EVOLUTION PRACTICE TEST 2017

Name: _____ **Date:** _____

1. It is thought that all citrus fruit trees evolved from a common ancestor because of their common ability to synthesize citric acid. This type of evidence of evolution is known as

   (1) comparative embryology

   (2) comparative biochemistry

   (3) geographical distribution

   (4) anatomical similarity

2. In areas of heavy use of the insecticide DDT, fly populations may show marked resistance to the DDT over a period of time. Someone who accepts the evolutionary theory of Lamarck would most likely explain this observation using the concept of

   (1) natural selection

   (2) inheritance of acquired characteristics

   (3) overproduction of a species

   (4) a change in the gene frequencies

3. Which concept is part of the modern evolutionary theory, but *not* Darwin's original theory?

   (1) Variations in traits are caused by mutation and recombination.

   (2) Species tend to produce more offspring than can survive.

   (3) Better adapted individuals survive to produce offspring.

   (4) The environment is responsible for eliminating less fit individuals.

4. According to the heterotroph hypothesis, the first living things probably were anaerobic because their environment had no available

   (1) food (2) energy (3) water (4) oxygen

5. Darwin's theory of evolution did *not* contain the concept that

   (1) genetic variations are produced by mutations and sexual recombinations

   (2) organisms that survive are best adapted to their environment

   (3) population sizes remain constant due to a struggle for survival

   (4) favorable traits are passed from one generation to another

6. Populations of a species may develop traits different from each other if they are isolated geographically for sufficient lengths of time. The most likely explanation for these differences is that

(1) acquired traits cannot be inherited by offspring

(2) environmental conditions in the two areas are identical

(3) genetic recombination tends to be different in both populations

(4) mutations are likely to be the same in both populations

7. The wings of experimental fruit flies were clipped short each generation for fifty generations. The fifty-first generation emerged with normal-length wings. This observation would tend to disprove the theory of evolution based on

(1) inheritance of mutations

(2) inheritance of acquired characteristics

(3) natural selection

(4) survival of the fittest

8. The idea that evolution takes place at a continuous but very slow rate is known as

(1) succession

(2) artificial selection

(3) punctuated equilibrium

(4) gradualism

9. In the early stages of development, the embryos of dogs, pigs, and humans resemble one another. This observation suggests that these animals may have

(1) a similar number of chromosomes

(2) similar habitat requirements

(3) the same blood components

(4) a common ancestry

10. Many scientists believe that the earliest cells on Earth were relatively simple, lacking nuclear membranes and other organized cellular structures. Over time, more complex cells developed from these simple cells. These statements describe the concept of

(1) inheritance of acquired characteristics

(2) evolution

(3) dominance

(4) use and disuse

11. A key concept in the modern theory of evolution explains

(1) how new organs arise according to the needs of an organism

(2) how variations occur within a species

(3) the continued increase in the human population

(4) the presence of asexual reproduction within a species

12. The term "evolution" is best described as

(1) a process of change in a population through time

(2) a process by which organisms become extinct

(3) the reproductive isolation of members of certain species

(4) the replacement of one community by another

13. Although similar in many respects, two species of organisms exhibit differences that make each well adapted to the environment in which it lives. The process of change that may account for these differences is

(1) evolution

(2) germination

(3) regeneration of lost structures

(4) transmission of homologous structures

14. Some scientists suggest that the mass extinction of dinosaurs resulted from sudden global weather changes caused by the impact of an asteroid on Earth. This event most likely promoted the evolution of new species of animals. These ideas best support the concept of

(1) punctuated equilibrium

(2) use and disuse

(3) gradualism

(4) geographic isolation

15. Modern evolutionary theory consists of the concepts of Darwin modified by knowledge concerning

(1) overpopulation

(2) the genetic basis of variation

(3) survival of the fittest

(4) competition

16. August Weismann conducted a series of experiments involving the removal of the tails from several generations of mice. Which concept of evolution did he help to *disprove*?

(1) natural selection

(2) gradualism

(3) inheritance of acquired characteristics

(4) geographic isolation

17. Sheep and pigs have more enzymes in common than sheep and frogs do. This finding may indicate that

(1) none of these animals are related

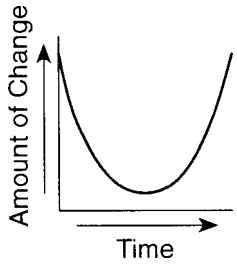
(2) frogs are not related to pigs

(3) sheep are more closely related to pigs than to frogs

(4) frogs are more closely related to sheep than to pigs

18. Which graph best illustrates the evolutionary concept of punctuated equlibrium?

(1)



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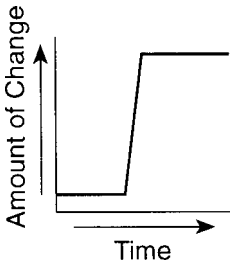

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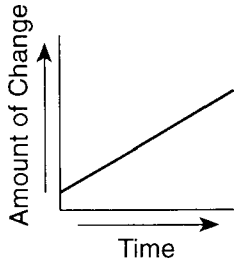

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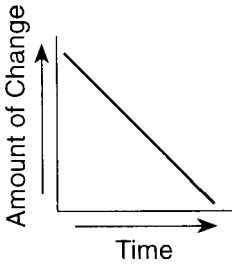


19. Blood proteins in horses are chemically similar to blood proteins in monkeys. This similarity suggests that horses and monkeys

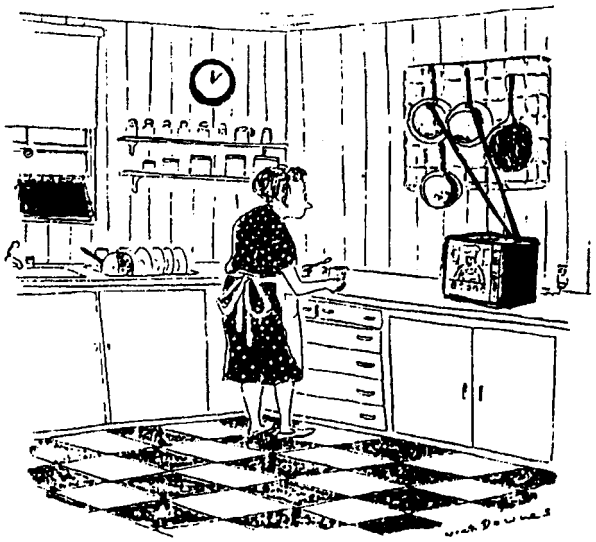
(1) can interbreed

(2) evolved at the same time

(3) live in the same habitat

(4) may have a common ancestor

20. Which concept is most closely related to the cartoon shown?



"Today's recipe for what I call 'the origin of life' requires a bit of hydrogen, nitrogen, compounds of sulfur, carbon, a smattering of metals: iron, magnesium. . ."

