MBIO 1220: Essentials of Microbiology, term test #1 Test paper **A**

READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

- **The test consists of 40 multiple choice questions.**
- **Choose the BEST answer for each question.**
- **Your NAME and STUDENT NUMBER must appear on the answer sheet.**

Name _____ Student number_____

1. **Which group of microorganisms is typically the smallest?**
   a. Bacteria
   b. Fungi
   c. Viruses
   d. Protozoa
   e. Algae

2. **What early breakthrough was instrumental in disproving the theory of spontaneous generation?**
   a. The development of the compound light microscope.
   b. The invention of swan necked flasks to keep a broth media sterile.
   c. The discovery that bacteria can convert alcohol to vinegar.
   d. The recognition that cleaning instruments with phenol could drastically lower the incidence of surgical infections.
   e. The observation that certain molds could inhibit the growth of bacteria on a Petri plate.

3. **Which of the following best describes Paul Ehrlich's early experiments in microbiology?**
   a. He observed that bacteria and animal cells behaved in exactly the same way when treated with dyes.
   b. He discovered that an arsenic derivative could be used to treat syphilis.
   c. He used a complex mixture of chemicals to treat cancer.
   d. He intentionally infected a boy with the cow pox virus.
   e. He discovered penicillin, the first antibiotic.

4. **In the 1880's, Louis Pasteur experimented with a bacterium that caused fowl cholera, a fatal disease in chickens. He discovered that when the bacterium was grown in the lab for a prolonged period of time, it would lose its ability to cause serious disease. He also noticed that birds infected with this bacterium could no longer be infected by normal disease causing strains. What did this experiment prove?**
   a. Life can only arise through biogenesis.
   b. Bacteria can cause disease in chickens.
   c. Exposure to a non-disease causing microbe could induce immunity to closely related, disease causing strains.
   d. That certain naturally occurring chemicals could be used to treat a wide variety of bacterial infections.

5. **Which of the following is NOT true regarding a bacterial species?**
   a. the species name consists of two words
   b. all members of the species are genetically identical
   c. a proper species name should be italicized or underlined when written
   d. *Escherichia coli* is an example of a species
   e. a species name can be abbreviated when it is used more than once

6. **Which of the following statements is INCORRECT?**
   a. Bacteria do not have mitochondria
   b. Protozoa do not have nucleoids
   c. Viruses are not made of cells
   d. Fungi do not have phospholipids
   e. Humans do not have peptidoglycan

7. **Which of the following statements highlights the importance of microorganisms?**
   a. They are responsible for producing much of the oxygen in the air we breathe
   b. They play an important role in making nitrogen available to plants
   c. They are the cause of many human diseases

d. They produce antibiotics that can be used to treat dangerous infections
e. All of the above

8. Which of the following is correct regarding ions:
a. Cations are negatively charged ions
b. A cation is formed when a neutral atom gains an electron, resulting in a positive charge on the atom
c. Anions are formed when a negatively charged atom loses an electron
d. Ions usually dissolve in water quite easily
e. Ionic bonds are formed when two positively charged atoms share electrons

9. Which of following characteristics makes water essential to cellular life as we know it?
a. Water is a solvent for polar compounds.
b. Water is capable of forming hydrogen bonds.
c. Water exists as a liquid over a broad range of temperatures.
d. Answers b and c only are correct.
e. All of the above are essential characteristics of water.

10. Which of the following is NOT true of a water molecule, H_2O?
a. The hydrogen atoms are connected to the oxygen atom by hydrogen bonds
b. A water molecule is an example of a compound
c. Atoms within the molecule share pairs of electrons in order to fill their outermost electron shells
d. The molecule is polar
e. The total number of protons in the molecule is equal to the total number of electrons

11. All 20 amino acids contain at least one:
a. Amino group
b. Carboxyl group
c. Nucleobase
d. Plasmid
e. More than one of the above

12. Nucleotides, which are the building blocks of DNA, are comprised of the following:
a. Side chain, phosphate group and nucleobase
b. Nucleobase, phosphate group, deoxyribose
c. Phosphate group, ribose, nucleobase
d. Carboxyl group, deoxyribose, nucleobase
e. None of the above

13. The term "compound" in "compound light microscope" means that:
a. Visible light is used to observe a specimen.
b. It uses two types of lenses: an objective lens and an ocular lens.
c. The objective lens magnifies the specimen between 10-100 times.
d. Bacteria must be stained with dyes to be viewed with the microscope.
e. All of the above.

