

Study Guide for Unit 4

1. Describe chronologically the major events from the beginning of life to now. Note the key events, i.e. aerobic cell, eukaryotic cells.
2. How many mass extinctions have there been in the history of the earth?
3. What is natural selection? How does it differ from artificial selection?
4. What are Darwin's four ideas necessary for evolution to occur?
5. What is Lamarckism? How is it different from Darwin's natural selection.
6. What are the evidences for evolution and describe each one.
7. Know the age of the earth as predicted by science and what happened during the Eras of time.
8. What is Pangaea?
9. What is a gene pool? Why is it important to have a large gene pool? How does that relate to the examples we used for the horse?
10. What is ultimate source of genetic variation or microevolution? How is it spread through a population?
11. Describe Hardy-Weinberg equilibrium in the terms of p and q.
12. Be able to calculate allele frequencies and genotype frequencies.
13. What factors affect Hardy-Weinberg equilibrium? Describe each one?
14. Be able to describe disruptive selection, Directional selection, and stabilizing selection.
15. Most species belong to which group of organisms?
16. Define a species.
17. What is a subspecies?
18. What is the differences between punctuated and gradualism evolution?
19. Define allopatric, sympatric, and parapatric speciation and give examples of each.
20. What are the prezygotic reproductive mechanisms of isolation? Know some examples of each.
21. What are the postzygotic reproductive mechanisms of isolation? Know some examples of each.
22. Define divergent and convergent evolution and how do they differ.
23. What is taxonomy?
24. Who is the "father" of taxonomy?
25. What are the divisions of taxonomy how do they relate to the number of species in each?
26. What are the three strategies in systematics? How are the different from each other and what are their limitations (include birds and marsupials in your explanation)?
27. How do they handle parallel or convergent evolution?
28. Know the 6-kingdom system and the 6 kingdoms.
29. How does it differ from the 8-kingdom system proposed by Cavalier-Smith?
30. What are the three domains?
31. What is a dichotomous key? Be able to key out the 6 kingdoms of life.
32. How does DNA hybridization help to classify bacteria?
33. Why do Archaea bacteria and Eubacteria in separate domains?
34. How are some microbes named?
35. Are bacteria multicellular? What are the other characteristics of bacteria? i.e. chromosomes, plasmids, flagella and nucleoid.
36. What are the differences in cell wall structure between Gram negative and Gram positive bacteria?
37. Be able to identify an organism to one of the four nutritional types. i.e. photoautotrophs, photochemotrophs, chemoautotrophs, and chemoheterotrophs.
38. How do bacteria contribute to the nitrogen cycle?
39. What bacteria photosynthesize?
40. What makes bacteria a pathogen?
41. What makes *Rickettsiae* and *Chlamydiae* so different?
42. What are the three groups of Archaea? How do they differ?
43. How do Archaea differ from Eubacteria? i.e. cell wall, membranes, and enzymes.
44. What is the difference between an exotoxin and endotoxin?
45. What was Robert Koch known for?
46. Know Koch's postulates and how to apply them.
47. Why do some of our antibiotics kill bacteria and not humans?
48. Why is there so much antibiotic resistance today?
49. What are three main shapes of bacteria and their cell arrangements?
50. Gram positive bacteria stain _____ (color) while Gram negative bacteria stain _____ (color).
51. What is an obligate aerobe, facultative anaerobe, and obligate anaerobe.
52. Be able to write an essay on the disease control triangle and how each side relates to the other side. Do they need to exist with each other in order to be successful and controlling disease?
53. Know the endosymbiotic theory and evidence for the theory.
54. What is unusual about *Giardia* and how does it offer evidence for the theory?