(1) the heterotroph hypothesis

(2) regeneration

(3) speciation

(4) survival of the fittest

21. According to the heterotroph hypothesis, aerobic activity in organisms could not evolve until

(1) anaerobes added alcohol to the environment

(2) autotrophs added carbon dioxide to the environment

(3) autotrophs released free oxygen into the environment

(4) anaerobes released ammonia into the environment

22. The embryos of fish, chickens, and pigs have gill slits and a tail. The presence of these features suggests that

(1) all these animals can swim

(2) pigs developed from chickens

(3) these animals may have had a common ancestor

(4) gill slits and tails are required for embryonic development

23. A large population of wildcats is broken up into several small groups as a result of geographic isolation. Over a long period of time, these groups will most likely become

(1) reproductively isolated

(2) identical in genotypes

(3) identical in phenotypes

(4) artificially selected

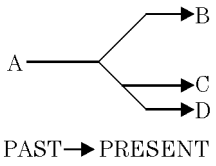
24. In the diagram shown, *B*, *C*, and *D* represent organisms that exist in the present time and show a striking similarity to each other in their bone structure. In the diagram, letter *A* most likely represents

(1) homologous structures

(2) a common ancestor

(3) an acquired characteristic

(4) geographic distribution



25. Which concept includes the other three?

(1) competition (2) survival of the fittest

(3) natural selection (4) overproduction

26. According to the heterotroph hypothesis, some early heterotrophs evolved into autotrophs because of their ability to synthesize organic compounds from water and

(1) carbon dioxide (2) hydrochloric acid

(3) oxygen (4) hydrogen

27. The theory that evolutionary change is slow and continuous is known as

(1) punctuated equilibrium

(2) geographic isolation

(3) speciation

(4) gradualism

28. Evidence that best supports the theory of biological evolution was obtained from the

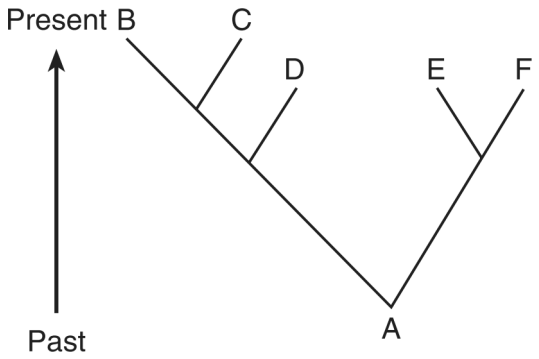
(1) investigation of environmental niches

(2) study of fossil records

(3) comparison of the number of cells in organisms

(4) analysis of food chains and food webs

29. A diagram of evolutionary pathways of various animal species is shown below.



The pattern of these evolutionary pathways is most likely the result of alterations within which structure?

(1) vacuole

(2) cell membrane

(3) nucleus

(4) ribosome

30. Which statement is best supported by the theory of evolution?

(1) Genetic alterations occur every time cell reproduction occurs.

(2) The fossil record provides samples of every organism that ever lived.

(3) Populations that have advantageous characteristics will increase in number.

(4) Few organisms survive when the environment remains the same.

31. Which statement is most closely related to the modern theory of evolution?

(1) Characteristics that are acquired during life are passed to offspring by sexual reproduction.

(2) Evolution is the result of mutations and recombination, only.

(3) Organisms best adapted to a changed environment are more likely to reproduce and pass their genes to offspring.

(4) Asexual reproduction increases the survival of species.

32. The theory of biological evolution includes the concept that

(1) species of organisms found on Earth today have adaptations not always found in earlier species

(2) fossils are the remains of present-day species and were all formed at the same time

(3) individuals may acquire physical characteristics after birth and pass these acquired characteristics on to their offspring

(4) the smallest organisms are always eliminated by the larger organisms within the ecosystem

33. The information below was printed on a calendar of important events in the field of biology.

1859

Darwin Publishes

On the Origin of Species by Natural Selection

This information is most closely associated with

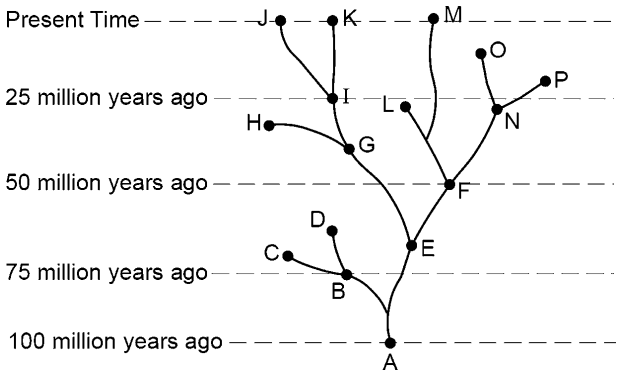
(1) an explanation for the change in types of minerals in an area through ecological succession

(2) the reasons for the loss of biodiversity in all habitats on Earth

(3) an attempt to explain the structural similarities observed among diverse living organisms

(4) the effect of carrying capacity on the size of populations

34. The diagram illustrates a proposed evolutionary path of certain organisms, based on the theory of evolution.



Which statement could best be inferred from the information in this diagram?

(1) Evolution does not involve gradual change.

(2) Evolutionary changes can result in extinction.

(3) Evolution begins with plants.

(4) Evolution produces organisms that all fill the same niche.

35. The extremes of dry and wet weather of the Galapagos Islands cause the food supply to constantly change. During dry years, the food is mainly large, hard seeds, and finches with large beaks are found in greater numbers.

Which statement best explains this observation?

(1) Dry environments cause mutations in finches.

(2) Finches grow larger when they have more water.

(3) Small finches become smaller during dry seasons.

(4) Large beak size is an adaptation to dry conditions.

36. Which processes lead to the greatest variety of genetic combinations?

(1) asexual reproduction and cloning

(2) meiosis and fertilization

(3) meiosis and mitosis

(4) cloning and mitosis

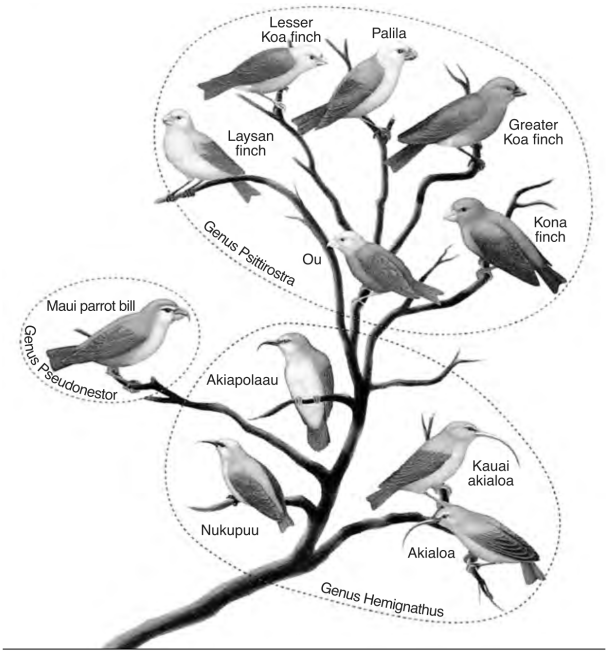
37. The variations that exist in a population of wild giraffes are usually a result of events that occur during

(1) mitotic division (2) genetic engineering

(3) asexual reproduction (4) sexual reproduction

38. Base your answer(s) to the following question(s) on the information and diagram below and on your knowledge of biology.