14. True or False: The longer the wavelength of light used in microcopy, the better the resolution.
a. True
b. False

15. Which of the following is a considered a differential staining method?
a. Gram-stain
b. Acid fast
c. Endospore
d. Capsule stain
e. All of the above

16. Which is the correct sequence used in the Gram-stain method?

a. Crystal violet, Iodine, Alcohol wash, Safranin
b. Safranin, Iodine, Alcohol wash, Crystal violet
c. Iodine, Crystal violet, Alcohol wash, Safranin
d. Crystal violet, Safranin, Alcohol wash, Iodine.
e. None of the above.

17. Which of the following organic molecules is not found in bacterial peptidoglycan?

a. N-acetyl glucosamine (NAG)
b. Glycerol
c. N-acetyl muramic acid (NAM)
d. Amino acids
e. Teichoic acid

18. The cytoplasmic membrane of prokaryotes contains the following biomolecules:

a. Sterols, lipopolysaccharide, phospholipids
b. Proteins and phospholipids
c. lipopolysaccharide, phospholipids, proteins
d. Sterols, proteins and phospholipids
e. Phospholipids and teichoic acid

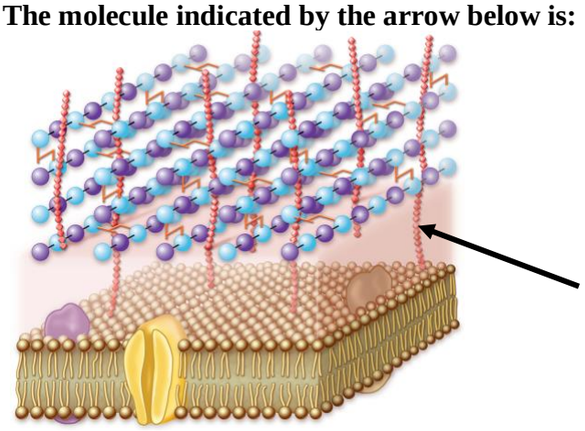
19. True or False: The phospholipids in a bacterial plasma membrane are completely hydrophobic, whereas the phospholipids in a eukaryotic plasma membrane are completely hydrophilic.

a. True
b. False

20. Why can streptomycin be used to combat bacteria, without harming humans?

a. Because humans do not make peptidoglycan
b. Because only bacteria have phospholipids in their cytoplasmic membranes
c. Because humans use 80S ribosomes to synthesize their proteins
d. Because only bacteria can produce endospores
e. Because bacterial cells use whip like flagella, whereas the flagella of human cells rotate

21. The molecule indicated by the arrow below is:



a. Wall teichoic acid
b. Lipopolysaccharide
c. Phospholipid
d. Lipoteichoic acid
e. Peptidoglycan

22. Flagella are filamentous projections from the bacterial surface that allow some bacteria to:

a. attach together and transfer genetic information.
b. perform random walk.
c. resist osmotic lysis in a hypotonic environment.
d. initiate an infection by colonizing surfaces.
e. all of the above.

23. Fimbriae are tiny, hollow protein projections from the bacterial surface that allow some bacteria to:

a. attach together and transfer genetic information.
b. perform random walk.

c. resist osmotic lysis in a hypotonic environment.
d. initiate an infection by colonizing surfaces.
e. all of the above.

