# Bio-10-Q2W2-Qs.Bank-Evolution

## **True/False**

Indicate whether the statement is true or false.

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- 1. H.M.S. *Beagle*, upon which Charles Darwin served as naturalist, set sail on a collecting and mapping expedition in 1831.
- \_\_\_\_\_ 2. The environments that Darwin studied exhibited little biological diversity.
- 3. By careful anatomical study, Darwin found that the many species of plants and animals on the Galápagos Islands were unique and bore no relation to species seen in other parts of the world.
- \_\_\_\_\_ 4. The tortoises of the Galápagos Islands are among the largest on Earth.
- 5. After returning to England, Darwin studied his collections for 10 years.
- \_\_\_\_\_ 6. Darwin named the process by which evolution proceeds *artificial* selection.

## Completion

Complete each statement.

- 7. \_\_\_\_\_ can occur only when either interbreeding or the production of fertile offspring is prevented among members of a population.
- 8. \_\_\_\_\_\_ occurs when formerly interbreeding organisms are prevented from producing fertile offspring.
- 9. Polyploid speciation is perhaps the fastest form of speciation because it results in immediate
- 10. The hypothesis that species originate through a slow buildup of new adaptations is known as
- 11. This hypothesis is supported by evidence from the \_\_\_\_\_ record.
- 13. The evolution of an ancestral species into an array of species that occupy diverse habitats is called
- 14. Any structure that is reduced in function in a living organism but may have been used in an ancestor is known as a(n) \_\_\_\_\_\_.
- 15. The concept that evolution occurs over long periods of stability that are interrupted by geologically brief periods of change is known as \_\_\_\_\_\_.
- 16. \_\_\_\_\_\_ is a mechanism for change in a population in which organisms with favorable variations live, reproduce, and pass on their favorable traits.
- 17. Any species with a multiple set of chromosomes is known as a(n) \_\_\_\_\_\_.
- 18. \_\_\_\_\_\_\_ is the type of selection that favors average individuals in a population.
- 19. The alteration of allelic frequencies by chance processes is known as \_\_\_\_\_\_.
- 20. The \_\_\_\_\_\_\_ is the percentage of a particular allele in a population.

- 21. The total number of genes present in a population is the \_\_\_\_\_
- 22. A variety of structural adaptations called \_\_\_\_\_\_ provides protection for an organism by copying the appearance of another species.
- 23. A structural adaptation enabling an organism to blend in with its environment is \_\_\_\_\_\_
- 24. \_\_\_\_\_\_ is a technique in which the breeder selects particular traits.

#### Essay

- 25. What happened to the ancestor of the honeycreeper when it left the mainland and encountered the diverse niches of Hawaii?
- 26. What is adaptive radiation?
- 27. Adaptive radiation is one example of divergent evolution. When does divergent evolution occur?
- 28. When will convergent evolution occur?

### **Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- 29. Hawaiian honeycreepers are a group of birds with similar body shape and size. However, they vary greatly in color and beak shape. Each species occupies its own niche and is adapted to the foods available in its niche. The evolution from a common ancestor to a variety of species is an example of \_\_\_\_\_.
  - a. divergent evolution c. vegetative propagation
  - b. cross-pollination d. convergent evolution
- 30. The flying squirrel of North America closely resembles the flying phalanger of Australia. They are similar in size and have long, bushy tails and skin folds that allow them to glide through the air. The squirrel is a placental mammal, while the phalanger is a marsupial. These close resemblances, even though genetically and geographically separated by great distances, can best be explained by \_\_\_\_\_.
  - a. convergent evolution c. spontaneous generation
  - b. divergent evolution d. vestigial structures
- 31. Within a decade of the introduction of a new insecticide, nearly all of the descendants of the target pests were immune to the usual-sized dose. The most likely explanation for this immunity to the insecticide is that
  - a. eating the insecticide caused the bugs to become resistant to it
  - b. eating the insecticide caused the bugs to become less resistant to it
  - c. it destroyed organisms that cause disease in the insects, thus allowing them to live longer
  - d. the pests developed physiological adaptations to the insecticide
  - \_\_\_\_\_ 32. Natural processes such as speciation and gradualism provide the genetic basis for \_\_\_\_\_\_.
    - a. evolution c. biogenesis
    - b. spontaneous generation d. sexual reproduction
- 33. Structures that have a similar evolutionary origin and structure but are adapted for different purposes, such as a bat wing and a human arm, are called \_\_\_\_\_.
  - a. embryological structures c. homologous structures
  - b. analogous structures d. homozygous structures
- \_\_\_\_\_ 34. Natural selection can best be defined as the \_\_\_\_\_.
  - a. survival of the biggest and strongest organisms in a population
  - b. elimination of the smallest organisms by the biggest organisms

