Chapter 2 Test Bank Questions

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Multiple Choice

1. Peppered moths (*Biston betularia*) vary in color from place to place. Is the variation within these populations heritable?
    a. No, variation within this species is not heritable
    b. Yes, the trait is the same in all populations which allows any moth to change from white to black at any given time
    c. Yes, this trait is heritable and is selected for or against depending on the environment
    d. No, variation is not heritable because reproduction does determine the color morph.

    ANSWER: C

    Difficulty: Medium

    Bloom Code: Synthesis

    Reference: Section 2.2

2. Natural selection involves three main components. They include:
    a. Heritability, differential survival, and differential reproduction
    b. Sexual selection and differential reproduction
    c. Survival and speciation
    d. None of the above

    ANSWER: A

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.1

3. Which scientist devised an orderly system for naming different organisms?
    a. Charles Darwin
    b. Ernst Mayr
    c. Carl Linnaeus
    d. Alfred Russell Wallace

    ANSWER: C

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: Section 2.1

4. A breeder is interested in producing an amelanistic morph of a bird species she breeds. Is this natural selection?
    a. Yes, because she is selecting for a beneficial trait
    b. No, because natural selection is a process driven by the natural environment, not humans
    c. Yes, because the species will experience differential reproductive success
    d. None of the above

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: Section 2.1

5. Two populations of deer are found in a mountainous habitat. These two populations look very similar. Also, there is observed mating between them that results in viable offspring. Do you think that these two populations have diverged into two species?

a. Yes, they have been separated by mountain barriers and their is no exchange of genetic material
b. Yes, because the two populations are allopatric
c. No, because the two populations are sympatric
d. No, because there is observed mating between them that results in viable offspring

ANSWER: D

Difficulty: Hard

Bloom Code: Synthesis

Reference: 2.3

6. A male bullfrog (Rana catesbeianus) is found to mate with more females and produce more offspring than any other male in a pond being studied. What would you say about this bullfrog's fitness?
   a. This males fitness is low compared to all other males in the pond
   b. This males fitness is intermediate compared to other males in the pond
   c. This males fitness is the highest of all other males sampled in the pond
   d. This male must have the loudest vocalization and be most aggressive

   ANSWER: C

   Difficulty: Medium

   Bloom Code: Application

   Reference: 2.2

7. Two adjacent populations of a species of deer may not diverge completely if:
   a. There is migration between populations, but no exchange of genetic material
   b. There is no migration

c. There are reciprocal transplants
d. There is migration between populations, and an exchange of genetic material

ANSWER: D

Difficulty: Medium

Bloom Code: Comprehension

Reference: 2.2

8. A student wants to test if a sessile species of a marine invertebrate (*Actinia tenebrosa*) grows differently in size and survives differently in a new environment where the water temperature and salinity are considerably different than where this organism typically grows. What type of experiment would allow this student to test for the local adaptation of this species?
    a. A reciprocal transplant study
    b. A cross correlation translocation study
    c. A model study
    d. A translocation approximation study

    ANSWER: A

    Difficulty: Medium

    Bloom Code: Application

    Reference: 2.2

9. What type of experiment takes organisms from a variety of sources and rears them under the same conditions?
    a. Reciprocal transplant experiment
    b. Common garden experiment
    c. Natural history experiment
    d. All of the above

    ANSWER: B

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.2

10. During the industrialization of England, a species of moth developed what is known as industrial melanism. What does this term refer to?
    a. It is a phenomenon where a species rapidly changes colors in response to the environment
    b. It is a phenomenon where a black or blackish form of a species reaches a high frequency in a population due to soot pollution from industrialism
    c. The phenomenon illustrates that species that are dark in color are being selected against in an industrial area
    d. None of the above

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Application

    Reference: 2.2

11. You learn that many plants are chemically defended and that herbivorous predators have developed resistance to many of these plant defenses. However, it appears that plants have responded to herbivore resistance by producing more chemical defenses, which in turn deters some herbivores. Evidently, this process has occurred many times over the last millions of years. This is an example of:
    a. Reciprocal transplantation
    b. Co-evolution
    c. Allopatric speciation
    d. Mutualism