The circled areas in the diagram represent bird species that are in the same genus, a classification group that includes closely related species. These birds are found on the Hawaiian Islands.



Source: *Biology, 9th Edition*, Mader, McGraw-Hill, Boston, MA, 2007, p.313

Which processes are directly responsible for the presence of the different species of birds shown in the diagram?

(1) mitosis and differentiation

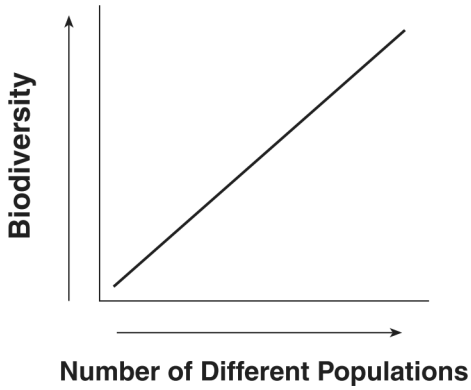
(2) gene manipulation and overpopulation

(3) gene mutations and natural selection

(4) competition and cloning

39. Which graph best shows the relationship between the amount of biodiversity and the number of different populations in an ecosystem?

(1)



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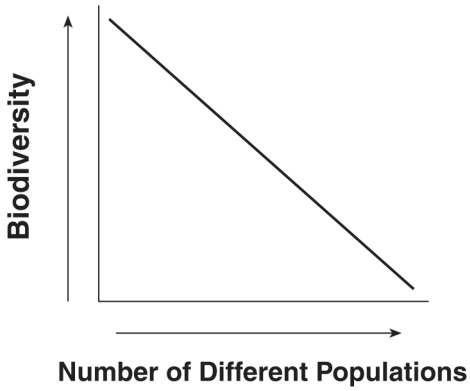

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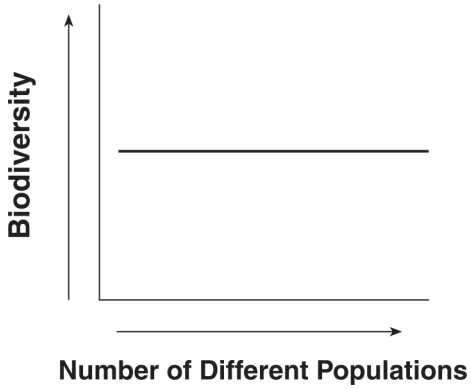

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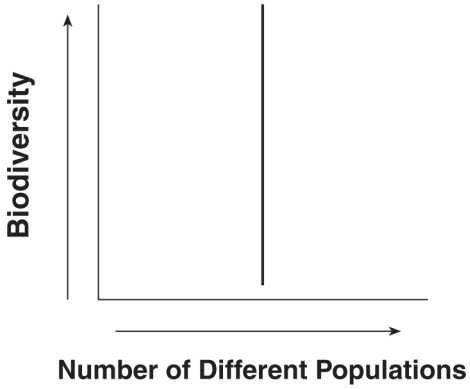


40. The sorting and recombination of genes during reproduction is important to evolution because these processes

(1) decrease variation and help maintain a stable population

(2) increase variation that enables species to adapt to change

(3) decrease the chances of producing offspring that are adapted to the environment

(4) increase the ability of all the offspring to adapt to the environment

41. Which statement describes an effect of natural selection on a species?

(1) It favors the survival of certain members of the species and results in a change in the proportion of individuals with highly adaptive traits.

(2) It provides feedback mechanisms for members of a species and results in a change in the proportion of individuals with homeostatic controls.

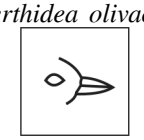
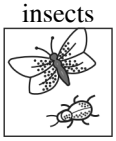
(3) It leads to reproduction with other species, increasing the number of different adaptations.

(4) It increases competition between populations that occupy different niches, increasing the chance of extinction of the less-adapted species.

Base your answer(s) to the following question(s) on the information and chart below and on your knowledge of biology.

The Galapagos Islands are home to many different species of finches. Three finch species, their relative beak sizes, and their food preferences are represented below. All three species live on the same island.

Three Galapagos Finches and Their Sources of Nutrition

Name	Foods
Vegetarian finch *Platyspiza crassirostris* 	Buds, leaves, fruit of trees 
Warbler finch *Certhidea olivacea* 	Flying and ground-dwelling insects 
Cactus finch *Geospiza scandens* 	Cactus flowers and nectar 

42. Which process allows for the evolution of finches over time?

(1) natural selection (2) selective breeding

(3) asexual reproduction (4) ecological succession

43. In a certain species of insect, some individuals have flattened white disks on their bodies that protrude and interlock, resembling an orchid flower. This adaptation provides the insect with a better opportunity to capture its prey. If environmental conditions remain unchanged, it is most likely that, in future generations, the proportion of the population with this adaptation will

(1) increase, only

(2) decrease, only

(3) increase, then decrease

(4) decrease, then increase

44. Some variation must be present in a population in order for natural selection to take place. These variations arise from mutations in the DNA and

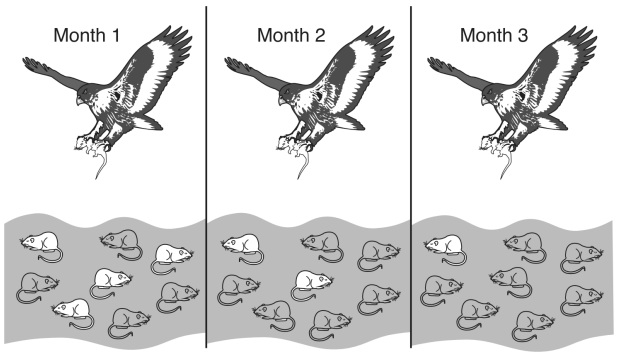
(1) sorting of chromosomes during sexual reproduction

(2) combining of chromosomes during organ development

(3) changing of chromosomes during cloning

(4) removal of chromosomes during selective breeding

45. The diagram below represents the same field of mice hunted by a hawk over a period of three months.



The overall changes in the population of mice can be explained best by

(1) natural selection (2) succession

(3) reproduction (4) mouse extinction

46. Maple leaf beetles and willow leaf beetles are named for the type of tree where they live and reproduce. They look identical to each other when observed, but experiments have shown that willow beetles would starve before eating maple leaves. This is an example of specialization that would directly reduce

(1) variation (2) competition

(3) adaptation (4) replication

47. In a population of birds, the percentage of individuals having a certain gene changes from 20% to 60% over the span of several hundred years. This situation will most likely affect the rate of

(1) biological evolution (2) asexual reproduction

(3) gene mutation (4) ecological succession

48. In order for a species to evolve, it must be able to

(1) consume a large quantity of food

(2) reproduce successfully

(3) maintain a constant body temperature

(4) be domesticated

49. A population of animals is permanently split by a natural barrier into two separate populations in different environments. What will likely result after a long period of time?

