MICROBIOLOGY - EXAM 3 2004 NAME _____

1. Viruses range in size from
a. 1 to 1000 nm (0.001 to 1 μm)
b. 10 to 500 μm (0.01 to 0.5 mm)
c. 10 to 500 nm (0.01 to 0.5 μm)
d. 10 to 500 μm (0.01 to 0.5 nm)

2. Members of the genus *Propionibacterium* are so named because they produce propionic acid which is
a. important in protecting our skin from pathogens.
b. important to the flavor of Swiss cheese.
c. a fermentation product of the bacterium
d. all of the above.
e. none of the above

3. Which parts of the human body have a normal microbiota?
a. tongue and nostrils
b. kidneys and lymph nodes
c. heart and lungs
d. all of the above

4. Opsonization is the process by which.....
a. antigens coat the invader and make it easier for B-Cells to find.
b. holes are punched in invading cells.
c. invading cells are coated with antibodies and therefore marked for destruction.
d. invading cells are surrounded by T_H-cells.

5. Virulence Plasmids can confer virulence to a bacterium by coding for the
a. production of one or more toxins.
b. production of siderophores.
c. ability to form a capsule.
d. production adhesions.
e. all of the above

6. "Lysogenic conversion" refers to:
a. changing the ability of a bacterium to cause disease (e.g. via phage that have genes for toxin production)
b. viral genes that change the phenotype of the host cell (e.g. converting a non-pathogen to a pathogen)
c. conversion of a non-pathogen to a pathogen via F-plasmids that carry toxin genes.
d. all of the above.
e. a and b.

7. There are many artificial ways to make bacterial cells competent for transformation, such as
a. injection of the F-plasmid into the cells
b. electroporation.
c. killing the recipient cells with heat
d. all of the above

8. Foreign cells that invade the human body become coated with specific antibodies and are...
a. protected from further immune response.
b. ejected from the body in sweat and saliva.
c. destroyed by the complement system and/or phagocytes.
d. called antigen presenting phagocytes.

9. _____ had troops boil water to avoid illness and _____built extensive aqueducts all over Europe to ensure the supply of fresh drinking water.
a. Ghenghis Khan / the Romans
b. The Romans/Ceasar
c. Alexander the Great/the Romans
d. The Romans/Ghengis Khan

10. Bacterial restriction enzymes (restriction endonucleases) cleave foreign DNA that is
a. methylated in the same pattern as the bacterium.
b. unmethylated.
c. in plasmids.
d. going to be transferred during conjugation.

11. Conjugation is brought about via information stored on fertility plasmids (conjugative plasmids), which contain genes for:
a. the F pilus
b. mobilization of the plasmid (transfer factors)
c. antibiotic resistance
d. an origin of replication
e. a, b and c
f. all of the above

12. What was the key piece of evidence that helped Beijerinck deduce that the causative agent of tobacco mosaic disease was not a toxin?
a. He used an electron microscope to show that it was a virus.
b. He used dilution experiments to show it was multiplying in the plant, but he still could not see it.
c. He crystallized the capsid, proving that viruses were made of nucleic acids
d. He fulfilled all of Koch's postulates.
e. all of the above

13. Immunization (vaccination) works because of the fact that specific _____ B-cells are produced in response to the first exposure to specific foreign _____.
a. memory / antibodies
b. plasma / antigens
c. memory / antigens
d. plasma / antibodies
e. memory / T-cells

14. Artificial Wetlands:
a. Need to inhibit microbial photosynthesis in order to treat waste.
b. Are a form of secondary waste treatment.
c. Are an example of activated sludge treatment.
d. Are not a place fish can live.
e. None of the above

15. In Immunology, "neutralization reactions" refer to
a. a lowering of the pH on skin and mucosal surfaces in an attempt to discourage pathogens.
b. neutralization of pH during the complement cascade inside a phagocyte.
c. coating of antigenic toxins and viral proteins with specific antibodies.
d. the killing of our own viral-infected cells by cytotoxic and killer T-cells

16. Primary Treatment of Sewage:
a. Is required by the Clean Water Act of 1972.
b. Is a physical process using gravity to do the work.
c. Uses a sedimentation tank to settle the material.
d. All of the above.
e. b and c only

17. Anaerobic Digestion:
a. Is performed on the liquid effluent of the primary and secondary treatments.
b. Produces a nutrient rich solid end-product that can be burned, put into landfills, or used as fertilizer
c. Produces methane as a gaseous end-product.
d. All of the above.
e. b and c only

18. During the production of Sauternes, _____ grow on the grapes in the field digesting the _____ in the grape skins. The grapes are then hand picked and fermented by yeats that specialize in the fermentation of glucose leaving the _____ behind in the wine.
a. *Botrytis cinerea* / pectin / fructose
b. Acetogenic Bacteria / protein / pectin
c. *Botrytis cinerea* / fructose / pectin
d. *Penicillium cambertii* / pectin / fructose
e. *Saccharomyces ellipsoide*s / glucose / pectin