    ANSWER: B

Difficulty: Medium

Bloom Code: Analysis

Reference: 2.2

12. A recent examination of two geographically isolated populations of mountain sheep indicates there has been long-standing separation between the two populations. An analysis shows that the two populations are actually different species. What type of speciation likely occurred?
    a. Sympatric
    b. Allopatric
    c. Endemic
    d. Syntopic

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Analysis

    Reference: 2.2

13. Darwin's finches are often used as examples of what?
    a. Human selection for unique bird breeds
    b. Evolution on islands via allopatric speciation
    c. Limited gene flow that resulted in hybrid species
    d. Island biogeography

    ANSWER: B

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.3

14. Present day distribution patterns of plants and animals are primarily due to:
    a. Changes in climate, particularly during the ice ages of the Pleistocene.
    b. Reciprocal transplantation
    c. Co-evolving relationships
    d. Island speciation events

    ANSWER: A

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.3

15. What type of evolution is described as the process whereby organisms that do not share a recent common ancestor evolve similar traits as a result of having to adapt to similar environments or ecological niches?
    a. Convergent evolution
    b. Allopatric speciation
    c. Parallel evolution
    d. Sympatric speciation

    ANSWER: A

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.5

16. You are at a museum and observe that the wing of a preserved bat resembles the wing of nearby preserved bird. You hypothesize that
    a. The structures are similar superficially in form and are therefore analogous because they did not share a recent common ancestor
    b. The structures are similar superficially in form, the wings are homologous structures

c. The structures are homologous and are therefore derived from an equivalent structure in a shared common ancestor
d. The structures are analogous and are therefore derived from an equivalent structure in a shared common ancestor

ANSWER: A

Difficulty: Hard

Bloom Code: Synthesis

Reference: 2.5

17. You take a research trip to Australia and observe that the wombat appears to be a similar looking species to a ground hog you have studied in North America. These two species have evolved in separate, but climatically similar environments, and they have developed closely corresponding adaptive features. This is a clear example of:
    a. Convergent evolution
    b. Environmental speciation
    c. Parallel evolution
    d. Allopatric speciation

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: 2.5

18. You collect individuals from a species of salamanders from several localities across an elevational transect ranging from sea level to approximately 2000 meters above sea level. The salamanders collected from 2000 meters above sea level develop the fastest, whereas those from sea level and intermediate sites developed more slowly. This is an example of:
    a. Hybridization

b. Counter gradient variation
c. Sympatric speciation
d. Allopatric speciation

ANSWER: B

Difficulty: Medium

Bloom Code: Application

Reference: 2.2

19. While you're walking your dog, you observe two snails interacting on a turf of grass. You recognize that they are two separate species. The two individuals are attempting to mate, but the direction of the turn in the shell prevents the two species from successfully mating. This is an example of:
    a. Allopatric speciation
    b. Novel speciation
    c. A pre-zygotic barrier
    d. A post-zygotic barrier

ANSWER: C

Difficulty: Medium

Bloom Code: Application

Reference: 2.3

20. Which term refers to speciation where there is both an ecological source of divergent selection and a means of reproductive isolation?
    a. Allopatric speciation
    b. Ecological speciation
    c. Sympatric speciation
    d. Ecological and sympatric evolution

ANSWER: B

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.3

21. Several finches from the mainland of South America fly to a Pacific Island archipelago and colonize the first island they get to. Over time, individuals on this island fly to a nearby island and colonize it. This process occurs repeatedly and over evolutionary time each colonizing bird becomes its own species due to distinct ecological and environmental processes taking place on each island. What type of speciation best describes this example?
    a. Lamarckian speciation
    b. Allopatric speciation
    c. Sympatric speciation
    d. Ecological

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Analysis

    Reference: 2.3

22. Mitochondrial DNA was used as genetic evidence to determine that two fish species in Lake Apoyo evolved as a result of a sympatric speciation process. Mitochondrial DNA is:
    a. DNA that is passed down to females only
    b. DNA that is passed down maternally
    c. DNA that is passed down paternally
    d. None of the above

    ANSWER: B

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.3

23. A seismic event occurs, splitting a population of wolves in two. One half of the population is now exposed to a very mountainous and rocky habitat with much snow, while the other half of the population is left to live in a wooded forest habitat. After thousands of generations, another seismic event occurs and the population of wolves is now able to be one again. However, they will no longer mate with one another. This is an example of:
    a. Allopatric speciation
    b. Sympatric speciation
    c. Hybridization
    d. None of the above.

