case of tuberculosis? (a) The presence of gram-negative cocci in the lung secretions of the patient. (b) The presence of gram-negative rods with bipolar staining in the lung secretions of the patient. (c) The presence of acid-fast rods in the lung secretions of the patient. (d) A positive Weil-Felix test. (e) A skin rash on the palms of the hands and soles of the feet.
24. The tubercles of tuberculosis

(a) are pockets of fibrous connective tissue, containing live *Mycobacterium tuberculosis*, that form in the lungs of tuberculosis patients.

(b) form in the lungs of tuberculosis patients because phagocytosis is ineffective in killing *Mycobacterium tuberculosis*, causing the body to respond by secreting fibrous connective tissue.

(c) may rupture and release active *Mycobacterium tuberculosis* into the lungs, causing a recurrence of the infection months or years after the initial exposure.

(d) Both (a) and (b) are true, but (c) is false.

(e) (a), (b) and (c) are all true.

25. Both staphylococcal food poisoning and salmonellosis can be acquired by eating contaminated food. After eating contaminated food, the time required for the onset of staphylococcal food poisoning is shorter than that for salmonellosis because

(a) *Staphylococcus aureus* grows more rapidly than *Salmonella enteritidis* serotypes.

(b) cells of *Salmonella* must reach the bloodstream before symptoms of gastrointestinal irritation are experienced.

(c) foods that contain *Salmonella* are usually eaten raw.

(d) *Staphylococcus aureus* grows only under conditions of high salt concentration.

(e) staphylococcal food poisoning is due to the presence of an exotoxin that forms in the food before it is eaten, but salmonellosis requires the colonization and growth of the bacteria in the intestine.

26. *Mycoplasma pneumoniae*

(a) is a common cause of primary atypical pneumonia.

(b) causes severe secondary pneumonia in AIDS patients.

(c) consists of acid-fast rods.

(d) Both (a) and (b) are true, but (c) is false.

(e) (a), (b), and (c) are all true.

27. The natural habitat of *Legionella pneumophila* is

(a) freshwater streams

(b) the upper respiratory tract of humans and animals

(c) the large intestine of humans and animals

(d) human and animal skin

(e) foods contaminated by soil
28. Which of the following statements is FALSE?

(a) The genera *Clostridium* and *Bacillus* are both gram-positive.
(b) The genera *Clostridium* and *Bacillus* are both spore-formers.
(c) The genera *Clostridium* and *Bacillus* are both strictly anaerobic.
(d) The genera *Clostridium* and *Bacillus* are both common soil organisms.
(e) The genera *Clostridium* and *Bacillus* are both rod-shaped.

29. The botulism toxin causes flaccid paralysis by

(a) causing swelling in the meninges.
(b) inhibiting the action of cholinesterase in the synapses of central nervous system neurons
(c) inhibiting protein synthesis in neurons.
(d) blocking synaptic transmission at the motor neuron end plates.
(e) causing the formation of gummae in the brain and spinal cord.

30. To protect canned food from contamination by botulism, high temperature and pressure (120°C, 14 psi) are necessary

(a) to destroy the heat-resistant spores of *Clostridium botulinum*.
(b) to destroy the heat-resistant neurotoxin of *Clostridium botulinum*.
(c) to permit the thermophilic cells of *Clostridium botulinum* to grow and reproduce.
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b), and (c) are all true.

31. In cases of botulism, death is generally due to

(a) kidney failure.
(b) dehydration.
(c) respiratory and cardiac failure.
(d) gummae in the central nervous system.
(e) immune system failure.

32. All of the following are related to typhoid fever EXCEPT

(a) the causative agent is a member of the family Enterobacteriaceae.
(b) the disease is a foodborne intoxication caused by an exotoxin that is secreted by the bacteria in contaminated food (before the food is consumed).
(c) ulcers may form in the intestine.
(d) human carriers who show no symptoms may transmit the disease.
(e) a rose-colored rash often develops on the body.
33. The enterotoxin that causes staphylococcal food poisoning
   (a) is secreted by virulent strains of *Staphylococcus epidermidis*.
   (b) is among the most heat resistant of exotoxins.
   (c) is only secreted by bacteria that have colonized the large intestine.
   (d) Both (a) and (b) are true, but (c) is false.
   (e) (a), (b), and (c) are all true.

34. Which of the following is a characteristic symptom of cholera?
   (a) relapsing fever
   (b) “rice-water” stools with the extensive loss of fluid
   (c) extreme jaundice
   (d) blood in respiratory tract secretions
   (e) rose-colored spots

35. Serotypes of *Salmonella*
   (a) are distinguished by differences in the O, H, and K antigens.
   (b) can be found among the intestinal flora of many animals, including chickens and cattle.
   (c) cause gastroenteritis in humans.
   (d) Both (a) and (b) are true, but (c) is false.
   (e) (a), (b), and (c) are all true.

