1. Explain why the statement that a monkey is more evolved than a mouse is incorrect.

Evolution is not trying to create a “perfect” species. Both the monkey and the mouse are subject to natural selection.

1. Describe a situation in which a population would undergo the bottleneck effect and explain what impact that would have on the population’s gene pool.

A bottleneck event is one that killed a vast majority of individuals in a population (a disease, an earthquake, a hurricane).It reduces genetic diversity because the only genetic diversity is that which the surviving individuals have. In addition, a small population is much more susceptible to genetic drift.

1. List the five Hardy-Weinberg assumptions and give one example of each

No mutation, random mating, no genetic drift (large population size), no gene flow (immigration/emigration), no natural selection

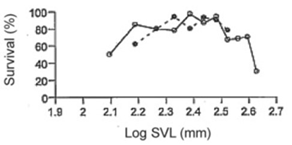
1. How would violations of each of the HWE assumptions lead to evolution?

Mutation, random mating, genetic drift, gene flow and natural selection all alter the allele frequency from one generation to the next.

1. A population in HWE is evolving/not evolving
2. Describe the three types of selection imposed by natural selection (stabilizing, disruptive, directional) and explain what happens to genetic variation in each.

Stabilizing reduces genetic variation, Disruptive selects for extreme phenotypes, directional selects for one extreme

1. House finches were found only in western North America until 1939, when a few individuals were released in New York City. These individuals established a breeding population and gradually expanded their range. The western population also expanded its range somewhat eastward, and the two populations have recently come in contact. If the two forms were unable to interbreed when their expanding ranges met, it would be an example of \_\_\_\_\_\_\_\_.
   1. prezygotic isolation
   2. speciation reinforcement
   3. allopatric speciation
   4. sympatric speciation
2. Which one of these processes describes bottleneck effect?
   1. chance events that change allele frequency
   2. alleles transferred to the next generation in portions that differ from previous generation
   3. transfer of alleles in and out of a population due to movement of fertile individuals
   4. sudden change in environments that alters gene frequency of a population
3. Biologists studying Galapagos marine iguanas measured the snout-to-vent (anus) length of Galápagos marine iguanas and observed the percent survival of different-sized animals, all of the same age. The graph shows the log snout-vent length (SVL, a measure of overall body size) plotted against the percent survival of these different size classes for males and females. What type of selection for body size appears to be occurring in these marine iguanas?



* 1. directional selection
  2. stabilizing selection
  3. disruptive selection
  4. You cannot determine the type of selection from the above information.

1. Your professor wants you to construct a phylogenetic tree of orchids. She gives you tissue from seven orchid species and one lily. What is the most likely reason she gave you the lily?
   1. to serve as an outgroup
   2. to see if the lily is a cryptic orchid species
   3. to see if the lily and the orchids show all the same shared derived characters
   4. to demonstrate likely homoplasies
2. In a population of beetles, antennae length is determined by a gene (B) where B = long antennae and b = short antennae. A population of 100 beetles, in HW Equilibrium was sampled and there were 90 long antennae beetles and 10 short antennae beetles. Calculate the p and q frequency.

p = 0.68, q = 0.32

1. Cystic fibrosis is a genetic disorder in homozygous recessives that causes death during the teenage years. If 9 in 10,000 newborn babies have the disease, what are the expected frequencies of the dominant (A) allele and recessive (a) allele according to the Hardy-Weinberg equation?

p = 0.97, q = 0.03

1. Researchers studying a small milkweed population note that some plants produce a toxin and other plants do not. They identify the gene responsible for toxin production. The dominant allele (T) codes for an enzyme that makes the toxin, and the recessive allele (t) codes for a nonfunctional enzyme that cannot produce the toxin. Heterozygotes produce an intermediate amount of toxin. In this population, 70 individuals produce toxin and 30 individuals do not. What is q, p, p2, q2, and 2pq? Of the 70 plants that produce toxin, how many are heterozygous?

p = 0.45, q = 0.55, q2 = 0.3, p2 = 0.2, 2pq = 0.49