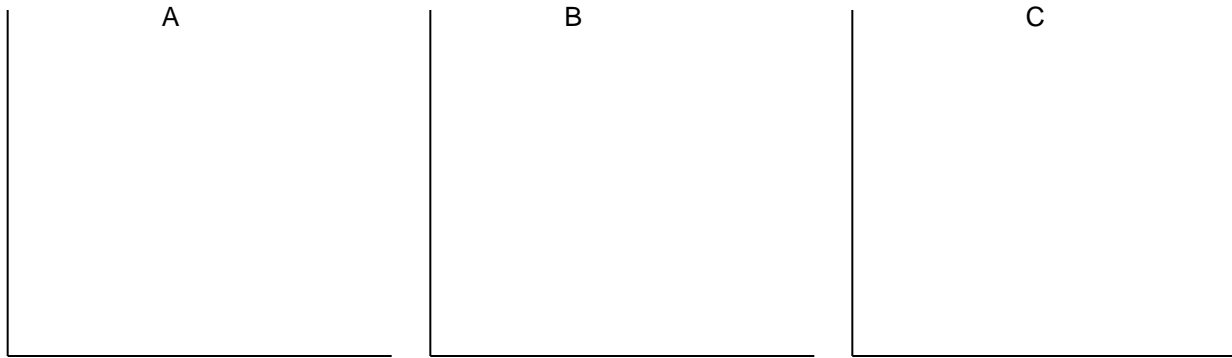
55. Know the characteristics of Kingdom Protista.
56. Know the characteristics of the Phylum Euglenophyta and examples.
57. Know the characteristics of the Group kinetoplasts and examples.
58. Know the Alveolata groups: characteristics and examples. Ciliates, Dinoflagellates, and Apicomplexa.
59. Know the Stramenopila groups: characteristics and examples. Chrysophyta, Phaeophyta, and Oomycota.
60. Know the Red and Green algae characteristics and examples: Rhodophyta and Chlorophyta.
61. Choanoflagellida is an evolutionary link for what kingdom? What are choanoflagellida's characteristics.
62. What are some characteristics and examples of the phylum Sarcodina? Include amoebas, actinopods, and foraminifera.
63. What is a slime mold (characteristics)? What is the difference between plasmodial and cellular slime molds?

Fill in the blanks (1 point each)

64. Prokaryotic cells divide by the process of _____.
65. The study of how variation is passed from one generation to the next is called _____.
66. The theory that states that present-day mitochondria and chloroplasts are descended from prokaryotes that came to live inside ancient eukaryotic cells is called the _____ theory.
67. Who wrote the work On the Origin of Species by Means of Natural Selection? _____
68. The differential reproductive success of individuals due to genetically inherited traits is _____.
69. _____ was the ideas that species evolve gradually and continuously through the steady accumulation of changes.
70. The naming and grouping of organisms is _____.
71. The scientific name for a human being is _____.
72. Mesozoic age is often called the age of _____
73. _____ is the study of the past and present distribution of plants and animals species.
74. In fishes and amphibians, the tissues between the gill slits, called the _____ develop into gills.
75. _____ is the ideas that individual differences may be passed on to offspring.
76. We now know that inheritance is "particulate" and not "blended" because of the pioneering work of _____.
77. Most genetic variability comes from _____.
78. The principle way for genetic variation to spread through a population is by _____.
79. The principle that states that: "Sexual reproduction by itself does not change the frequency of alleles within a population" is called the _____.
80. An **extreme form** of positive assortative mating is called _____.
81. The reduction of deleterious alleles in the population is a process called _____.
82. Alleles carried from one population into another is a process called _____.
83. A shift in the frequency of one or more traits in a particular directions is called _____ selection.
84. A type of selection that acts against the average the average in the phenotype so that the extremes are favored is called _____ selection.
85. Morphologically distinct subpopulations, which can interbreed, are sometimes called _____.
86. The production of a nonviable (unable to grow) or sterile (unable to reproduce) individual is an example of a _____ barrier to gene flow.
87. Some paleontologists say that the fossil record shows that there is (are) at least _____ mass extinction event(s).
88. Plants that contain two or more complete sets of chromosomes are said to be _____.
89. Taxonomist put monkeys, apes, lemurs, and humans into the same group, called the _____.
90. A biologist who classifies and names organisms is called a _____.
91. A group of species that share many morphological characteristics is called a _____.
92. The term used to designate a group of organisms at any level of the classification hierarchy is the _____.
93. The idea that each species consists of actually or potentially interbreeding individuals that are reproductively isolated from other such groups is called the _____.
94. The ideal classification system would group individuals based upon _____.