    ANSWER: A

    Difficulty: Hard

    Bloom Code: Synthesis

    Reference: 2.3

24. A plant species is found on the mainland of Africa and a migratory bird species feeds on its seeds. These birds arrive on an island, defecate, and leave the seeds on this island. Let us assume the seeds will germinate. Over evolutionary time, what may become of these plants on the island?
    a. Nothing, because they are sterile
    b. They may evolve into endemic species since they are isolated from individuals of the original species on the mainland
    c. They will experience sympatric evolution with the original plants on the island
    d. Nothing, because they will never be able to exchange genetic material with the mainland population

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Analysis

    Reference: 2.3

25. Norfolk Island, located approximately 700 km from New Caledonia and New Zealand is an island where many endemic species have evolved. If more species in a group found on that island were better dispersers then you would expect:
    a. Those groups to have a lower proportion of endemic species
    b. Those groups to have a higher proportion of endemic species
    c. Those groups to be all endemics on New Caledonia
    d. Those groups to be all endemics on New Zealand

    ANSWER: A

    Difficulty: Hard

    Bloom Code: Evaluation

    Reference: 2.3

26. You learn that two species of fish co-occurring in a lake evolved into different species because of divergent specialization on bottom- or open water - feeding behaviors. This is a remarkable example of what type of speciation?
    a. Rapid environmental speciation, because the environment drove the speciation event
    b. Sympatric speciation because the two fish lived in sympatry during the process of speciation
    c. Speciation dominated by a chance event, where the chromosome number randomly doubled
    d. Allopatric speciation, because the two fish were separated by the water.

    ANSWER: B

    Difficulty: Medium

    Bloom Code: Analysis

    Reference: 2.3

27. Changes in temperature in the North Sea over the past million years caused changes in sea level that:
    a. Prevented the dispersal of animals and plants between land masses
    b. Caused almost all animals to go extinct
    c. Allowed for dispersal of both plants and animals between land masses
    d. None of the above

    ANSWER: C

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.4

28. As Gondwanaland broke up, bands of vegetation developed nearly 100 million years later. Forty million years later distinct vegetation and climate were established. From when Gondwanaland began to break up, which process do you think most likely unfolded?
    a. Ecological speciation
    b. All organisms evolved into unique species as a result of sympatric speciation
    c. No speciation likely occurred
    d. No process likely started because that is not enough time for any species to evolve

    ANSWER: A

    Difficulty: Hard

    Bloom Code: Synthesis

    Reference: 2.4

29. The evolution of which two groups is an example of parallel evolution?
    a. Bacteria and viruses

b. Placental and marsupial mammals
c. All vertebrate and invertebrate organisms
d. Plants and animals

ANSWER: B

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.5

Multiple Select

30. Some individuals make disproportionately large contributions to subsequent generations, and thus determine the direction of evolution. Which of the following would contribute to this process?
    a. Individuals that were best able to survive the risks and hazards of the environment in which they were raised
    b. Individuals that were able to survive the environment and successfully reproduce
    c. Individuals that were able to mate the most
    d. All of the above

    ANSWER: A, B

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.1

31. Which two scientists derived the theory of evolution by means of natural selection?

a. Ernst Haeckel
b. Charles Darwin
c. Alfred Russel Wallace
d. Carl Linnaeus

ANSWER: B, C

Difficulty: Easy

Bloom Code: Knowledge

Reference: Section 2.1

32. The theory of evolution by means of natural selection relies on what established truths?
a. Variation is heritable
b. There is differential reproductive success
c. Individuals of a population of species are not identical
d. All individuals are favored by natural selection

ANSWER: A, B, C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.1

33. Evolution will force population characteristics to diverge from one another only if:
a. There is no genetic variation
b. There is sufficient heritable variation
c. Selection is strong enough to counteract mixing and hybridization
d. There are reciprocal allopatric transplants

ANSWER: B, C

Difficulty: Medium

Bloom Code: Application

Reference: 2.2

34. Ecological speciation is comprised of which components:
    a. Differing environments or ecological interactions that select for local adaptation
    b. A means of reproductive isolation
    c. Hybridization
    d. All of the above

    ANSWER: A, B

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.3

35. A ring species evolves due to a process of speciation that unfolds when:
    a. There are distinct forms of a species (subspecies) that are capable of producing fertile hybrids
    b. Subspecies are arranged across a temperature gradient
    c. Subspecies are arranged along a geographic gradient
    d. The arrangement of the ring species is such that the two ends of the gradient themselves meet and where they do those individuals do not interbreed.