	c. survival and reproduction of the organisms that occupy the largest area							
	environment							
 35.	A pattern of evolution that results when two unrelated species begin to appear similar because of							
	environmental conditions is							
	a. disruptive selection	с.	directional selection					
	b. convergent evolution	d.	divergent evolution					
 36.	The average individuals of a population are fav	orec	d in selection.					
	a. directional	с.	disruptive					
	b. stabilizing	d.	natural					
 37.	In selection, individuals with both extrem	ne f	orms of a trait are at a selective advantage.					
	a. directional	C.	disruptive					
	b. stabilizing	d.	natural					
 38.	selection favors one extreme form of a tr	rait	in a population.					
	a. Directional	C.	Disruptive					
	b. Stabilizing	d.	Natural					
 39.	What is the movement of genes into and out of	a ge	ene pool called?					
	a. random mating	c.	gene flow					
	b. nonrandom mating	d.	direct evolution					
 40.	Which of the following lines of evidence for ev	olut	tion is indirect?					
	a. pesticide resistance	с.	fossils					
	b. observed allele frequency changes	d.	all of these					
 41.	Which answer BEST shows an animal's adapta	tion	to the tropical rain forest?					
	a. camouflage in a tree frog	c.	an elephant's long trunk					
	b. the long neck of a giraffe	d.	migration of birds in winter					
 42.	A mechanism of Darwin's proposed theory is _							
	a. artificial selection	c.	variation					
	b. evolution	d.	all of these					
 43.	The founder of modern evolution theory is cons	side	red to be					
	a. Charles Darwin	c.	Stephen Jay Gould					
	b. Alexander Oparın	d.	Lynn Margulis					
 44.	Upon close examination of the skeleton of an a	dult	python, a pelvic girdle and leg bones can be observed.					
	These features are an example of							
	a. artificial selection	c.	vestigial structures					
	b. homologous structures	d.	comparative embryology					
 45.	Which combination of characteristics in a popu	latio	on would provide the greatest potential for evolutionary					
	change?							
	a. small population, few mutations	C.	large population, few mutations					
	b. small population, many mutations	d.	large population, many mutations					
 46.	The theory of continental drift hypothesizes that	t Af	frica and South America slowly drifted apart after once					
	being a single landmass. The monkeys on the ty	wo c	continents, although similar, show numerous genetic					
	differences. Which factor is probably the most	ımp	ortant in maintaining these differences?					
	a. comparative anatomy	С.	geographic isolation					
. –	b. comparative embryology	a.	Tossii records					
 47.	Which of the following is <u>not</u> a factor that caus	es c	hanges in the allelic frequencies of individuals in a					
	population?	0	random salastion					
	a. statistical selection	С. Л	random selection					
	o. unectional selection	u.	distuptive selection					

48. When checking shell color for a species of snail found only in a remote area seldom visited by humans, scientists discovered the distribution of individuals that is shown in the graph in Figure 15-1. Based on the information shown in the graph, the snail population is undergoing \_\_\_\_\_.

d.



#### Figure 15-1

a. stabilizing selection

b. disruptive selection

- c. artificial selection
  - directional selection
- 49. What type of adaptation is shown in Figure 15-4?



- Figure 15-4
- a. mimicry
- b. camouflage

- c. artificial selection
- d. homologous structure
- 50. The structures shown in Figure 15-5 are \_\_\_\_\_



- Figure 15-5
- a. homologous
- b. heterologous

- c. analogous
- d. vestigial



\_\_\_\_\_ 51. Which type of natural selection showed in Figure 15-6 favors average individuals?

a.	A	с.	С
b.	В	d.	D

- 52. Which type of natural selection shown in Figure 15-6 would favor giraffes that need to reach the tallest branches to eat?
  - a. A c. C b. B d. D
  - \_ 53. Why might the beak of the Akialoa, pictured in Figure 15-7, developed this way?





- a. to reach nectar in flowers
- b. to dig through tree bark for insects
- c. to scoop up fish
- d. to crack open seeds

# Short Answer

54. How do changes in genetic equilibrium lead to speciation?

- 55. List and describe the indirect evidence available to support the theory of evolution.
- 56. What direct evidence is available to support the theory of evolution?
- 57. How is Darwin's theory of evolution by natural selection related to the origin of structural and physiological adaptations?
- 58. Summarize Darwin's theory of evolution by natural selection.