(1) The evolution of the two populations will be identical.

(2) The production of variations will stop in the two populations.

(3) The two populations will evolve into separate species.

(4) Autotrophic nutrition will replace heterotrophic nutrition in the two populations.

50. When changes occur in the genes of sex cells, these changes

(1) lead to mutations in the parent organism

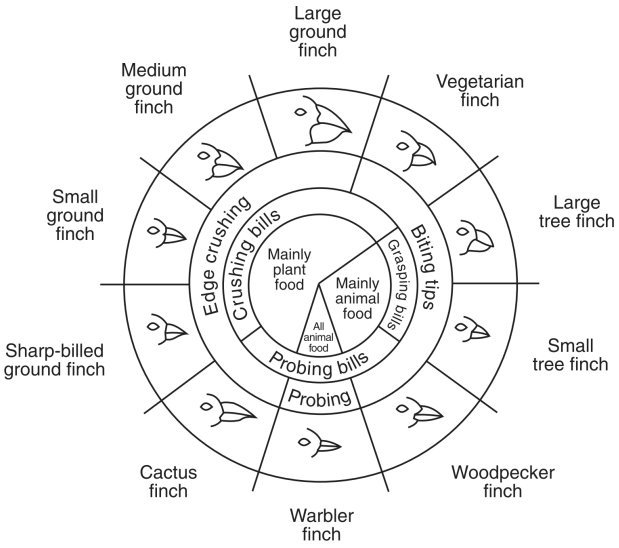
(2) are always harmful to the offspring

(3) can be the basis for evolutionary change

(4) only affect asexually reproducing organisms

51. Base your answer to the following question on the finch diversity diagram below and on your knowledge of biology.

Variations in Beaks of Glapagos Islands Finches



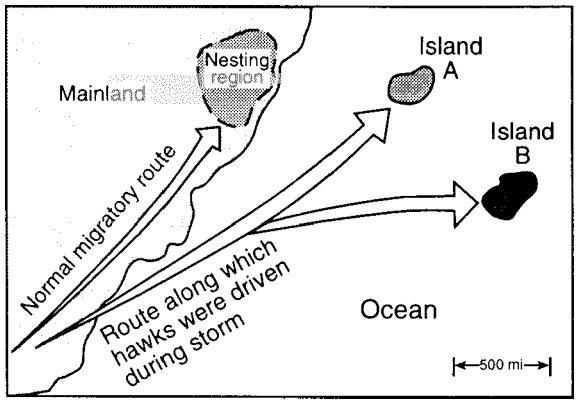
From: *Galapagos: A Natural History Guide*

Warbler finches are classified as

(1) producers (2) herbivores

(3) carnivores (4) decomposers

52. Thousands of years ago, a large flock of hawks was driven from its normal migratory route by a severe storm. The birds scattered and found shelter on two distant islands, as shown on the map below. The eviornment of island *A* is very similar to the hawk's original nesting region. The enviornment of island *B* is very different from that of island *A*. The hawks have survived on these islands to the present day with no migration between the populations.



Which statement most accurately predicts the present-day condition of these island hawk populations?

(1) The hawks that landed on island *B* have evolved more that those on island *A*

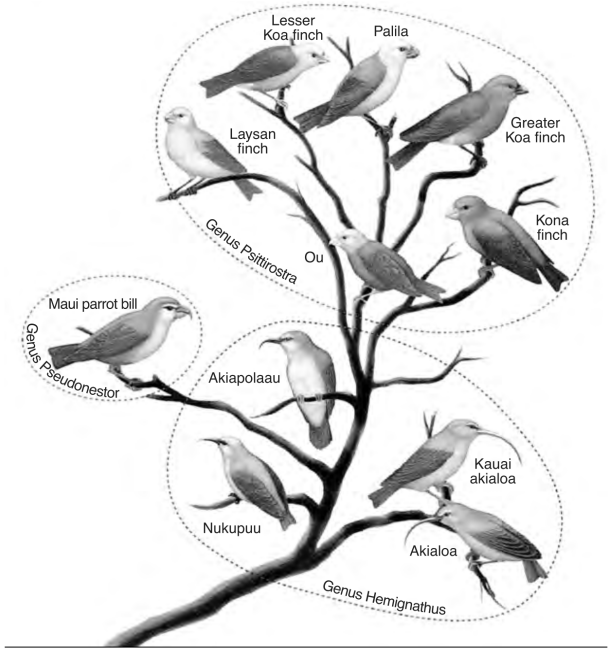
(2) The hawks that landed on island *A* have evolved more that those on island *B*

(3) The populations on island *A* and *B* have undergone identical mutations.

(4) The hawks on island *A* have given rise to many new species.

53. Base your answer(s) to the following question(s) on the information and diagram below and on your knowledge of biology.

The circled areas in the diagram represent bird species that are in the same genus, a classification group that includes closely related species. These birds are found on the Hawaiian Islands.



Source: *Biology, 9th Edition*, Mader, McGraw-Hill, Boston, MA, 2007, p.313

Which two finches are most closely related?

(1) Lesser Koa finch and Nukupuu

(2) Akialoa and Ou

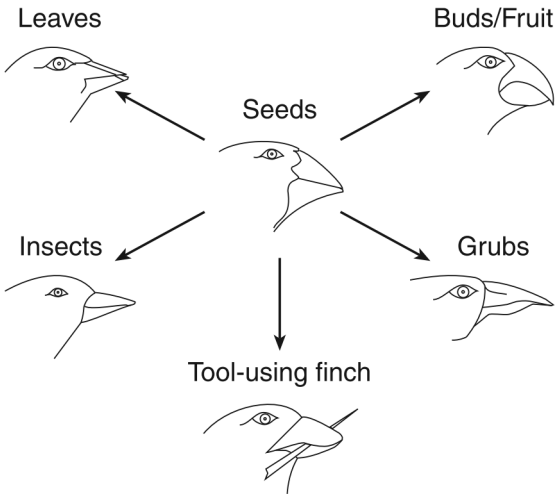
(3) Kauai akialoa and Maui parrot bill

(4) Ou and Greater Koa finch

54. Base your answer(s) to the following question(s) on the information and diagram below and on your knowledge of biology.

Finches on the Galapagos Islands are thought to have originated from South America and to have evolved into new species over the last 10,000 years. Some of this evolution is represented in the diagram below.