    ANSWER: A, C, D

    Difficulty: Hard

    Bloom Code: Synthesis

    Reference: 2.3

36. Island endemics evolve because they:
    a. Can exchange genetic material with mainland species
    b. Are isolated from individuals of the mainland species

c. Do not have gene flow with mainland species
d. They do not hybridize with other species

ANSWER: B, C

Difficulty: Medium

Bloom Code: Analysis

Reference: 2.3

37. As climate has changed over evolutionary time scales, different organisms have responded by:
    a. Advancing their range
    b. Becoming fragmented into isolated patches
    c. Retreating their range
    d. Eventually rejoining after being fragmented

ANSWER: A, B, C, D

Difficulty: Medium

Bloom Code: Comprehension

Reference: 2.4

38. Since the peak of the last glaciation, global temperatures have risen by about 8 degrees Celsius. Pollen records indicate:
    a. All flora have responded the same by expanding their range
    b. Some tree species have retreated their range
    c. Some tree species have expanded their range
    d. That trees were not expanding or contracting their range

ANSWER: B, C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.4

Fill in the Blank

39. The theory of evolution by means of natural selection establishes that individuals of a population of species are not _____.
    a. Sympatric
    b. Identical
    c. Siblings
    d. All of the above

    ANSWER: B

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: Section 2.1

40. The change, over time, in the heritable characteristics of a population of species is known as _____?
    a. Speciation
    b. Natural Selection
    c. Allopatric speciation
    d. Evolution

    ANSWER: D

    Difficulty: Hard

    Bloom Code: Synthesis

    Reference: Section 2.1

41. Which term refers to a trait that has a genetic basis and is capable of being passed down to subsequent generations?

a. Evolution
b. Fitness
c. Heritable
d. Speciation

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.1

42. The term _____ refers to the success of individuals in the population to leave descendants in an environment relative to others.
a. Fitness
b. Speciation
c. Evolution
d. Natural selection

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.1

43. _____ structures are similar in superficial form or function.
a. Analogous
b. Homologous
c. Sympatric
d. Synonymous

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.5

44. A structure that is derived from an equivalent structure in a common ancestor is called _____.
    a. Homologous
    b. Synonymous
    c. Analogous
    d. Divergent

    ANSWER: A

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.2

45. A zebra was bred in captivity with a horse. The resulting offspring were all sterile. This can be thought of as a _____
    a. Sympatric species
    b. Allopatric species
    c. Post-zygotic barrier
    d. None of the above

    ANSWER: C

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.3

46. There is a species of bird called the Island Scrub Jay found only on the island of Santa Cruz in the Channel Islands off the coast of California. This species of bird is thus _____ to the Channel Islands.
    a. Cosmopolitan

b. Extinct
c. Endemic
d. Endogenous

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.3

47. The distribution of a subspecies of salamanders *Ensatina eschscholtzii*, is known as _____.
    a. An island endemic
    b. A sympatric species
    c. A ring species
    d. None of the above

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 2.3

48. Speciation is _____.
    a. A process that happens instantaneously
    b. An event that happens as soon as offspring are born
    c. A gradual process that happens over evolutionary time
    d. An event that happens when hybridization occurs

ANSWER: C

Difficulty: Medium

Bloom Code: Application

Reference: 2.3

49. Human-caused global warming due to the greenhouse effect is _____ than postglacial warming.
    a. Nearly 100 times faster
    b. An event that only just started and appears to have a slightly greater effect
    c. Nearly 500 times faster
    d. Approximately 1000 times slower

    ANSWER: A

    Difficulty: Easy

    Bloom Code: Knowledge

    Reference: 2.4

50. If a structure is superficial in form or function and is not derived from a common ancestor it is _____. However, if the structure is derived from an equivalent structure in a common ancestor it is considered _____.
    a. Homologous, analogous
    b. Analogous, convergent
    c. Approximately 1000 times slower
    d. Analogous, homologous

    ANSWER: D

    Difficulty: Medium

    Bloom Code: Comprehension

    Reference: 2.4