36. Which of the following describes the organism responsible for bubonic plague?
   (a) a member of the family Enterobacteriaceae
   (b) a spirochete
   (c) a strictly aerobic, spore-forming rod
   (d) a gram-positive rod with metachromatic granules
   (e) a strictly anaerobic, spore-forming rod

37. Shigellosis is characterized by
   (a) development of a leathery pseudomembrane in the back of the throat.
   (b) glomerulonephritis.
   (c) watery diarrhea and dysentery.
   (d) Both (a) and (b) are true, but (c) is false.
   (e) (a), (b), and (c) are all true.
38. The cholera enterotoxin
   (a) inhibits nerve transmission at motor neuron end plates.
   (b) inhibits the action of cholinesterase in central nervous system synapses.
   (c) inhibits the action of cholinesterase in the large intestine.
   (d) inhibits water reabsorption by blocking anion active transport in the large intestine.
   (e) inhibits protein synthesis.

39. *Escherichia coli*
   (a) is a gram-negative, facultatively anaerobic rod.
   (b) is used as an indicator of fecal contamination in food and water.
   (c) is in this room with you, even as you take this test.
   (d) Both (a) and (b) are true, but (c) is false.
   (e) (a), (b), and (c) are all true.

40. Wound infections of *Clostridium perfringens* are often accompanied by
   (a) large, open sores on the body.
   (b) intestinal ulceration.
   (c) a red-colored skin rash.
   (d) gas gangrene.
   (e) fluid buildup in the lung tissue.

41. Woolsorter’s disease is a pulmonary infection caused by
   (a) *Streptococcus pyogenes*
   (b) *Mycobacterium tuberculosis*
   (c) *Legionella pneumophila*
   (d) *Bacillus anthracis*
   (e) *Borrelia burgdorferi*

42. The rigid paralysis and muscle spasms associated with tetanus are due to
   (a) the invasion of muscle tissue by the tetanus bacteria.
   (b) a neurotoxin that interferes with cholinesterase activity at the synapses of neurons.
   (c) a neurotoxin that inhibits synaptic transmission at motor neuron end plates.
   (d) an exotoxin that kills muscle cells by inhibiting protein synthesis in the cells.
   (e) an erythrogenic toxin that causes hemorrhaging in the capillary beds that surround muscle tissue.
43. Erythema chronicum migrans (ECM) is the distinctive, ring-like skin lesion associated with

  (a) typhoid fever.  
  (b) Lyme disease.  
  (c) primary syphilis.  
  (d) tertiary syphilis.  
  (e) anthrax.

44. *Treponema pallidum*

  (a) is a spirochete.  
  (b) is transmitted congenitally or through the bite of a tick.  
  (c) is cultured on chocolate agar.  
  (d) Both (a) and (b) are true, but (c) is false.  
  (e) (a), (b), and (c) are all true.

45. *Borrelia burgdorferi*

  (a) is a spirochete.  
  (b) is transmitted through the bite of both adult and immature deer ticks.  
  (c) can produce chronic joint inflammation.  
  (d) Both (a) and (b) are true, but (c) is false.  
  (e) (a), (b), and (c) are all true.

46. The formation of lesions called gummae is associated with

  (a) chancroid  
  (b) Lyme disease  
  (c) tertiary syphilis  
  (d) tuberculosis  
  (e) secondary syphilis

47. A gram-negative diplococcus associated with urinary tract infections, pelvic inflammatory disease, and eye infections is

  (a) *Neisseria gonorrhoeae*  
  (b) *Hemophilus influenzae*  
  (c) *Vibrio cholerae*  
  (d) Chlamydia trachomatis  
  (e) *Treponema pallidum*

48. The hard chancre is a painless, purple-colored skin ulcer associated with

  (a) toxic shock syndrome.  
  (b) lyme disease.  
  (c) chlamydial urethritis.  
  (d) secondary syphilis.  
  (e) primary syphilis.
49. Secondary symptoms of syphilis include

(a) a measles-like rash that can cover large areas of the body.
(b) fever.
(c) a painful burning sensation during urination.
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b), and (c) are all true.

50. *Yersinia pestis* is transmitted by

(a) fleas.
(b) the airborne route.
(c) contaminated seafood (such as clams and oysters).
(d) Both (a) and (b) are true, but (c) is false.
(e) (a), (b), and (c) are all true.