

Practice questions for the Evolution midterm

- 1) An adaptive radiation produces:
 - a) sterile hybrids
 - b) unfilled ecological niches
 - c) a group of closely related but distinct lineages
 - d) unoccupied habitats
 - e) a reduction in the rate of evolutionary change

- 2) If a gene is described as polymorphic, how many alleles does it have?
 - a) One
 - b) Two
 - c) Three
 - d) Two or more

- 3) A female hummingbird normally lays exactly two eggs each time she nests. Occasionally, a nest with three eggs is found, but the usual result is the loss of all three nestlings because the nest, built for two, breaks apart as they grow larger. Of course females that lay only one egg, which also occurs from time to time, raise only one young. Assuming egg number is inherited, this pattern is an example of:
 - a) directional selection
 - b) disruptive selection
 - c) stabilizing selection

- 4) Which of the following populations is in Hardy Weinberg equilibrium?
 - I. 25% AA, 50% Aa, 25% aa
 - II. 64% AA, 32% Aa, 4% aa
 - III. 81% AA, 18% Aa, 1% aa
 - a) I only
 - b) II only
 - c) III only
 - d) I and II only
 - e) I, II and III

- 5) Because of differences in breeding times, two species of frog do not mate at the same time and so do not produce interspecific hybrids. The isolating mechanism is:
 - a) behavioral
 - b) mechanical
 - c) temporal
 - d) hybrid breakdown

- 6) Evolution is often described as "the theme that ties together all aspects of biology." This is because the process of evolution
 - A. explains how organisms become adapted to their environment.
 - B. explains the diversity of organisms.
 - C. explains why all organisms have characteristics in common.
 - D. explains why distantly related organisms sometimes resemble one another.
 - E. all of the above are appropriate answers.

- 7) An example of coevolution is that between
- A. birds and bees
 - B. flowering plants and insect pollinators
 - C. dinosaurs and mammals
 - D. humans and other primates
- 8) Which of the following is not a fact or inference of Darwin's theory of evolution by natural selection?
- A. there is heritable variation among individuals.
 - B. there is struggle for limited resources.
 - C. individuals whose inherited characteristics best fit them to the environment will on average leave more offspring.
 - D. offspring inherit characteristics acquired by their parents during the parents lifetime.
 - E. all of the above are correct statements.
- 9) The idea that attributes acquired by an individual during its lifetime (for example, increased or decreased muscular strength due to more or less physical work) were passed on to the offspring is known as _____ and is attributed to _____.
- A. adaptation, Wallace.
 - B. natural selection, Darwin.
 - C. inheritance of acquired characteristics, Lamarck.
 - D. genetics, Mendel.
 - E. none of the above is correct.
- 10) An example of Müllerian mimicry would be
- A. a butterfly that resembles a leaf
 - B. two species of poisonous frogs that resemble one another in coloration
 - C. a minnow with spots that look like large eyes
 - D. a palatable species of butterfly that resembles an unpalatable one
 - E. a carnivorous fish with a worm-like tongue that lures prey
- 11) Suppose a species of grasshopper normally breeds in June and lays its eggs on the young shoots of an annual grass that comes up in June. A mutant female grasshopper in the population produces a batch of eggs that carry a new allele that delays sexual development until August. Her offspring feed on the young shoots of another grass, in the very same habitat, that comes up in August. Her offspring mate successfully with one another producing a new generation of August-mating grasshoppers. The August-mating sub-population of grasshoppers is a good candidate for:
- A. allopatric speciation
 - B. stabilizing selection
 - C. sympatric speciation
 - D. directional selection
 - E. disruptive speciation
- 12) Which of these factors always produces adaptive evolutionary change in a given environment?
- A. genetic drift.
 - B. founder effect.
 - C. mutation.
 - D. non-random mating.
 - E. none of the above is correct.

- 13) In the early 1800's, peppered moths living in England rested on tree trunks that were covered with whitish lichens. The moths were also whitish in color and so matched the color of the background on which they rested. This made the moths less visible to the birds that preyed on them. In the late 1840's, an increasing number of very dark moths began to appear in moth populations near cities where pollution had killed most of the lichens, leaving the tree trunks sooty and black. Over the past 100 years, the frequency of dark moths has increased to as much as 98% in populations near polluted cities. What type of selection has operated on moths in the polluted areas since 1840?
- A. directional selection
 - B. stabilizing selection
 - C. disruptive selection
 - D. sexual selection
 - E. artificial selection
- 14) Compared with other factors that can alter allele frequencies, mutation rates:
- A. are low, but mutations are the source of genetic variability.
 - B. are so low that they make no difference in nature.
 - C. are so low that they cannot be detected in most populations.
 - D. are less important than genetic drift, but more important than migration.
 - E. are the most significant factor in microevolution.
- 15) A population of Amerindians living in Brazil was surveyed and 10 individuals were found with type M blood (genotype = MM), 180 had type MN blood (genotype = MN), and 810 had type N blood (genotype = NN). What is the frequency of the M allele in this population?
- A. 0.01
 - B. 0.09
 - C. 0.10
 - D. 0.20
 - E. insufficient information is given to calculate.
- 16) If one gene with two codominant alleles (denoted A and B) controls flower color in pansies, and AA individuals have red flowers, AB individuals pink flowers, and BB individuals white flowers, then in matings of pink with pink individuals, on average how many of the offspring will have red, pink, and white flowers, assuming Mendelian segregation:
- A. 25%, 50%, 25%
 - B. 0%, 100%, 0%
 - C. 33.3%, 33.3%, 33.3%
 - D. none of the above is correct
 - E. insufficient information is given to calculate this quantity
- 17) In a large randomly breeding population of lizards, 75% of the individuals at birth have white stripes; 25% do not have white stripes. If this is a genetic trait governed by a single pair of alleles with the allele for white stripes dominant, assuming Hardy Weinberg proportions, the frequency of the allele for no white stripes is
- A. 0.25
 - B. 0.50
 - C. 0.75
 - D. 1.00
 - E. There is no way to estimate.

18) An example of a macroevolutionary event is:

- A. the changing frequency of light to dark moths when the Industrial revolution increased smoke in the environment.
- B. the mass extinction of dinosaurs.
- C. an isolated population of fruit flies grows really large.
- D. a great reduction in population size of salmon due to over fishing.
- E. none of the above is an example of a macroevolutionary event.

19) Which of the following is **not** an example of convergent evolution:

- A. the similar body forms of the marsupial mole and the placental mole.
- B. the wings of Archaeopteryx and a bat.
- C. the body forms of the porpoise and the shark.
- D. the structure of the chimpanzee eye and the human eye.
- E. all of the above are examples of convergent evolution.

20) All living and extinct members of an order of birds called Passeriformes (the perching birds) have a distinctive palate, wing, and foot structure, and these are not found in any other bird species. The presence of these structures in all Passeriformes and no other birds means the structures are _____, and that the order Passeriformes is a _____ group.

- A. synapomorphies, monophyletic
- B. symplesiomorphies, monophyletic
- C. synapomorphies, paraphyletic
- D. symplesiomorphies, paraphyletic
- E. none of the above is correct

21) Natural selection can be most closely equated with

- A. assortative mating
- B. genetic drift
- C. differential reproductive success
- D. bottlenecking of a population
- E. gene flow

22) The oldest known eukaryote fossils occur in the:

- a) Cambrian
- b) Cenozoic
- c) Paleozoic
- d) Mesozoic
- e) Precambrian