

BIO 213 Diversity and Ecology
First Exam, Spring 2001

Questions: 50

Time: 1 hour

NOTE:

Don't forget to write your social security number on the answer sheet.

Read the questions carefully, pay particular attention to what is asked of you.

Darken the circle corresponding to the correct answer.

1. Which of the following is TRUE?

- a. Ecologists employ a more reductionist approach to biology than molecular biologists.
- b. The scientific method allows scientists to prove theories.
- c. Science assumes an organized reality.
- d. Only certain species are subject to natural selection.
- e. Ecology refers to a species' interactions with its nonliving environment.

2. In biology, holistic is to reductionist as:

- a. Cell biology is to ecology.
- b. Long time periods are to small time periods.
- c. Small spaces are to large spaces.
- d. a and c
- e. None of the above.

3. Which of the following statements concerning the scientific method is FALSE?

- a. Everything in science is tentative.
- b. The first step in the scientific method is to formulate hypotheses.
- c. Simplifying assumptions must be made.
- d. Theories are hypotheses that have considerable support.
- e. All of the above are true.

4. Which of the following statements is FALSE?

- a. The human population doubles every few hundred years.
- b. Humans use approximately half the solar energy that impinges on the earth.
- c. Mountains, deserts, and the Arctic and Antarctic are the primary areas that humans have yet to exploit.
- d. Human population growth has relied significantly on the use of fossil fuels.
- e. There is a trend towards increasing urbanization and loss of natural habitats.

5. The only evolutionary mechanism that adapts organisms to the environment is:

- a. Natural selection
- b. Genetic drift
- c. Gene flow
- d. Mutation pressure
- e. None of the above

6. Which of the following statements is FALSE?

- a. Diploid gametes come together to form a haploid zygote.
- b. During the formation of gametes there is a reduction division.
- c. Populations consist of interbreeding individuals of the same species.
- d. Gene pools include all alleles of all genes of all individuals in a population.
- e. In diploid organisms, one allele typically comes from the mother while the other comes from the father.

7. The best example of a proximate explanation for a phenomenon is:

- a. Birds migrate south to avoid elevated winter mortality.
- b. Birds migrate south because of a decrease in photoperiod.
- c. Viceroy butterflies are orange because they are mimics of Monarch butterflies.
- d. Wasps and bees have the same coloration because they are Mullerian mimics.
- e. None of the above.

8. Evolution can occur as a direct result of all of the following EXCEPT:

- a. Differential mortality.
- b. The movement of individuals into or out of populations.
- c. Differing forward and backward mutation rates.
- d. Differential reproductive success.
- e. All of the above can result in evolution.

9. Which of the following statements are TRUE?

- a. The wildtype is the genotype most commonly found in the population.
- b. Mutations are the raw source of genetic variation, and most mutations are beneficial.
- c. Development that is canalized is under strong genetic control.
- d. a and b are true.
- e. a and c are true.

10. Which of the following are TRUE?

- a. Most traits are determined partly by genes and partly by the environment.
- b. Heritability describes the degree to which genes determine a phenotypic trait.
- c. Plants generally show more developmental plasticity than animals.
- d. a and b are true.
- e. All of the above are true.

11. Which statement is FALSE?

- a. Group selection arguments focus on traits or behaviors that are “good for the species.”
- b. Bees are Batesian mimics.
- c. A mechanistic explanation for bird migration might involve the pineal eye and “wanderlust.”
- d. The Viceroy butterfly is a Batesian mimic.
- e. Natural selection results from both differential reproductive success and differential survival.

12. Which of the following did NOT first evolve in bacterial lineages?

- a. aerobic respiration
- b. fermentation
- c. photosynthesis
- d. organelles
- e. motility

13. Which provides the proper listing of hierarchical categories in biological classification?

- a. phylum, class, order, family, genus, species
- b. phylum, order, class, family, genus, species
- c. phylum, family, order, class, genus, species
- d. phylum, class, family, order, species, genus
- e. none of the above

14. Which of the following are TRUE?

- a. The green-brown color polymorphism in grasshoppers is an example of directional selection.
- b. With disruptive selection, there are two separate fitness peaks.
- c. With stabilizing selection, there is only one fitness peak.
- d. b and c.
- e. All of the above are true.