- 59. A study of the squirrel population in a large northern city revealed that many of the squirrels inhabited large park areas that were also populated by numerous squirrel predators. The graph in Figure 15-2 reflects the data collected in regard to color and number of squirrels. Explain how this type of disruptive selection can lead to the separation of this population into two distinct species.
- 60. A study of the squirrel population in a large northern city revealed that many of the squirrels inhabited large park areas that were also populated by numerous squirrel predators. The graph in Figure 15-2 reflects the data collected in regard to color and number of squirrels. Explain why the light- and dark-colored squirrels might be selected for and the medium-colored squirrels selected against.

A biologist studying a variety of fly in the rain forest noticed that the types of foods the fly preferred were located either high in the trees or in the foliage on the ground. There didn't seem to be any of the preferred foods anywhere in between. An experiment was designed that would select for a genetically determined behavior known as <u>geotaxis</u>. If a fly shows positive geotaxis, it flies downward. If a fly shows negative geotaxis, it flies upward. To conduct the experiment, the flies being studied were marked and placed in a maze (illustrated in Figure 15-3). Each fly was placed in the "start" chamber. To exit from this area, the fly had to make a decision about which of the three exits to enter. One exit faced upward, indicating negative geotaxis, and another exit aimed downward, indicating positive geotaxis. A third exit permitted the fly to remain on middle ground. Each fly was placed in the maze 15 times and its choice of direction recorded. Some flies consistently went upward and entered the food vial at the end of the exit tube. Others consistently went downward and entered the food vial at the lower end. Some flies chose the upward and downward exits equal numbers of times; others went for the middle exit.



Figure 15-3

- 61. What might eventually happen if, in the wild, the flies developed into two populations with one showing positive geotaxis and the other showing negative geotaxis? Refer to Figure 15-3.
- 62. What might be acting in the flies' environment to select for flies that do not exhibit a distinct preference for flying upward at every trial or downward at every trial? Refer to Figure 15-3.
- 63. Referring to Figure 15-3, describe what would be happening to the frequency of the allele for negative geotaxis in the above question.
- 64. If the selection of direction is a genetic trait, what should happen when flies consistently selecting the upward exit are mated and those selecting the downward exit are mated, and the "no preference" and middle choice flies are discarded? Refer to Figure 15-3.
- 65. What type of selection pressure is operating in this experiment? Use Figure 15-3 to explain your answer.
- 66. In terms of evolution and natural selection, why would the researcher suspect that the flies being studied would show geotaxis? Refer to Figure 15-3.

# **Bio-10-Q2W2-Qs.Bank-Evolution** Answer Section

## **TRUE/FALSE**

1.	ANS:	Т	PTS:	1
2.	ANS:	F	PTS:	1
3.	ANS:	F	PTS:	1
4.	ANS:	Т	PTS:	1
5.	ANS:	F	PTS:	1
6.	ANS:	F	PTS:	1

# COMPLETION

7.	ANS:	Speciation								
8.	PTS: ANS:	1 Reproductive isolation								
9.	PTS: ANS:	1 reproductive isolation	1 reproductive isolation							
10.	PTS: ANS:	1 gradualism								
11.	PTS: ANS:	1 fossil								
12.	PTS: ANS:	1 punctuated equilibriu	1 punctuated equilibrium							
13.	PTS: ANS:	1 adaptive radiation								
14.	PTS: ANS:	1 DIF: vestigial structure	В	OBJ:	15-6	NAT: C6   F4   G1				
15.	PTS: ANS:	1 DIF: punctuated equilibriu	B m	OBJ:	15-3	NAT: C3   G1   G3				
16.	PTS: ANS:	1 DIF: Natural selection	В	OBJ:	15-5	NAT: C6   F4   G1				
17.	PTS: ANS:	1 DIF: polyploid	В	OBJ:	15-1	NAT: C3   C6   G3				
	PTS:	1 DIF:	В	OBJ:	15-5	NAT: C6   F4   G1				

		e						
19.	PTS: ANS:	1 genetic drift	DIF:	В	OBJ:	15-4	NAT:	C2   C4   G1
20.	PTS: ANS:	1 allelic frequen	DIF: icy	В	OBJ:	15-5	NAT:	C6   F4   G1
21.	PTS: ANS:	1 gene pool	DIF:	В	OBJ:	15-5	NAT:	C6   F4   G1
22.	PTS: ANS:	1 mimicry	DIF:	В	OBJ:	15-4	NAT:	C2   C4   G1
23.	PTS: ANS:	1 camouflage	DIF:	В	OBJ:	15-2	NAT:	C3   C6   F4
24.	PTS: ANS:	1 Artificial selec	DIF: ction	В	OBJ:	15-2	NAT:	C3   C6   F4
	PTS:	1	DIF:	В	OBJ:	15-5	NAT:	C6   F4   G1

# ESSAY

25. ANS:

Speciation occurred, with each species adapting to a different food source.

