

**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)  $30^{\circ}$  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

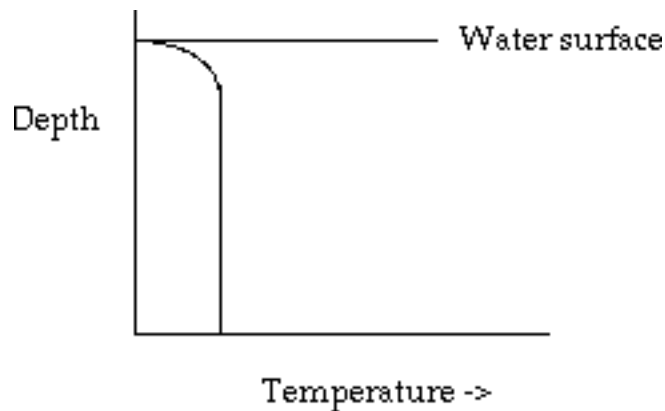
41. Differences between soil surface- and atmospheric temperatures are least

- (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
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- (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