15. Which of the following characterizes human population size over time?

- a. Human population size increased quickly initially.
- b. It has reached a peak and is now decreasing.
- c. It has always increased, but growth is slower now than in the past.
- d. It shows sign of reaching an equilibrium.
- e. None of the above.

16. Gecko foot hairs

- a. are 1/10th the diameter of a human hair
- b. are called setae
- c. each toe has about 100,000 of them
- d. each ends in 100 or more tiny spatulae
- e. all of the above are correct

17. Which of the following does not invoke the concept of Darwinian fitness?

- a. Group selection
- b. Stabilizing selection
- c. Directional selection
- d. Disruptive selection
- e. Sexual selection

18. The slope of a regression of body temperature versus ambient temperature ...

- a. is an inverse measure of the degree of thermoregulation
- b. is near one in passive thermoconformers
- c. is near zero in active thermoregulators
- d. varies continuously from near zero to 1 among lizard species
- e. all of the above are correct

19. Which is the correct sequence of biological organization?

- (A) Cells - organs - organisms - communities - populations
- (B) Cells - tissues - organs - organisms - populations
- (C) Organisms - populations - ecosystems - communities
- (D) Cells - organs - organelles - organisms - populations
- (E) Organelles - organs - tissues - organisms - populations

20. Which of the following are terminal branches on phylogenetic trees most likely to represent?

- (A) Clades
- (B) Species
- (C) Fossils
- (D) Shared derived characters
- (E) Communities

21. The zone where air masses converge at the surface of the earth is

- (A) 30° N and S latitude
- (B) The poles
- (C) The equator
- (D) A & C
- (E) Can't say as it varies seasonally

22. Climate can be influenced by

- (A) Latitude
- (B) Topography
- (C) Greenhouse gases
- (D) A & C
- (E) All the above

23. Which of the following is **false** about the Coriolis effect?

- (A) It is minimal at the equator
- (B) It is partly responsible for oceanic current patterns
- (C) Violates the law of conservation of momentum
- (D) It is maximum at the poles
- (E) Causes Easterlies and Westerlies.

24. Continental climates

- (A) Fluctuate more than maritime climates
- (B) are caused by low pressure areas formed inland
- (C) Cause summer thunderstorms
- (D) A, B & C
- (E) A & C only

25. Which of the following is NOT a major clade of lizards?

- (A) Gekkota
- (B) Scleroglossa
- (C) Discoglossa
- (D) Iguania
- (E) Anguimorpha

26. Collision between warm and cool air masses does not involve

- (A) Change in total heat content
- (B) Production of a weather front.
- (C) Upward displacement of warmer air
- (D) Adiabatic temperature changes
- (E) Changes in air pressure

27. Which of the following factors best distinguishes tropical evergreen from tropical thorn forest?

- (A) Average annual temperature
- (B) Average annual precipitation
- (C) Both the above
- (D) Latitude of occurrence
- (E) None of the above

28. Tuna fish and some large reptiles are examples of

- (A) Poikilotherms that are partially endothermic
- (B) Endotherms that are partially poikilothermic
- (C) Homeotherms that are partially ectothermic
- (D) Poikilotherms that are always endothermic
- (E) Endotherms that are always poikilothermic

29. Which of the following is energetically the cheapest activity?

- (A) Running
- (B) Flying
- (C) Dancing
- (D) Swimming
- (E) Burrowing

30. Which of the following can be used to classify organisms?

- (A) Genetic information
- (B) Morphological information
- (C) Anatomical information
- (D) All the above
- (E) Two of the above

31. Critical adaptations in lizard evolution were

- (A) streptostyly
- (B) mesokinesis
- (C) forked tongues
- (D) jaw prehension
- (E) all of the above are correct

32. Evolution is:

- (A) Differential reproductive success between individuals in a population
- (B) Change in allele frequency in a population over time
- (C) Differential survival or reproductive success of individuals in a population due to random chance
- (D) Interaction between individuals in a population and their environment
- (E) The appearance of new taxa in the fossil record

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34. Which of the following is not an **anthropocentric** argument for conserving diversity?