PTS: 1

18. ANS: Stabilizing selection

26. ANS:

the process of evolution of an ancestral species into an array of species that occupy different niches

- PTS: 1
- 27. ANS:

It occurs when species begin to adapt to different environments and change according to the pressures of natural selection.

PTS: 1

28. ANS:

when unrelated organisms occupy similar environments and face similar selection pressures

PTS: 1

### MULTIPLE CHOICE

29.	ANS: A	PTS: 1	DIF: B	OBJ:	15-6
	NAT: C6   F4   G1				
30.	ANS: A	PTS: 1	DIF: B	OBJ:	15-6
	NAT: C6   F4   G1				

31.	ANS: D	PTS:	1	DIF:	В	OBJ:	15-2
32	NAT: $C3   C6   F4$ ANS: A	ΡΤS	1	DIF	B	OBI-	15-2
52.	NAT: C3   C6   F4	115.	1	DII.	D	0.000	10 2
33.	ANS: C	PTS:	1	DIF:	В	OBJ:	15-3
	NAT: C3   G1   G3				_		
34.	ANS: D NAT: $C3   C6   G3$	PTS:	1	DIF:	В	OBJ:	15-1
35.	ANS: B	PTS:	1	DIF:	В	OBJ:	15-6
	NAT: C6   F4   G1						
36.	ANS: B	PTS:	1	DIF:	В	OBJ:	15-4
37	NAT: $C_2   C_4   G_1$	ΡΤς	1	DIF	В	OBI	15-4
57.	NAT: C2   C4   G1	115.	1	DII.	D	ODJ.	15 4
38.	ANS: A	PTS:	1	DIF:	В	OBJ:	15-4
20	NAT: C2   C4   G1	DTC	1	DIE	D	ODI	15 4
39.	ANS: C NAT: $C2   C4   G1$	PTS:	1	DIF:	В	OB1:	15-4
40.	ANS: C	PTS:	1	DIF:	В	OBJ:	15-3
	NAT: C3   G1   G3						
41.	ANS: A	PTS:	1	DIF:	В	OBJ:	15-2
12	NAT: $C3   C6   F4$	ρτς.	1	DIE	в	OBI-	15-1
72.	NAT: C3   C6   G3	115.	1	DII.	D	ODJ.	15-1
43.	ANS: A	PTS:	1	DIF:	В	OBJ:	15-1
	NAT: C3   C6   G3	DTTG	1	DIE	D	ODI	15.0
44.	ANS: C NAT: $C3   G1   G3$	PTS:	1	DIF:	В	OBJ:	15-3
45.	ANS: B	PTS:	1	DIF:	В	OBJ:	15-5
	NAT: C6   F4   G1						
46.	ANS: C	PTS:	1	DIF:	В	OBJ:	15-5
17	NAI: C6   F4   GI	ρτς.	1	DIE	В	OBI	15 5
47.	NAT: C6   F4   G1	115.	1	DII.	D	ODJ.	15-5
48.	ANS: D	PTS:	1	DIF:	В	OBJ:	15-4
	NAT: C2   C4   G1				_		
49.	ANS: B NAT: $C3 \mid C6 \mid E4$	PTS:	1	DIF:	В	OBJ:	15-2
50	ANS: C	<b>PTS</b> ∙	1	DIF∙	В	OBI <sup>,</sup>	15-3
20.	NAT: C3   G1   G3	115.		DII.	D	0.201	10 0
51.	ANS: A	PTS:	1	DIF:	А	OBJ:	15-4
50	NAT: C2   C4   G1	DTG	1	DIE	٨		15 4
52.	AINS: $C$ NAT: $C2   C4   G1$	P15:	1	DIF:	A	ORI:	15-4
53.	ANS: A	PTS:	1	DIF:	А	OBJ:	15-5
	NAT: C6   F4   G1						

SHORT ANSWER

54. ANS:

Answers will vary. Allele frequency is altered by genetic drift, natural selection, migration, mutation, or nonrandom mating. This results in a change in genetic equilibrium in a population that is evolving. Evolution leads eventually to speciation.

