

Name _____

Biology 331, Spring 2006 - Lecture Exam 1
Multiple Choice, 2 pts. each. Please circle answer.

1. Woese

- a. first viewed bacteria using a microscope
- b. first viewed fungi using a microscope
- c. used DNA evidence to describe the three domains of life
- d. was the first to link microbial bacterial pathogens to specific diseases
- e. disproved the theory of spontaneous generation

2. Respiration

- a. only occurs in mitochondria
- b. requires that inorganic chemicals always provide the electrons/energy
- c. produces ATP using PMF, regardless of the electron donor and acceptor
- d. does not always involve an electron transport chain
- e. requires that oxygen always serve as the final electron acceptor

3. In contrast with phospholipids, diglycerol tetraether

- a. contains ester bonds
- b. contains isoprenes
- c. forms bilayers
- d. builds cell walls
- e. is only found in Bacteria

4. In contrast with Gram Positives, Gram Negatives contain

- a. no peptidoglycan
- b. pseudopeptidoglycan
- c. teichoic acid
- d. LPS
- e. S layers

5. All of the following can be found within the cytoplasm of some prokaryotes except

- a. PHB
- b. pili
- c. sulfur
- d. gas vesicles
- e. membranes

6. Which of the following reactions shows anaerobic chemolithotrophy?

- a. $H_2 + O_2 \text{ yields } H_2O + ATP$
- b. $H_2 + CO_2 \text{ yields } CH_4 + H_2O$
- c. $H_2S + O_2 \text{ yields } S \text{ (granules)} + H_2O + ATP$
- d. $H_2S + O_2 \text{ yields } H_2SO_4 \text{ (secreted)} + ATP$
- e. $CH_4/CH_3 + O_2 \text{ yields } CO_2 + H_2O + ATP$

7. Methanogenesis

- a. is widely performed by organisms in all domains of life
- b. involves CH_4 donating electrons
- c. involves CO_2 donating electrons
- d. involves only heterotrophs
- e. none of the above are true

8. Which of the following statements about phototrophic Bacteria is true?

- a. all enhance pigment content by expressing cytoplasmic membranes
- b. all exclusively use bacteriochlorophylls
- c. all perform chemotrophy at night to supplement energy needs
- d. they likely descended from microbes that converted heat to chemical energy

e. virtually all microbiologists agree they were likely the first life on earth

9. Archaeobacterial photosynthesis

- a. uses bacteriochlorophylls
- b. uses two photosystems with electron transport chains
- c. involves the direct generation of PMF by light-activated pigments
- d. is carried out by yellow microbes that tolerate high salt
- e. splits H₂S to generate H₂ and S, stored as cytoplasmic granules

10. Deinococcus

- a. uses carotene pigments for protection
- b. is an anaerobic chemolithotroph
- c. is a Gram Negative Proteobacteria
- d. was the first thermophilic microbe isolated in culture
- e. is the source for thermal-stable polymerases used in PCR

11. Which of the following statements about prokaryotic variation and evolution is true?

- a. transformation refers to the transfer of DNA via a sex pilus
- b. conjugation refers to the transfer of DNA via a phage
- c. the same enzyme carries out recombination in both eukaryotes and prokaryotes
- d. during stress, Bacteria induce a more error-prone DNA polymerase
- e. in general, plasmids and chromosomal DNA evolve at the same rate

12. Which of the following antibiotics does not match the stated target?

- a. vancomycin - cell wall
- b. erythromycin - cell membrane
- c. puromycin - tRNA in ribosome
- d. rifampin - RNA Polymerase
- e. streptomycin - small subunit, ribosome

13. Physical barriers of the human body include all except

- a. interferon
- b. skin
- c. mucus
- d. cilia
- e. system flushing

14. MHC

- a. are a kind of phagocytic cell
- b. are antibodies made during the first exposure to an antigen
- c. are blood proteins that stimulate inflammation and fever
- d. come in about 100,000,000 different shapes in each person
- e. can display antigens and are the basis for tissue rejection

15. Which of the following statements about antibodies is true?

- a. IgA lasts only 3-6 months
- b. IgM holds four antigens
- c. IgG is made by Killer T cells
- d. antibodies are live cells that actively kill antigens
- e. there are 150 different antibodies in each person

16. In 1798, Jenner

- a. discovered the process of phagocytosis
- b. invented the process of variolation
- c. discovered the first vaccine for rabies
- d. discovered the first neutralizing antibody treatment for diphtheria

e. discovered that cowpox stimulated memory for smallpox

17. Natural passive immunity involves exposure to

- a. a vaccine
- b. whole antigen
- c. maternal antibodies
- d. neutralizing survivor antibodies
- e. neutralizing survivor T cells

18. 2 pts. per term. Mixed Bag 'O Definitions (2 pts. per term)

OPSONIZATION

CHEMOLITHOTROPH

LACTOFERRIN

FAME

GYRASE

PASTEURIZATION

MALT

19. 4.5 pts. Describe THREE of Koch's postulates.

20. 2.5 pts. each. Answer any THREE, naming PHYLUM and TWO distinctive structural or lifestyle features.

Bdellovibrio, Phylum =

Sphaerotilus, Phylum =

Myxococcus, Phylum =

Gemmata, Phylum =

21. 1 pt. each. Answer the following T/F questions about microbial genetics issues.

_____ Only Eukaryotic DNA is wrapped and coiled by histones.

_____ Eukaryotic and Archaea genomes are both littered with mostly junk sequences.

- _____ From a telomerase standpoint, prokaryotes are immortal.
- _____ All prokaryotes use only one RNA Polymerase.
- _____ Although prokaryotic ribosomes are the same size, they are genetically different.
- _____ Eukaryotic and Archaea genes both contain introns.
- _____ Eukaryotic organelles have their own diploid set of linear chromosomes.
- _____ The Ames test exposes E. coli bacteria to suspect chemicals.

22. Matching Organisms and Reactions. Some may be used more than once. Some will not be used.

Sulfolobus
Methylococcus
Subsurface Bacteria
Burkholderia

Alcaligenes
Thiovulum
Desulfobacter
Methanopyrus

Aquifex
Beggiatoa
Methanococcus
Dehalobacter

- _____ $H_2S + O_2$ yields S (granules) + H_2O
- _____ $H_2 + CO_2$ yields $CH_4 + H_2O$
- _____ $PCB/PAH + O_2$ yields "safe" organic products
- _____ $H_2S + O_2$ yields H_2SO_4 (secreted) in thermal habitats
- _____ $SO_4 + CH_2O$ yields $H_2S + CO_2$
- _____ $H_2 + NO_3$ yields HNO_2
- _____ $H_2 + O_2$ yields H_2O
- _____ $SO_4 + H_2$ yields $H_2S + H_2O$
- _____ $CH_2O + CO_2$ yields $CH_4 + H_2O$
- _____ $CH_4/CH_3 + O_2$ yields $CO_2 + H_2O$

23. 1 pt. per box. Complete this table about photosynthetic microbial diversity.

	Primary Pigment(s)	Pigment Location/Membrane	Phylum
<u>Chlorobium</u>			
<u>Thiospirillum</u>			
<u>Anabaena</u>			
<u>Heliobacterium</u>			

24. 4.5 pts. Explain the THREE ways that drug resistance genes work.

25. 6 pts. Name and describe THREE approaches for making vaccines, including a pro and con for each.

- 1)
- 2)
- 3)