Evolution Exam 2 Biology 1010 Spring 2015

1. Which describes the relationship between mutation and natural selection?
    a. Mutation occurs randomly as a result of natural selection
    b. Mutation creates variation within a population and increases the chance of survival of a population in a changing environment.
    c. Mutation rate is directionally driven in response to different selection pressures.
    d. Natural selection occurs in populations that are genetically stable.
2. Stabilizing selection is a mechanism that
    a. Drives the population toward one extreme value for the phenotypic character being studied.
    b. That leads to an essentially permanent trait.
    c. Is exemplified when comparing human birth weight with survival of the fetus.
    d. Leads to species adapting towards one of two different phenotypes
3. The operation of natural selection depends upon the fact that
    a. Some individuals have a better chance to produce more offspring
    b. Mutations are always harmful
    c. Acquired characteristics are inherited.
    d. Low genetic variation in a population enhances evolution
4. The evolutionary reason that pea hens prefer peacocks with large tails and many eye spots is
    a. That the size and spot density are indicative of peacock fitness shown as an increased two year survival rate of chicks.
    b. These males are also stronger and faster than less flashy ones, and can more easily catch up with the pea hens.
    c. That peacocks that survive predation are more physically fit and make better mates.
    d. That the male will draw predators to it and this indirectly protects the pea hen and offspring from predation
5. The fact that the hand of man, the wing of the bird, the wing of the bat, and the limb of the alligator all have the same bones in the same relative positions
    a. Is that this is the best possible physical composition for all of them.
    b. Is explained by common descent of all these organisms from a primitive reptile
    c. Is due to a parallel evolution of arms and hands in these separate lineages.
    d. Is explained by each appendage having the same function
6. Under the biological species concept, a species is a group of organisms that
    a. Are physically similar.
    b. Share a recent common ancestor
    c. Live together in a location and carry out identical ecological roles
    d. Have the potential to interbreed in nature and produce fertile offspring
7. Mass extinctions
    a. Remove many species, but they are replaced within a million years or less by an even greater diversity of life
    b. Mainly serve to “weed out” poorly adapted organisms and make room for new, more advanced species
    c. Permanently and irreversibly reduce the total number of species on Earth.
    d. Remove well-adapted species and groups from the Earth, and it may take tens of millions of years for species diversity to recover.
8. Human social behavior appears to be
    a. Exclusively a product of our genes.
    b. Determined by environment.
    c. A product of our genes, external influences, and environment.

d. Unrelated to genetics.

9. Convergent evolution describes
    a. Changes of two closely related species caused by physical separation
    b. Not closely related species that evolve similar characteristics because of living in similar environments
    c. Maintain homologous structures due to close evolutionary relationships
    d. Genetic drift causing fixation of similar physical structures
10. The effect of genetic drift on a population whose number has decreased to very low numbers either one or multiple times is called a bottleneck effect. Which of the answers below most likely explains the impact on such a population?
    a. Natural selection cannot occur.
    b. Genetic diversity is decreased.
    c. Speciation will occur.
    d. Only recessive or deleterious mutations will be fixed.
11. Allopatric and sympatric speciation differ in that
    a. Sympatric speciation occurs in the same physical space while allopatric speciation means that populations are separated by a physical barrier like a mountain range or a river leading to speciation.
    b. Allopatric speciation involved pre-mating gene flow barriers while sympatric involved post-mating gene flow barriers.
    c. Allopatric speciation occurs quickly in separate places while sympatric speciation is slow and occurs in the same physical place.
    d. Sympatric speciation concerns species that are the same (hence the prefix “sym”) while allopatric speciation concerns species that are different (hence the prefix, “allo”).
12. Culture
    a. Is unique to humans because no other animal has the complex, symbolic language required for communication cultural patterns to other individuals.
    b. Is learned behaviors that are passed from one individual to another and is unique to humans.
    c. Is an evolutionary adaptation of humans that is seen in other animals like some primates who use tools and teach their use to other individuals.
    d. Is unique to humans because it is learned behavior and not an instinctive form of behavior that is inherited.
13. Rhagoletis flies diverged into two races, one that laid eggs on apples early in the fall and the other that laid eggs on Hawthorn fruits later in the fall. The Hawthorn race is ancestral. From which individuals of the Hawthorn race of Rhagoletic flies were the apple race flies most likely selected?
    a. From those that produced larvae less likely to eat Hawthorn fruits.
    b. From those flies that emerge early from the pupal case.
    c. From those flies showing the mean frequency of emergence from the pupal case.
    d. From the smaller adult flies.
14. Proteins like cytochrome C are said to have been highly conserved during evolutionary time. The practical implication of this statement is that
    a. Species closely related show few differences in amino acid sequence for cytochrome C
    b. No change to the amino acid sequence is tolerated or the species would be at a selective disadvantage.
    c. The allele encoding cytochrome C has been fixed.
    d. Genetic drift is not allowed for evolutionarily conserved proteins.

15. Geological evidence indicates that two land masses became separated by a deep ocean channel 45 million years ago and have been moving apart ever since. You are studying a group of organisms that is widespread as a native part of the biota on both of the land masses. What can you conclude about the group's evolutionary history?
    a. The group's ancestors *were definitely present* on the original land mass before it broke up.
    b. The group's ancestors *cannot have been present* on the original land mass before it broke up.
    c. It depends on the dispersal abilities of the organism. If the organism cannot move across the open ocean, it is very likely that the group's ancestors were present on the original land mass before it broke up.
    d. The group's ancestors *must* have independently colonized each of the land masses from a third location within the past 45 million years.

Essays

1. Describe one example of natural selection in the wild. Provide the supporting data to back up your example. (4 points)
2. There are a number of traits that are characteristic of primates and we have a basic understanding of how these traits may have been advantageous in evolution of primates in the changing environment during the last 70 million years. Which new characteristic do you think was most important in differentiation and evolution of hominids from all other primates? Describe the physical changes that were needed to accomplish the physical transition and how this transition would provide adaptive in the changing environment. (6 points)