

## **Biology 100/110**

### **Study Guide #3- Part 1**

**TIPS FOR THIS EXAM:** There are a lot of definitions and vocabulary. My advice is to study hard and study often.

1. MAKE FLASHCARDS to study the terms.
2. DRAW PICTURES/DIAGRAMS for everything you can!!!
3. USE THE TUTORIAL CENTER on the first floor of building 36. They are open 9-2 everyday.
4. COME SEE ME-- I have office hours on Mondays and Wednesdays from 3:30-4:20 and on Fridays from 11-12.
5. EMAIL ME YOUR QUESTIONS-- It's not always possible to get an immediate answer, but I check my email at least once a day (except on Wednesdays) and try my best to get back to everyone within a day or two.

### **Evolution**

1. Describe the contributions of Cuvier, Lyell, Malthus, Mendel and Wallace to Darwin's thoughts on Evolution. What term did Darwin use for evolution?
2. What is a phylogenetic tree? How are these trees developed and what do they show?
3. Describe the mechanism of evolution (natural selection). What are the three observations/rules that led Darwin to his ideas about natural selection? What is artificial selection and how is it different from natural selection?
4. Describe the concept that Darwin called "Use and Disuse". What other name does it go by and who was the major proponent of this idea in Darwin's time? Is "Use and Disuse" a legitimate mechanism of heredity? Why or why not?
5. Describe the term adaptation. Give an example.
6. Compare and contrast the terms homology and analogy in terms of adaptations. What is molecular homology?
7. Define the following: population, gene pool, allele frequency and microevolution.
8. Define and give examples of directional selection, stabilizing selection, disruptive selection, balancing selection and sexual selection.
9. Describe how directional selection leads to antibiotic resistance. Why is it unreasonable to give antibiotics to a patient with a cold or flu? What is a "superbug"/ superinfection?
10. Describe how disruptive selection can lead to speciation. What is a species? Discuss speciation in the context of Darwin's finches. How is that different from, say, domestic dogs or cats.
11. Define and give examples of genetic drift (bottle neck, founder effect, inbreeding) and gene flow (immigration and emigration).

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12. Define and give examples of mechanical, behavioral, temporal, ecological (geographical), gametic and post-zygotic isolation as mechanism of speciation.

13. Describe the three models of speciation: gradual, punctuated and adaptive radiation. What is an adaptive zone? Define extinction. How many mass extinctions do scientists have evidence for? What type of evidence do we have of extinct organisms? What are “extant” organisms?

14. What is a lineage? A cladogram? Review what you learned about the six kingdoms and the three domains. Draw a diagram of these two systems of classification. Include a couple examples of organisms that are in each category.

**Origins of Life**

1. What were the first cells like and when did they likely arise on Earth? Describe the atmosphere on Earth at that time. How did these cells get nutrients?

2. How and when did organelles evolve? Describe the endosymbiont theory.

**Prokaryotes and Viruses**

1. Review what you learned previously about prokaryotic cells (size, structure, etc). Flagella, cell walls, chromosomes, plasmids, etc.

2. What is the difference between eubacteria and archaea? Where, in general, do you find each type of cell? Give some examples.

3. Describe prokaryotic cell morphology (coccus, bacillus, spirochete, spirillum, vibrio, pleomorphic).

4. What is a sex-pilus and what is bacterial conjugation? What is prokaryotic fission? How is it different from mitosis?

5. What is a biofilm and how is it formed? Define glycocalyx, capsules, slime layers. Give examples of where you might find a biofilm.

6. What is normal flora? How is that different from obligate pathogens and opportunistic pathogens? Give an example for each.

7. What are viruses? Describe their overall structure. Describe their morphology (draw a picture) of helical (rod), polyhedral and bacteriophage viruses.

8. What is a viral envelope? Where does it come from? How does an envelope help a virus gain entry into host cells?

9. Describe, in general, a viral life cycle, including how it gets into the body of the host and how it recognizes, gets into the cells, gets its genome inside and how it replicates.

10. What is a prion? How is it different from a virus? What diseases are caused by prions?

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**Protozoans and Fungi**

1. Describe the general characteristics of protists. Where do they fit in the domain/kingdom systems? Describe and give some examples of organisms that are protists.
2. Describe and give examples of flagellates, euglenoids, amoeboids, ciliates and algae. What are “red-tide”, Giant kelp and diatoms?
3. Describe the general characteristics of fungi. Where do they fit in the domain/kingdom systems? Describe and give some examples of organisms that are fungi.
4. How do fungi obtain nutrients? What are hyphae, mycelium and spores?
5. What are yeast and how do they reproduce? What industrial uses are there for yeast?
6. What do athlete’s foot, jock itch and ring worm have in common? What is thrush?

**Plants**

1. What were the major adaptations made by aquatic plants that allowed them to colonize land and when did this occur?
2. Describe/diagram the evolutionary trends in plants. Describe the extant members of each group including bryophytes, lycophytes, horsetails, ferns, gymnosperms (conifers, ginkos) and angiosperms.
3. Describe or use labeled drawings to show the following structures: Roots, shoots, xylem, phloem, cuticle, stomata, vascular bundles, cotyledons.
4. What is the difference between monocots and dicots? Draw a diagram. Give an example from common vegetables of each.
5. Draw a diagram of a flower and label the carpel, stigma, style ovary, ovule, stamen, anther, pollen, filament, petal, sepal and receptacle.
6. What is a pollinator? Give an example. What is co-evolution in the context of plants and their pollinators?