- (A) Diverse communities contain many plants of pharmaceutical value
- (B) Genes from wild organisms may be valuable for improving domestic stock
- (C) Ecological tourism is a great way to earn revenue
- (D) Humans have a moral obligation to conserve nature
- (E) Other species have as much a right to live as we (humans) do

35. The following are all parts of an aquatic organism's external environment except

- (A) Temperature of water
- (B) Food resources available
- (C) Intestinal pH
- (D) Competing species
- (E) Mates

36. The evolutionary relationships between species are represented by their

- (A) Phylogeny
- (B) Ontogeny
- (C) Latin binomial
- (D) Neotype
- (E) Prototype

37. The phrases "survival of the fittest" and "struggle for existence" are misleading when applied to natural selection because

- (A) The fittest don't survive
- (B) Competition does not exist in nature
- (C) Physically strong individuals have the lowest Darwinian fitness
- (D) High survival alone doesn't guarantee high Darwinian fitness
- (E) Natural selection never weeds out strong competitors

38. This evolutionary mechanism results in adaptation to the environment

- (A) Mutation
- (B) Migration
- (C) Genetic drift
- (D) Natural selection
- (E) All of the above

39. Vegetational formations under regimes of low average annual temperature (-5 to -10°C) and high average annual rainfall (> 300 cm) are known as

- (A) Tropical rainforests
- (B) Cold deserts
- (C) Taiga
- (D) Tundra
- (E) Do not exist

40. Brown and green coloration in grasshoppers in response to moisture content of plant food:

- (A) is an example of environmentally induced polymorphism
- (B) needs to have an underlying genetic basis to be subject to selection
- (C) is an example of group selection
- (D) A & B
- (E) B & C

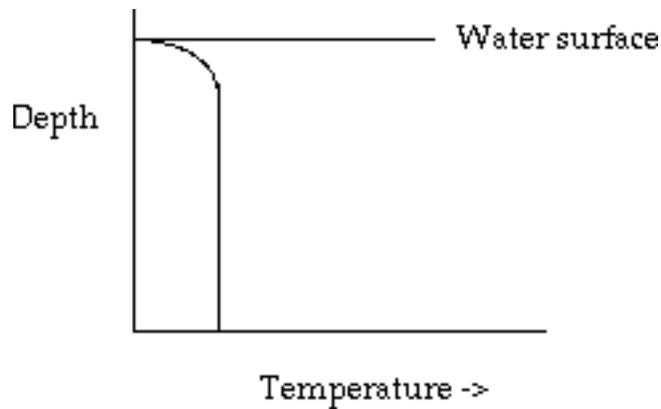
41. Differences between soil surface- and atmospheric temperatures are least

- (A) At midnight
- (B) After sunrise
- (C) At noon
- (D) Before noon
- (E) After midnight

42. Actual and potential evapo-transpiration amounts are most likely to resemble each other when the atmospheric humidity is

- (A) 10%
- (B) 25%
- (C) 50%
- (D) 75%
- (E) 95%

43.



The above bathythermograph may characterize a temperate lake during

- (A) The summer
- (B) Early fall
- (C) Late fall
- (D) Winter
- (E) Spring

44. Cold dry air

- (A) Descends at the horse latitudes
- (B) Warms adiabatically as it is compressed
- (C) Is partly responsible for arid climates
- (D) Can cause severe weather fronts in continental climates
- (E) All of these

45. Differences between soil surface- and atmospheric temperatures are least

- (A) At midnight
- (B) After sunrise
- (C) At noon
- (D) Before noon
- (E) After midnight

46. The following factors help in soil-formation

- (A) climate
- (B) parent materials
- (C) topography
- (D) water
- (E) All of the above

47. Maintaining a stable internal state under a wide range of external environmental conditions is a fundamental principle called

- (A) Inertia
- (B) Canalization
- (C) Plasticity
- (D) Homeostasis
- (E) Homeothermy

48. The horned lizard *Phrynosoma* appears to occupy the same niche in American deserts that the agamid lizard *Moloch* does in Australian deserts. What would you call this pair of species?

- (A) Ecological equivalents
- (B) Sympatric
- (C) Closely related
- (D) Competitors
- (E) None of the above

49. The way geckos scale smooth vertical surfaces is by

- (A) suction
- (B) electrostatic attraction
- (C) sticky glue
- (D) Van der Waals subatomic forces
- (E) all of the above

50. Which of the following questions about reproduction would an evolutionary biologist be most interested in?

- (A) Hormone levels during the breeding season
- (B) Neurophysiological basis behind mate choice
- (C) Why females prefer brightly colored males
- (D). A & B
- (E) A & C