

Unit 8 Evolution

Top 10 (Though there are more!)

Ch. 22

1. Explain how the work of the following folks contributed to the development of the Theory of Natural Selection”
 - a. Thomas Malthus
 - b. Georges Cuvier
 - c. Charles Lyell
2. Explain how evolution as it was conceived of by Jean-Baptiste Lamarck differs from Natural Selection.
3. Draw a diagram illustrating the process of natural selection. Make sure your diagram includes all of the following features:
 - a. Overproduction of offspring
 - b. variation among individuals
 - c. limited resources
 - d. competition
 - e. differential reproductive success (“fitness”)
 - f. adaptation
4. Explain how each of the following demonstrate Darwinian selection. For each, indicate the source of selection, the criteria that determines fitness in the environment, and the end result of the selective process:
 - a. Artificial selection
 - b. Galapagos finches
 - c. The evolution of resistance in a population of insects or bacteria (you pick).
5. How has modern science refined our understanding of evolution since Darwin/Wallace’s publication?
6. Explain how each of the following specifically support some aspect of evolutionary theory:
 - a. The fossil record (generally)
 - b. Transition fossils (specifically)
 - c. Homologous anatomical structures
 - d. Analogous anatomical structures

- e. Vestigial anatomical structures
- f. Comparative embryology
- g. Molecular Homology (DNA and proteins)
- h. Artificial Selection
- i. Biogeography
- j. Observed Evolution (pick one)

Ch. 23

1. How is variation generated in a population? How is it maintained?
2. How is it possible that individuals with two different genotypes can have the same phenotype?
3. Explain how each of the following features of a (hypothetical) population in Hardy-Weinberg Equilibrium leads to that population not evolving over time:
 - a. large population size
 - b. random mating
 - c. no immigration/emigration
 - d. no net mutation rate
 - e. a constant environment
4. Solve HW Problems
5. If no real population of organisms is in Hardy-Weinberg Equilibrium, why is it a useful tool to study the effects of evolution?
6. Why does evolution have to involve the change of the genetic makeup of a population over time?
7. Explain each of the following modes of evolution in a population. For each one, describe the cause of change in the genetic makeup of a population and how the population evolves as a result of that change, and provide 1 “real world” examples of the process in action:
 - a. Natural Selection
 - b. Genetic Drift
 - c. Gene Flow
 - d. Sexual Selection
8. Why is evolution an emergent property of populations of organisms? Why are individuals unable to evolve?
9. Compare the effects of disruptive, directional and stabilizing selection on the genetic

makeup of a population.

10. Why do traits have to be heritable for evolution to affect them?

11. The meanings and relationships of all of the following terms:

- alleles
- genes
- gene pool
- genotype
- phenotype
- homozygous
- heterozygous

12. How can a violation of any of the conditions of HW equilibrium would affect the evolution of a population?

Ch. 24

1. Explain what the “Biological Species” definition is. Describe its strengths and weaknesses.
2. Why does a biological species have to be reproductively isolated from other organisms?
3. Compare allopatric and sympatric speciation.
4. Briefly explain the following species barriers
 - a. habitat isolation
 - b. temporal isolation
 - c. behavioral isolation
 - d. mechanic isolation
 - e. gametic isolation
 - f. reduced hybrid viability
 - g. reduced hybrid fertility
 - h. hybrid breakdown
5. Compare the concepts of gradualism and punctuated equilibrium.
6. What are the alternate definitions of “species”, and why they are necessary?
7. The evidence that supports that speciation is an ongoing process.

Ch. 25

1. Explain the hypothesis, procedure and results of the Miller-Urey experiment.
2. Why is it hypothesized that the evolution of RNA preceded the evolution of DNA?
3. How science can be used to investigate events that no one was around to witness.

Ch. 26

1. How has DNA technology changed the way that classification is done?
2. Explain the relationship between taxonomy and phylogeny.
3. How to make and read a cladogram.
4. The ideas of maximum parsimony and maximum likelihood.
5. The differences between mono-, poly-, and paraphyletic groups in a phylogenetic tree.