24. Most disease causing bacteria are:
a. Extreme halophiles
b. Alkaliphiles
c. Psychrophiles
d. Mesophiles
e. Eukaryotes

25. The bacteria that spoil milk in your fridge are most likely to be:
a. Psychrophiles
b. Psychrotrophs
c. Mesophiles
d. Thermophiles
e. Hyperthermophiles

26. You've completed a spore stain on a sample of fresh apple juice and you find green spots amidst a sea of pink bacterial cells. Given your knowledge of microbiology, which procedure would be the best way to completely get rid of the bacterium contaminating the apple juice?
a. Boiling the apple juice for 10 minutes.
b. Treating the apple juice with high pressure to rupture the cells.
c. Autoclaving the apple juice, even if the high temperature causes the flavor to change.
d. Pasteurizing the apple juice using standard HTST treatment.
e. None of the above. The only way to get rid of this bacterium is to incinerate the apple juice and go get a fresh batch that doesn't have any bacteria in it!

27. *Streptococcus pyogenes* is famous for:
a. Destroying red blood cells and causing a throat infection called "strep throat"
b. Producing a capsule that allows it to evade phagocytosis
c. Being so resistant to disinfectants that it can even use them for food
d. Producing a waxy compound in the cell wall that makes them stain pink in an acid-fast stain
e. Growing in canned food and causing the food-borne illness known as botulism

28. Which of the following statements correctly describes the growth of bacteria?
a. **During the stationary phase, bacteria adapt to their new medium and get ready to grow at the maximum rate possible.**
b. **Generation time is the time required for the number of bacterial cells to double.**
c. **Bacteria exhibit exponential growth in the lag phase.**
d. **A fast growing bacterium completes a round of cell division about once every 6 hours**
e. **More than one of the above is true.**

29. Benzethonium chloride is a quaternary ammonium compound that is commonly added to first aid ointments for small wounds and burns because of its strong antimicrobial activity against Gram positive bacteria, while having relatively low toxicity toward humans. The use of benzethonium chloride to prevent infection of small wounds and burns by Gram positive bacteria is best described as:
a. Sterilization
b. Disinfection
c. Antisepsis
d. Degerming
e. Sanitization

30. What temperature must be achieved for a minimum of 15 min in an autoclave to ensure sterilization?
a. 101°C

b. 111°C
c. 121°C
d. 131°C

31. True or False: If a bacterium was placed into a hypotonic solution, the cytoplasmic membrane of the bacterium would shrink away from the cell wall (plasmolysis).
a. True
b. False

32. To sanitize means to:
a. remove or destroy all microorganisms and viruses
b. lower microbial counts to a safe level to meet public health standards
c. Disinfect skin or living tissue
d. none of the above

33. Which of the following processes is sufficient to destroy the endospores of *Clostridium botulinum*?
a. Heating an object to 170°C in an oven for 2 hours
b. Exposing food to dangerous gamma radiation
c. Gassing a plastic package with ethylene oxide for four hours
d. Heating milk to 140°C for 3 seconds
e. All of the above

34. True or False: A treatment that is considered bacteriostatic slows or stops the growth of bacteria, whereas a treatment that is germistatic does not.
a. True
b. False

35. Which component of Adenosine triphosphate (ATP) contains the energy that is used by enzymes to carry out anabolic processes within the cell?
a. The ribose sugar
b. The adenosine base
c. The phosphates
d. None of the above

36. How do enzymes accelerate chemical reactions?
a. By increasing the activation energy required to promote a chemical reaction
b. By decreasing the activation energy required to promote a chemical reaction
c. By separating chemical reactants away from each other.
d. By maintaining the reaction temperature.
e. All of the above

37. True or False: The glycolysis pathway produces carbon dioxide.
a. True
b. False

38. Which of the following processes is involved in fermentation?
a. The Krebs cycle
b. Glycolysis
c. The electron transport chain
d. Conversion of O_2 to H_2O

39. When an organic molecule loses electrons, it is said to be:
a. Oxidized
b. Hydrophobic
c. An anion
d. Energy rich
e. Reduced

40. Lactic acid fermentation is a pathway that converts _____(1)_____ into _____(2)_____, as a way of using up an end product of glycolysis.

a. Alcohol, 2) Lactic acid
b. Glucose, 2) CO_2
c. Glucose, 2) Lactic acid
d. Lactic acid, 2) CO_2
e. Lactic acid, 2) Alcohol

***** THE END*****