Darwin's Finches
Adaptive Radiation



The seed-eating finch was most likely the

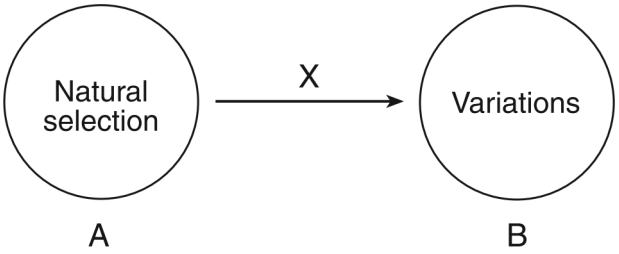
(1) largest finch

(2) common ancestor

(3) parent of the other finches

(4) most successful

55. The diagram below represents the relationship between natural selection and variation. The arrow between them is labeled X.



Which phrase best indicates the meaning of the arrow labeled X?

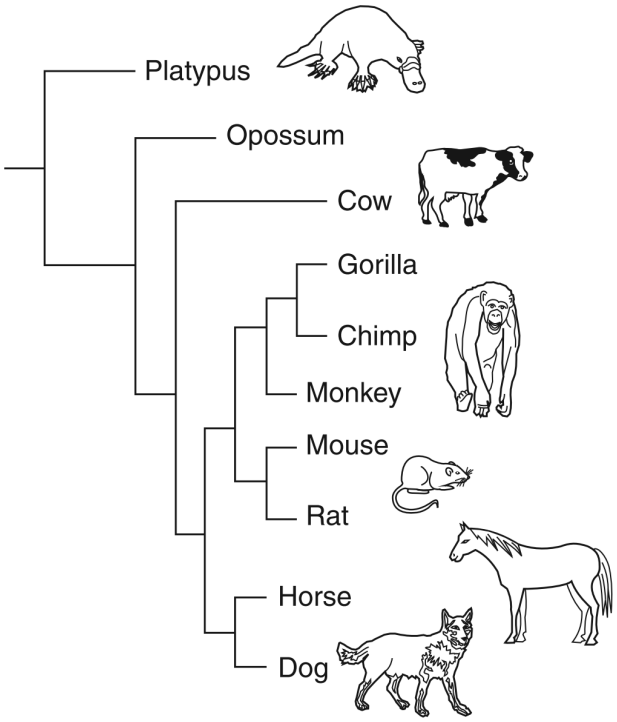
(1) is dependent on

(2) increases the rate of

(3) decreases the rate of

(4) is independent of

56. Base your answer(s) to the following question(s) on the diagram below and on your knowledge of biology. The diagram shows the evolutionary relationships of some organisms.



Which two organisms would most likely synthesize the most similar enzymes?

(1) monkey and mouse

(2) cow and horse

(3) chimp and rat

(4) horse and dog

57. Fish absorb oxygen through the gills, earthworms absorb oxygen through the skin, amebas take in oxygen through the cell membranes, and cows inhale oxygen through the nasal passages into their lungs. This statement demonstrates that living things

(1) rely on similar or the same processes, but accomplish them in different ways

(2) rely on different processes and accomplish them in different ways

(3) rely on different processes, but perform them in the same or related ways

(4) have no relationship to one another, and are all independent individuals

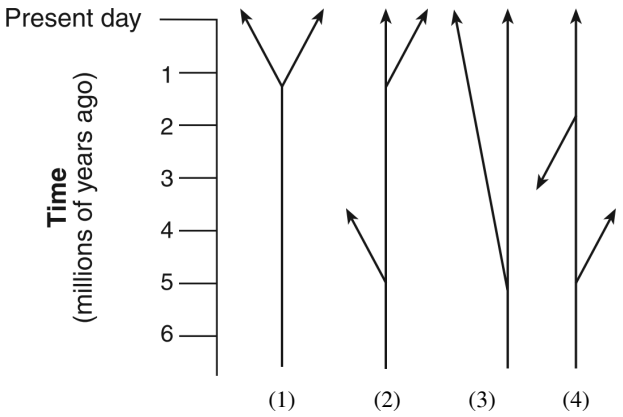
58. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

Yes, This Big Lizard is Pink

A new study from the University of Rome Tor Vergata shows that a rare strawberry-tinted land iguana [rosada iguana] in the Galapagos Islands is genetically distinct from other iguanas there, having diverged from them more than five million years ago as the archipelago [a group of islands] formed. The rosada iguana-which escaped Darwin's notice-was discovered only recently, largely because it lives on the desolate slopes of an active volcano.

Source: Smithsonian, March 2009

Which diagram best represents the evolutionary pathway of the strawberry-tinted iguana?

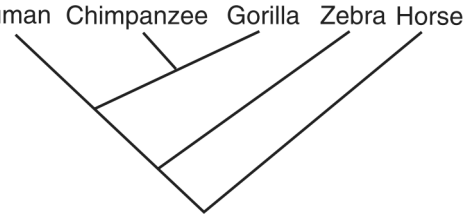


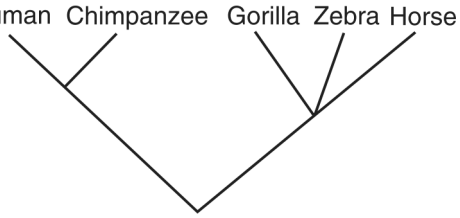
(1) (1) (2) (2) (3) (3) (4) (4)

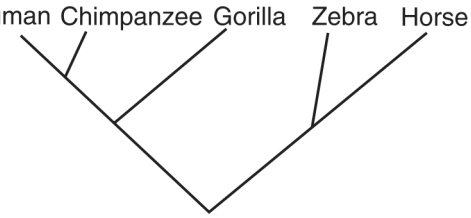
59. Base your answer to the following question on the information below and on your knowledge of biology

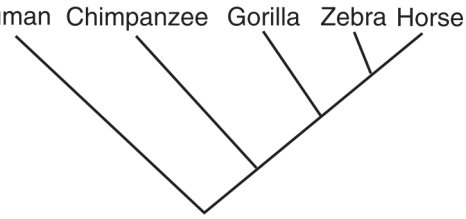
Species	Sequence of Four Amino Acids Found in the Same Part of the Hemoglobin Molecule of Species
human	Lys–Glu–His–Phe
horse	Arg–Lys–His–Lys
gorilla	Lys–Glu–His–Lys
chimpanzee	Lys–Glu–His–Phe
zebra	Arg–Lys–His–Arg

Which evolutionary tree best represents the information in the chart?

(1)


(2)


(3)


(4)


60. According to the fossil record, which statement is accurate?

(1) Most of the species that have lived on Earth no longer exist.