19. Biomagnification is most likely to occur with chemicals that are
a. highly chlorinated and recalcitrant
b. highly chlorinated and biodegradable
c. highly chlorinated and recalcitrant

20. In the production of blue cheeses, the fungus _____ is injected into the cheese to aid in the _____ process.
a. *Penicillium camemberti* / brieing
b. *Penicillium roquefortii* / curd-making
c. *Propionbacterium camemberti* / ripening
d. *Penicillium roquefortii* / ripening
e. *Propionbacterium camemberti* / curd-making

21. An Hfr cell has the genetic information of the F plasmid
a. free, as a plasmid, in the cytoplasm
b. incorporated into a larger plasmid that always codes for antibiotic resistance
c. integrated into the plasma membrane of the host cell
d. integrated into the chromosome

22. The malo-lactic fermentation is responsible for
a. increasing the pH of some red wines.
b. decreasing the alcohol content of some red wines.
c. adding more malic acid to some red wines.
d. all of the above

23. Plasmids can contain genes that encode for
a. antibiotic resistance
b. special metabolic properties
c. capsule formation
d. toxin production
e. all of the above

24. Which of the following are most efficient at transference of chromosomal DNA to F- cells?
a. F+ cells
b. lysogenized cells
c. Hfr cells
d. competent cells
e. none of the above

25. Imagine there were organisms that lived in a lake and could naturally degrade DDT. Suddenly there was a massive DDT spill at a nearby industrial plant and the chemical seeped into the lake. The plant engineers added a fertilizer to the DDT so that these organisms would have enough nutrients to effectively degrade the DDT. This would be an example of:
a. Bioaugmentation.
b. Biostimulation.
c. Biomagnification.
d. All of the above.
e. b and c only

26. Match the mechanisms of horizontal gene transfer with the appropriate description (3pts.)

A. Transformation	_____ uptake of naked DNA
B. Conjugation	_____ transfer of DNA by viruses
C. Transduction	_____ transfer of DNA by cell to cell contact

27. Matching. Letters can only be used once. (10 pts.)

a. Morbidity rate _____ source of disease-producing organism

b. Prevalence rate _____ animal diseases that can spread to humans

c. Incidence _____ number of new cases / number of individuals in the population

d. Reservoir _____ number of deaths / number of individuals with the disease

e. Zoonoses _____ organism that spreads a disease from one host to another host

f. Vector

g. Mortality rate

28. A) Define eutrophication, B) list one possible cause, and C) describe why it is an environmental concern. (3 pts.)

A)

B)

C)

29. One important non-specific host defense is the normal resident microbial population of our bodies. Briefly describe two ways that this indigenous microbial flora may discourage pathogens (4 pts.)

1.

2.

30. Besides genes for a pilus and transfer factors, what other two traits are coded for on the Ti plasmid (tumor inducing plasmid) of *Agrobacterium tumefaciens*? (2 pts.)

1.

2.

31. Define "probiotics" and give an example of how it is used. (2 pts.)

32. Fill in the blanks with the right terms from the list of terms. (6 pts.)

endemic, parademic, pandemic, epidemic, academic, soil, air, water, demonic, symphonic, pneumonic, nosocomial, zoonotic, cats, rats, bats, wombats.

Plague (black death): *Yersinia pestis* (Gamma Proteobacteria, Enterobacteriaceae) infection is _____ in prairie dogs and other wild rodents. Fleas on the wild rodents can transfer plague to the occasional human. Of greater threat is when fleas pass *Y. pestis* on to domestic _____, which can then pass (via fleas) *Y. pestis* on to large numbers of humans. This can result in a local _____ (India, 1994) or even a world-wide _____(middle ages). *Y. pestis* infects lymph nodes to make bubos, hence "bubonic" plague. Subcutaneous hemorrhaging makes dark areas, hence "Black Death". *Yersinia pestis* in lungs results in _____ plague, which can then spread through the _____.

33. A) Describe how you would measure the Biochemical Oxygen Demand (BOD) of sewage and B) explain why you would want to measure it in the dark. (2 pts)

A)

B)

34. Are viruses alive? Give 2 reasons for your answer. (20 words or less) (**2 pts**)

35. Briefly describe **either** specialized **or** generalized transduction. You can use pictures, but you don't have to. Be sure and indicate the roles of the lytic and/or lysogenic cycles. (8 pts.)

36. Fill in the blanks in the following picture using words from the following list (8 pts.)

transformation, transduction, conjugation, origin of transfer, Hfr cell, F+ cell, F' cell, F- cell, chromosome, F-plasmid, Ti plasmid, R plasmid,R pilus, F pilus, flagellum, adhesin, bacteriophage T1, phage lambda, competent cell, incompetent cell.