PTS: 1 DIF: A OBJ: 15-5 NAT: C6 | F4 | G1

55. ANS: Fossils can show evolutionary changes over time. Anatomical studies indicate evolutionary relationships. Vestigial structures indicate evolutionary pathways. Embryological development and genetic comparisons show evolution from a common ancestor.

PTS: 1 DIF: A OBJ: 15-3 NAT: C3 | G1 | G3

56. ANS:

Direct evidence that supports the theory of evolution is drug resistance by bacteria, pesticide resistance by insects, and changes in allele frequencies within certain other populations such as the peppered moth.

PTS: 1 DIF: A OBJ: 15-3 NAT: C3 | G1 | G3

57. ANS: Structural and physiological adaptations occur at random within populations because of adaptations. Darwin's theory explains how these are fixed within populations.

PTS: 1 DIF: A OBJ: 15-2 NAT: C3 | C6 | F4

58. ANS:

Darwin's theory of evolution by natural selection can be summarized by the following four statements. First, variations exist within populations. Second, some variations are more advantageous for survival and reproduction than others. Organisms produce more offspring than can survive. Finally, over time, offspring of survivors will make up a larger proportion of the population.

PTS: 1 DIF: A OBJ: 15-1 NAT: C3 | C6 | G3

59. ANS:

After a long period of time, squirrels with the once-most-common phenotype, medium fur color, will produce fewer and fewer offspring and will gradually be eradicated. The light- and dark-colored individuals will live and reproduce successfully. After a while, disruptive selection will concentrate the color distribution at the two extremes. Eventually, the two groups may no longer recognize each other for mating purposes. This reproductive isolation could lead to the two types becoming separate species. Another possibility with the same end result is that these squirrels would tend to survive most successfully in areas where either dark or light coat color variation would be most advantageous. This would lead to geographic isolation.

PTS: 1 DIF: A OBJ: 15-4 NAT: C2 | C4 | G1

60. ANS:

The light-colored squirrels blend in well with the soil found in the area and with the leaves that fall from the trees and cover the ground in the autumn. The darker-colored squirrels blend in well with the paved walkways of the park area and also with the darkened tree trunks. The medium-colored squirrels would be more visible to predators and thus be selected against.

PTS: 1 DIF: A OBJ: 15-4 NAT: C2 | C4 | G1

61. ANS:

Eventually, the two populations would become reproductively isolated owing to their height preferences. Two distinct species with their separate gene pools would result.

62	PTS: 1	DIF:	A	OBJ: 15-4	NAT: C2   C4   G1
02.	The preferred foods upward and at a diffe example, that they fe only in the evening. other times, the fly r the flies. Perhaps sor vegetation.	could rip erent time eed on the So at that hay do be me of the	en at different t e of the year, it e pollen or other t time of the day etter moving do se predators als	imes so that at one po would be more produ r product of a particu y, the fly would do be wnward. There could o have preferred nich	bint in the year, it would be beneficial to fly active to fly downward. It might be, for lar species of flower. The flower may open etter to fly upward toward the flower. At also be a variety of predators that feed on hes that are related to height levels in the
63.	PTS: 1 ANS:	DIF:	A	OBJ: 15-2	NAT: C3   C6   F4
	The frequency of the	allele fo	or negative geota	axis would be decreas	sing.
64	PTS: 1	DIF:	A	OBJ: 15-5	NAT: C6   F4   G1
07.	You should end up v will fly only downw	vith two c ard.	different types of	of flies. One type will	consistently fly only upward and the other
	PTS: 1	DIF:	A	OBJ: 15-4	NAT: C2   C4   G1
65.	ANS: Disruptive selection (sometimes positive middle flies are bein mate.	would be geotaxis g discard	e operating. The and sometimes led in the experi	e two extremes are be negative) is being se ment while the two e	ing favored while the middle choice lected against. This is true because the extremes are being retained and allowed to
66.	PTS: 1 ANS: It would be reasonab downward toward for	DIF: ble to exp bod becau	A lect that the flies use there wasn't	OBJ: 15-4 s would move either of anything for them to	NAT: C2   C4   G1 directly upward toward food or directly eat in between those areas.

PTS: 1 DIF: A OBJ: 15-4 NAT: C2 | C4 | G1