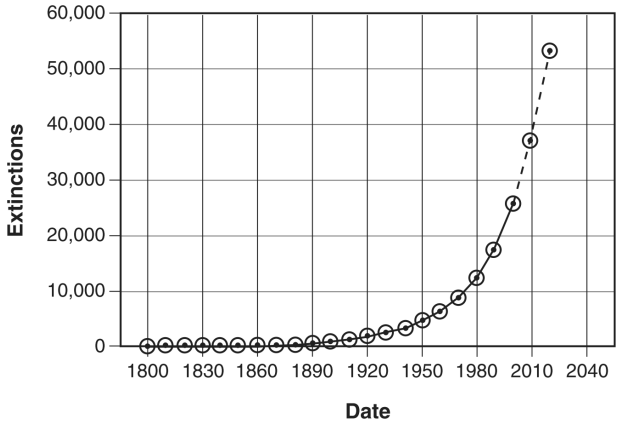
(2) Most of the species that have lived on Earth still exist today.

(3) Fossils of species that never existed can be found.

(4) Fossils of species that never existed, but will exist in the future, can be found.

61. Base your answer(s) to the following question(s) on the graph below and on your knowledge of biology. The graph shows the number of species that became extinct from 1800 to 2000. It also shows estimates of the number of species that will become extinct between 2000 and 2020.

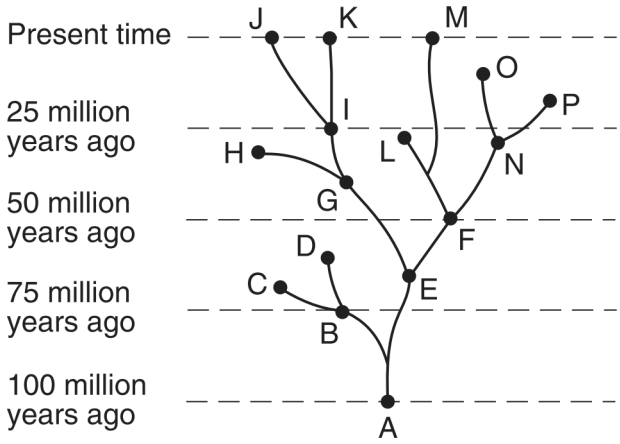
Species Extinct Since 1800



The number of species that became extinct between the years 1950 and 2000 is approximately

(1) 5,000 (2) 12,000 (3) 22,000 (4) 37,000

62. Base your answer(s) to the following question(s) on the diagram below and on your knowledge of biology. The diagram represents possible evolutionary pathways of certain organisms.



Which statement can best be inferred based on the information in the diagram?

(1) Natural selection occurs only as a result of mutations.

(2) Natural selection requires a minimum of 5 million years to occur.

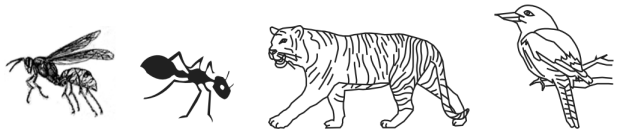
(3) Each new species that develops continues to exist through present time.

(4) Some species that are no longer successful in their environment may become extinct.

63. The dichotomous key below provides a way to classify some animals into groups according to their physical characteristics.

Dichotomous Key	
I	wings ..... go to II no wings ..... group A
II	feathers ..... group B no feathers ..... go to III
III	two legs ..... group C six legs ..... group D

The key can be used to classify each of the four animals represented below.



Wasp Ant Tiger Bird

Which row in the chart shows the correct classification group for each animal?

Row	Wasp	Ant	Tiger	Bird
(1)	group D	group D	group A	group B
(2)	group B	group A	group D	group C
(3)	group B	group D	group A	group C
(4)	group D	group A	group A	group B

(1) Row 1 (2) Row 2 (3) Row 3 (4) Row 4

64. Characteristics that are harmful to a species tend to decrease in frequency from generation to generation because these characteristics usually

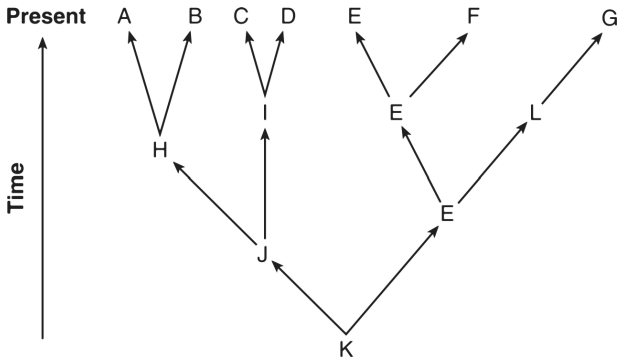
(1) have a high survival value for the species

(2) have a low survival value for the species

(3) are inherited by more individuals

(4) affect only the older members of the population

65. The evolutionary pathways of several species are represented in the diagram below. Which species was best adapted for survival in changing environmental conditions?



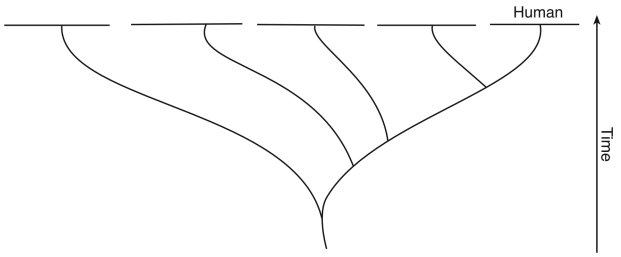
(1) A (2) E (3) K (4) L

66. The data table below shows the number of amino acid differences in the hemoglobin molecules of several species compared with amino acids in the hemoglobin of humans.

Amino Acid Differences

Species	Number of Amino Acid Differences
human	0
frog	67
pig	10
gorilla	1
horse	26

Based on the information in the data table, write the names of the organisms from the table in their correct positions on the evolutionary tree below.

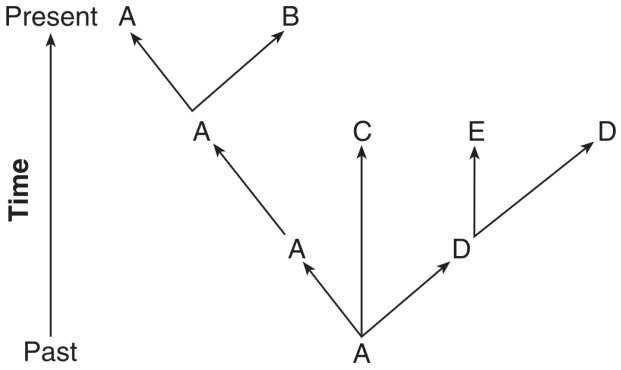


67. The amino acid sequences of three species shown below were determined in an investigation of evolutionary relationships.

Species A:	Val	His	Leu	Ser	Pro	Val	Glu
Species B:	Val	His	Leu	Cys	Pro	Val	Glu
Species C:	Val	His	Thr	Ser	Pro	Glu	Glu

Based on these data, which *two* species are most closely related? Support your answer.

