

Name \_\_\_\_\_

Period \_\_\_\_\_

AP Biology

Date \_\_\_\_\_

## REVIEW UNIT 6: EVOLUTION — “TOP TEN”

### A. Top “10” — If you learned anything from this unit, you should have learned:

#### 1. Darwin’s Principle of Natural Selection

- a. Variation  
individuals within a population possess heritable variation within traits
  - sexual recombination
  - mutation
- b. Overproduction  
organisms produce more offspring than can survive
- c. Competition  
those individuals with advantageous adaptations will out-compete others
- d. Differential Survival  
individuals with favorable characteristics tend to survive more
- e. Differential Reproduction  
individuals with favorable characteristics tend to have more offspring & pass on these traits to their offspring
  - alleles for favorable traits increase in the population
  - individuals are selected, but populations evolve

#### 2. Selection

- a. directional vs. stabilizing vs. disruptive
- b. sexual selection
- c. genetic drift = effect of chance events
  - bottleneck effect (cheetahs)
  - founder’s effect (European settlers in Americas)
- d. gene flow

#### 3. Evidence

- a. fossil record
- b. biogeography
  - convergent evolution (analogous structures)
- c. comparative anatomy
  - homologous structures
  - vestigial structures
- d. comparative embryology

- e. comparative genomics (molecular biology)
    - universal genetic code
    - conserved proteins (hemoglobin, cytochrome C)
  - f. artificial selection
    - agriculture, dog breeding, pesticide resistance, antibiotic resistance
4. Hardy Weinberg equilibrium
- a.  $p + q = 1$  (allele frequency)
  - b.  $p^2 + 2pq + q^2 = 1$  (phenotype frequency)
  - c. H-W conditions:
    - infinitely large population
    - random mating
    - no mutation
    - no gene flow (migration in or out)
    - no selection
5. Speciation
- a. biological species concept (Ernst Mayr)
    - population able to interbreed & produce viable, fertile offspring
  - b. allopatric = geographically isolated populations
  - c. sympatric = populations in same environment adapt to fill different niches
    - adaptive radiation (Galapagos finches)
    - mechanisms:
      - pre-zygotic: habitat factors, temporal factors, behavioral factors, mechanical factors, gamete factors
      - post-zygotic: reduced hybrid viability, reduced hybrid fertility
  - d. rate of speciation
    - gradualism (Darwin)
    - punctuated equilibrium (Stephen Jay Gould & Niles Eldridge)
6. Origin of Life
- a. Earth is 4.5 billion years old
  - b. abiotic origin
    - atmosphere of CO<sub>2</sub>, methane (CH<sub>4</sub>) & ammonia (NH<sub>3</sub>) energized by lightning & UV rays
    - formation of organic compounds in seas (Miller – Urey experiment)
    - formation of protobionts & then bacteria (3.5 bya)

**B. Labs**

1. Hardy-Weinberg Population Genetics Lab

Be sure to review the procedures and the conclusions, and understand:

- a. Factors that affect evolution (changes in allele frequency) in populations
- b. How & when to use both H-W formulas
- c. Compare expected frequencies to actual to test for evolution