

Name:

PS#:

Biol 3306

Exam3

Fall 2011

1. In dance flies, males of some species court females by offering them a nuptial gift (prey insect), others offer an insect wrapped in silk, while in still other species, males offer only a silken balloon (no insect). If this behavior has evolved because of sensory bias, which of the following statements is most likely to be true?

- a) in those species where males present wrapped insects, females should prefer an unwrapped insect more than a wrapped insect
- b) in those species where males present unwrapped insects, female mate choice should not be based on the size of prey the male offers
- c) in those species where males present unwrapped insects, female fecundity should not be affected by the size of prey they receive
- d) in those species where males present unwrapped insects, females should prefer wrapped insects over unwrapped insects
- e) in a phylogeny of dance flies, the species where males only make balloons occur at the base of the tree

2. Which of the following is not a life history character?

- a) mating frequency
- b) age at reproductive maturity
- c) offspring size
- d) clutch size
- e) size at birth

3. Which of the following is a vicariant event?

- a) Re-invasion of Spruce-fir forest into Canada after the retreat of the glaciers
- b) Colonization of the continent of Antarctica after it drifts away from the South Pole
- c) A rise in sea level causes the incursion of brackish water into a marsh
- d) The course of a river alters, cutting its way through a forest
- e) The formation of the island of Hawaii about 500,000 years ago

4. Which of the following is a synapomorphy between humans and apes?

- a) more erect posture
- b) reduced body hair
- c) tool use
- d) precision grip
- e) vegetarian diet

5. In bowerbirds, males build an elaborate horseshoe shaped pile of sticks and twigs, which they decorate with brightly colored objects such as flowers. One male completely destroys another male's bower, although this behavior will increase his own risk of predation. This is a possible example of:

- a) cooperation
- b) altruism
- c) spite
- d) selfishness
- e) none of the above

6. Guppies are small fish that live in freshwater streams. They are distributed throughout northern South America. At the end of the Pleistocene glaciation, sea levels rose, separating the island of Trinidad from mainland South America. If the guppy populations were to undergo a speciation event, it would most likely be:

- a) vicariance speciation through local adaptation
- b) founder event speciation through chance colonization

- c) ecological speciation through disruptive selection
- d) sexual selection-driven speciation through assortative mating
- e) all of the above are possible

7. The Cambrian explosion

- a) occurred approximately 550 million years ago
- b) included most extant and some extinct phyla
- c) is the earliest fossilization of an adaptive radiation
- d) is the earliest fossilization of hard-bodied organisms
- e) all of the above

8. Which of the following is not an example of female mate choice?

- a) females mate with a male that provides a nutritional benefit
- b) females mate with a male that signals his resistance to disease
- c) females mate with the male that wins the fight to monopolize her group
- d) females mate with a male that is preferred by other females
- e) females mate with a male that produces an intense and complex signal

9. In eukaryotic cells, the products of chloroplast genes that have been transferred to the nucleus are directed back to the organelle:

- a) all of the time
- b) only 5% of the time
- c) about 10% of the time
- d) about 50% of the time
- e) never

10. You have artificially selected on several populations of *Drosophila melanogaster* for changes in longevity. In one set of populations, you have succeeded in increasing lifespan by 50% relative to controls. According to the antagonistic pleiotropy hypothesis, in these populations you would also expect to see:

- a) earlier onset of reproduction relative to control populations
- b) greater reproductive output relative to control populations
- c) later onset of reproduction relative to control populations
- d) smaller offspring relative to control populations
- e) larger clutch size relative to control populations

11. In the morphological species concept, species are defined by

- a) monophyly
- b) reproductive isolation
- c) morphological similarity
- d) species recognition
- e) ability to interbreed

12. Which of the following statements about human evolution is true?

- a) tool use evolved before bipedalism
- b) language evolved before a large brain
- c) bipedalism evolved before a large brain
- d) language evolved before tool use
- e) none of the above is true

13. Inclusive fitness has two components:

- a) fitness and inclusive fitness
- b) personal fitness and impersonal fitness
- c) direct fitness and indirect fitness
- d) direct fitness and fitness through helping
- e) direct fitness and inclusive fitness

14. Which of the following was generated by Miller's prebiotic synthesis experiment?

- a) DNA
- b) simple sugars
- c) nitrocellulose
- d) glycoproteins
- e) lipids

15. Which of the following is an indirect benefit of female choice?

- a) nuptial gift
- b) paternal care
- c) foraging territory
- d) sexy sons
- e) lower disease risk

16. Which of the following is important for the vicariance model of speciation?

- a) physical separation
- b) population bottlenecks
- c) secondary contact
- d) natural selection
- e) environmental differences between subdivided populations

17. Name the two evolutionary hypotheses that can explain why organisms senesce (1). Pick one of them, and explain how it works (2). Give an example of this hypothesis you may use a hypothetical organism and/or traits, provided it is realistic (2).

Question 18
Formulae

$$\text{Mean : } \bar{x} = \frac{1}{N} \sum x_i \quad , \quad \text{Variance : } V(x) = \frac{1}{N} \sum (x_i - \bar{x})^2$$

$$\text{Covariance : } \text{COV}(x,y) = \frac{1}{N} \sum (x_i - \bar{x})(y_i - \bar{y})$$

$$V_P = V_G + V_E + \text{COV}_{GE} \quad , \quad w = \alpha + \beta z + (\gamma/2)z^2 \quad , \quad R = h^2 s \quad , \quad h^2 = \frac{V_A}{V_P}$$

$$b = \frac{\text{COV}(x,y)}{V(x)} = \frac{\frac{1}{2}V_A}{V_P} = \frac{1}{2}h^2 \quad , \quad \frac{\text{COV}_{OM}}{V_M} = \frac{\frac{1}{2}V_A}{\frac{1}{2}V_P} = h^2 \quad , \quad V_{\text{Midparent}} = \frac{1}{2}V_P$$

$$rB > C$$

Did you have any problems during the test? Let us know about them here. (Obviously, this is not for credit.)