68. Base your answer(s) to the following question(s) on the diagram below and on your knowledge of biology. Letters A through E represent different species of organisms. The arrows represent long periods of geologic time.

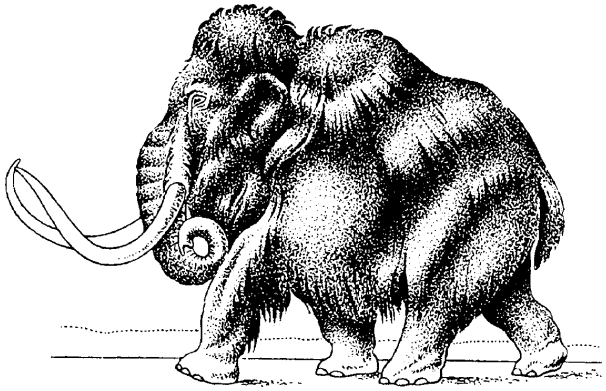


Which species is the common ancestor to all of the other species?

69. Identify *one* species that was *not* able to adapt to its environment. Support your answer.

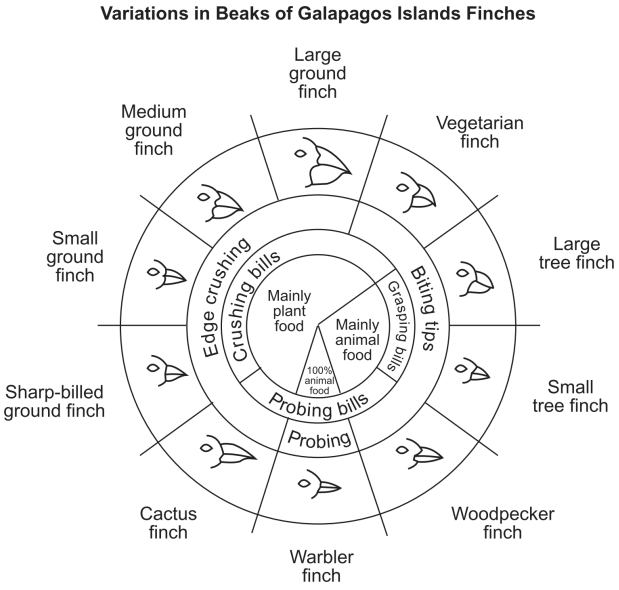
70. Explain why changes in climate can result in the extinction of a species.

71. The accompanying diagram represents a woolly mammoth, a relative of the modern elephant. Woolly mammoths lived during the Ice Age and eventually became extinct.



State *one* possible reason this species died out.

72. Base your answer to the following question on the diagram below and on your knowledge of biology.

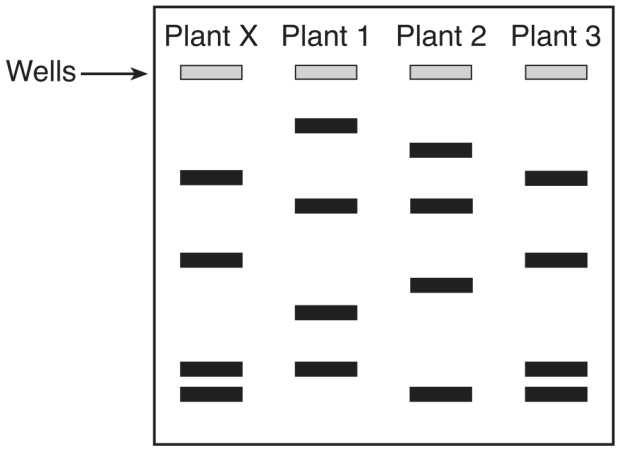


From: *Galapagos: A Natural History Guide*

There are a number of islands in the Galapagos that these finches could possibly inhabit. Explain why each island would *not* be expected to have all of the species shown.

73. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

As part of a laboratory technique, DNA samples taken from four plants were separated. The results are represented in the diagram below.



Which plant is most closely related to plant *X*? Support your answer using information from the diagram.

74. The technique of paper chromatography was performed on plant extracts from four different plant species. The results showed the same pattern for two of the plant species. State an evolutionary relationship between these two plants that is supported by this observation.

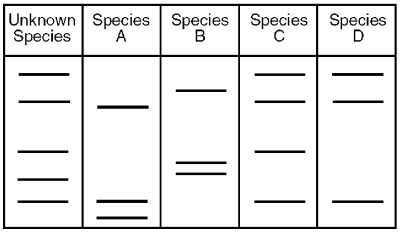
75. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

Scientists found members of a plant species they did not recognize. They wanted to determine if the unknown species was related to one or more of four known species, *A*, *B*, *C*, and *D*.

The relationship between species can be determined most accurately by comparing the results of gel electrophoresis of the DNA from different species.

The chart below represents the results of gel electrophoresis of the DNA from the unknown plant species and the four known species.

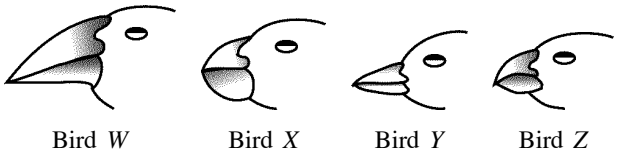
Results of Gel Electrophoresis of DNA from Five Plant Species



Key
—— = Band in the gel

The unknown species is most closely related to which of the four known species? Support your answer.

76. The dichotomous key shown below can be used to identify birds *W*, *X*, *Y*, and *Z*.



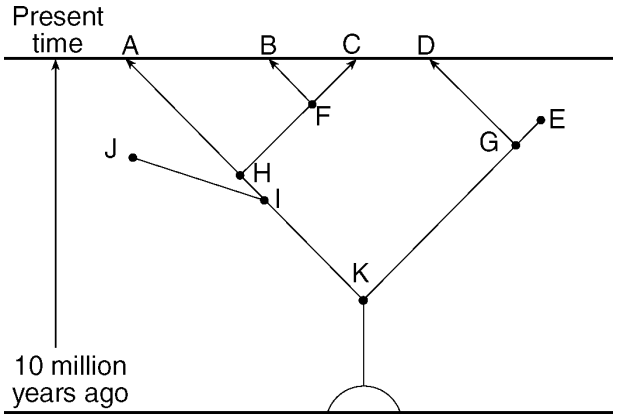
Dichotomous Key to Representative Birds	
1. a. The beak is relatively long and slender	*Certhidea*
b. The beak is relatively stout and heavy	go to 2
2. a. The bottom surface of the lower beak is flat and straight	*Geospiza*
b. The bottom surface of the lower beak is curved	go to 3
3. a. The lower edge of the upper beak has a distinct bend	*Camarhynchus*
b. The lower edge of the upper beak is mostly flat	*Platyspiza*

Bird *X* is most likely

(1) *Certhidea* (2) *Geospiza*

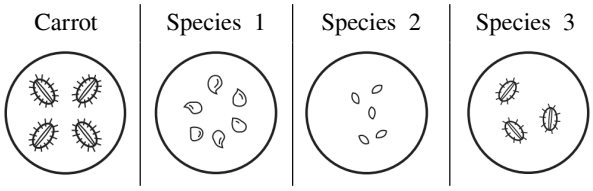
(3) *Camarhynchus* (4) *Platyspiza*

77. Base your answer(s) to the following question(s) on the diagram and on your knowledge of biology. The diagram shows an interpretation of relationships based on evolutionary theory. The letters represent different species.