95. The method of classification that attempts to describe organisms in a way that shows their evolutionary history is called _____.
96. Classification systems must begin with grouping individuals based on _____.
97. An organism that lives within another organism for the benefit of both is an association called _____.
98. The most abundant organism on the face of the earth are bacteria that fall into the kingdoms Archaeobacteria and _____.
99. Bacteria unable to survive for extended periods in the absence of oxygen are termed _____.
100. Photoautotrophs use light as their source of energy and _____ as their source of carbon.
101. _____ developed a staining process for bacteria in 1884 that is till the single most common tool in the study of bacteria.
102. _____ is the ability of a bacterial pathogen to enter into and multiply within the body of the host.
103. _____ is the ability of a bacterial pathogen to produce chemical substances injurious to the tissues of the host.
104. Gram positive bacteria stain _____, and Gram negative bacteria stain _____.
105. Many Gram negative bacteria have _____ composed of lipopolysaccharides that can cause fever and vomiting.
106. Some Gram positive bacteria have potent _____ made of proteins that can be fatal.
107. *Treponema pallidum*, the causative agent of syphilis, belongs to the group of bacteria known as the _____.
108. One of the smallest bacteria, _____, has a complex intracellular reproductive cycle.
109. The important bacteria *Escherichia coli* has a _____ shape and a _____ Gram stain.
110. A common bacterium that can cause food poisoning is _____.
111. Toxic substances made by bacteria that are components of the bacteria themselves are called _____.
112. Toxic substances made by the bacteria that are protein and are excreted from the bacteria are called _____.
113. The most common shape of a prokaryotic cell is the _____.
114. Bacterial cell walls are a mixture of polysaccharides and polypeptides called _____.
115. Hairlike structures on the outside of the bacteria that allow them to become attached to the surfaces and to other cell are called _____.
116. The very rapid growth of bacteria is called _____.
117. The group of Archaea that are obligate anaerobes are called _____.
118. The group of Archaea that typically inhabit hot springs, such as those found in Yellowstone National Park are called _____.
119. Temporary extensions of the cytoplasm of a motile Protist are called _____.
120. The group of algae characterized by having a photosensitive "eyespot" is called the _____.
121. The White Cliffs of Dover, England are made from the dead bodies of the group of protists called _____.
122. The group _____ consists completely of parasitic species.
123. _____ keep some freshwater protists from exploding by taking on too much water.
124. Ciliates, such a paramecia, often contain two kinds of nuclei, a single _____ with DNA that is translated and transcribed, and several _____, which are typical eukaryotic nuclei.
125. Giardia is a unicellular eukaryote that lacks _____.
126. The red tides that can kill tons of fish are caused by toxic species of _____.
127. Giant kelp belongs to the phylum Phaeophyta, whose member are commonly called _____.
128. The causative agent of African sleeping sickness is _____, a parasitic kinetoplastid.
129. *Paramecium* used a precise form of locomotion, by beating its _____, it can move forward or backward.
130. A naked mass of multicellular cytoplasm that is the feeding stage of the myxomycota is called a _____.
131. The first system of classification to be accepted by a majority of scientists was proposed by _____.

132. In the graphs below, diagram the following selection patterns: a) directional b) stabilizing c) disruptive.



133. Describe how an epidemiologist might use Koch's postulates to track down an epidemic. (4 pt.)

134. You test a herd of 1000 holstein cows and come up with the following genotypes for the kappa-casein gene. (5 pt.)

- AA - 555
- AB - 337
- BB - 108

The alleles are Co-dominant (both are expressed). Why is this important? Milk produced from kappa-casein BB cows makes better cheese (It's the cheese!).

a. Calculate the frequency of the A alleles in the herd.

b. Calculate the frequency of the B alleles in the herd.

c. Calculate the frequency of the AA genotypes in the herd.

d. Calculate the frequency of the AB genotypes in the herd.

e. Calculate the frequency of the BB genotypes in the herd.

135. Explain a) what Hardy-Weinberg equilibrium is and b) the conditions needed for it to occur. (6 pt.)

1. Create a dichotomous key for the 5 kingdoms of life using the outline provided below (8 pt.).

1a.

1b.

2a.

2b.

3a.

3b.

4a.

4b.

2. Complete the dichotomous key for Kingdom Protista. You can use the following (7 pt.) :
Ciliophora, Dinoflagellates, Euglenophyta, Kinetoplastids, Sarcodina, Chrysophyta, Apicomplexa.

1a. Many species, including *Paramecium*, at least have two nuclei _____

1b. Strictly mononucleate see 2a.

2a. Non-motile, parasitic, with complex life cycle; Plasmodium causes the disease malaria _____

2b. Motile by one of several means see 3a.

3a. Move by extruding their cytoplasm to the appropriate direction (pseudopodia) _____

3b. Flagellated see 4a.

4a. Strictly heterotrophic; Trypanosoma and Giardia are representative genera _____

4b. Either autotrophic or heterotrophic see 5a.

5a. Lacking a cell wall, but has proteinaceous pellicle _____

5b. Has cellulose or pectin-containing cell wall see 6a.

6a. Stores food as the glucose polymer, starch;
 can cause red tide _____

6b. Stores food in lipid form as oil; silica in cell wall; diatomaceous earth was
 formed from marine deposits of these organisms