Explain why species *B* and *C* are more closely related than species *A* and *C* are.

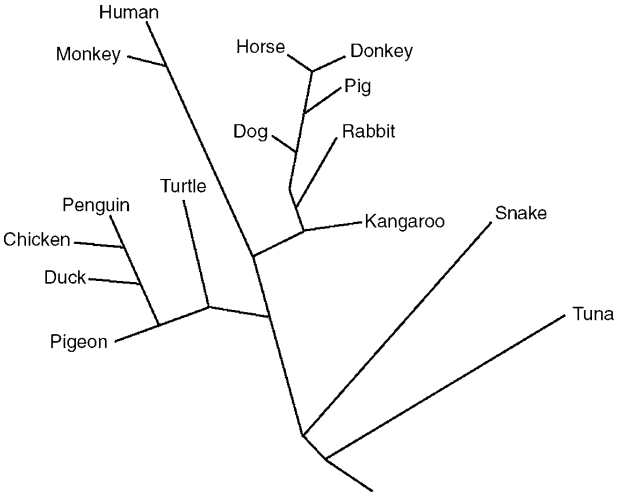
78. The diagrams below represent seeds taken from a carrot plant and seeds taken from plant species 1, 2, and 3.



Which species would be expected to be most similar to the carrot? Support your answer.

79. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

Based on their analysis of the differences in amino acid sequences of one kind of protein, scientists prepared the evolutionary tree shown below.



According to this diagram, is the pig more closely related to the dog or the kangaroo? Justify your answer.

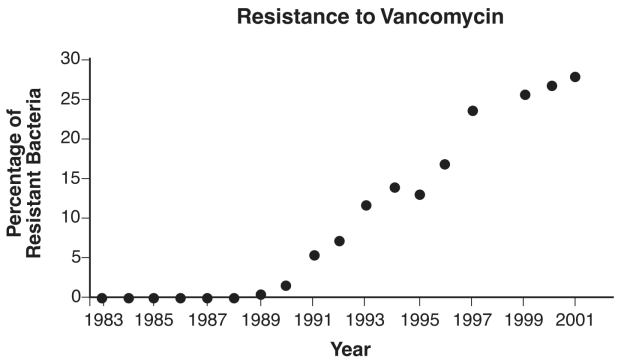
80. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

Rabbits eat plants and in turn are eaten by predators such as foxes and wolves. A population of rabbits is found in which a few have a genetic trait that gives them much better than average leg strength.

State what is likely to happen to the rabbits in the population that do *not* have the trait for above average leg strength.

81. Predict how the frequency of the trait for above average leg strength would be expected to change in the population over time. Explain your prediction.

82. Base your answer(s) to the following question(s) on the scatter-plot graph below and on your knowledge of biology. The graph shows changes in the percentage of vancomycin-resistant bacteria in a population between the years 1983 and 2001.



Source: http://evolution.berkeley.edu/evolibrary/article/bergstrom_03

Explain why the percentage of resistant bacteria increased over time.

83. Base your answer(s) to the following question(s) on the Universal Genetic Code Chart below and on your knowledge of biology. Some DNA, RNA, and amino acid information from four similar sequences of four plant species is shown in the chart below.

FIRST BASE	SECOND BASE: U	SECOND BASE: C	SECOND BASE: A	SECOND BASE: G	THIRD BASE
U	UUU, UUC: PHE UUA, UUG: LEU	UCU, UCC, UCA, UCG: SER	UAU, UAC: TYR UAA: STOP UAG: STOP	UGU, UGC: CYS UGA: STOP UGG: TRP	U C A G
C	CUU, CUC, CUA, CUG: LEU	CCU, CCC, CCA, CCG: PRO	CAU, CAC: HIS CAA, CAG: GLN	CGU, CGC, CGA, CGG: ARG	U C A G
A	AUU, AUC, AUA: ILE AUG: MET or START	ACU, ACC, ACA, ACG: THR	AAU, AAC: ASN AAA, AAG: LYS	AGU, AGC: SER AGA, AGG: ARG	U C A G
G	GUU, GUC, GUA, GUG: VAL	GCU, GCC, GCA, GCG: ALA	GAU, GAC: ASP GAA, GAG: GLU	GGU, GGC, GGA, GGG: GLY	U C A G

Using the Universal Genetic Code Chart, fill in the missing amino acid sequence for species *C* in the chart below.

Species A	DNA base sequence	CCG	TGC	ATA	CAG	GTA
	mRNA base sequence	GGC	ACG	UAU	GUC	CAU
	Amino acid sequence	**GLY**	**THR**	**TYR**	**VAL**	**HIS**
Species B	DNA base sequence	TGC	TGC	ATA	CAG	GTA
	mRNA base sequence	____	____	____	____	____
	Amino acid sequence	**THR**	**THR**	**TYR**	**VAL**	**HIS**
Species C	DNA base sequence	CCG	TGC	ATA	CAG	GTT
	mRNA base sequence	GGC	ACG	UAU	GUC	CAA
	Amino acid sequence	____	____	____	____	____
Species D	DNA base sequence	CCT	TGT	ATG	CAC	GTC
	mRNA base sequence	GGA	ACA	UAC	GUG	CAG
	Amino acid sequence	**GLY**	**THR**	**TYR**	**VAL**	**GLN**

84. Using the information given, fill in the missing mRNA base sequence for species *B* in the chart below.

Species A	DNA base sequence	CCG	TGC	ATA	CAG	GTA
	mRNA base sequence	GGC	ACG	UAU	GUC	CAU
	Amino acid sequence	**GLY**	**THR**	**TYR**	**VAL**	**HIS**
Species B	DNA base sequence	TGC	TGC	ATA	CAG	GTA
	mRNA base sequence	____	____	____	____	____
	Amino acid sequence	**THR**	**THR**	**TYR**	**VAL**	**HIS**
Species C	DNA base sequence	CCG	TGC	ATA	CAG	GTT
	mRNA base sequence	GGC	ACG	UAU	GUC	CAA
	Amino acid sequence	____	____	____	____	____
Species D	DNA base sequence	CCT	TGT	ATG	CAC	GTC
	mRNA base sequence	GGA	ACA	UAC	GUG	CAG
	Amino acid sequence	**GLY**	**THR**	**TYR**	**VAL**	**GLN**