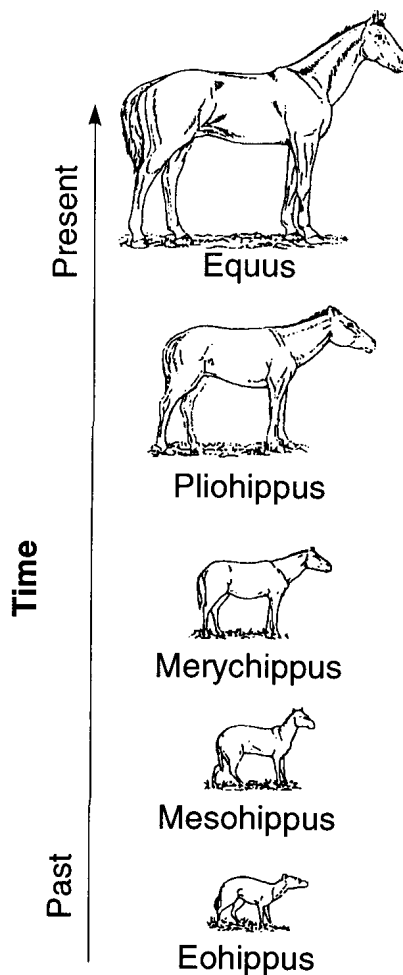


- In order for a species to evolve, it must be able to
  - consume a large quantity of food
  - reproduce successfully
  - maintain a constant body temperature
  - be domesticated
- The diversity of organisms present on Earth is the result of
  - ecosystem stability
  - homeostasis
  - natural selection
  - direct harvesting
- The theory of biological evolution includes which concepts?
  - species of organisms found on Earth today have adaptations not always found in earlier species
  - fossils are the remains of present-day species and were all formed at the same time
  - individuals may acquire physical characteristics after birth and pass these acquired characteristics on to their offspring.
  - the smallest organisms are always eliminated by the larger organisms within the ecosystem
- 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

- inheritance of acquired characteristics
- evolution
- dominance
- use and disuse

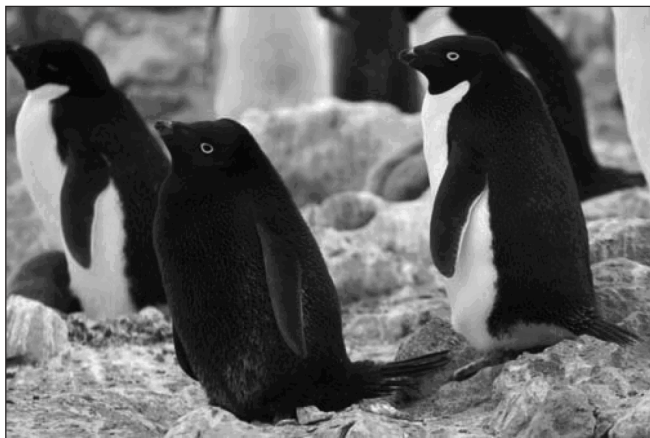
- Base your answer to the following question on the diagram below.



Which concept is best illustrated by the physical variations in the horse as its body size and structure change over time?

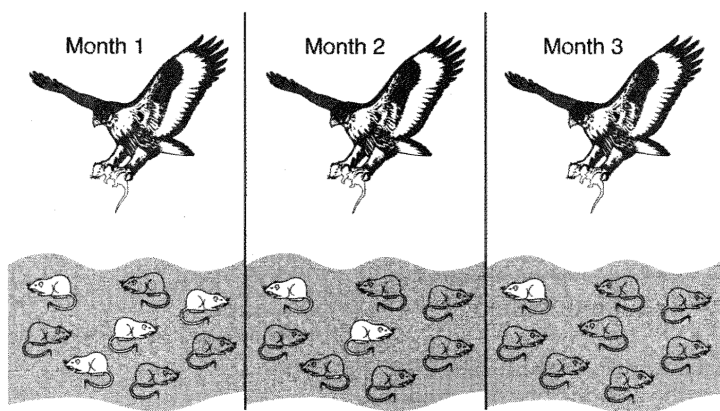
- acquired characteristics
  - artificial selection
  - intermediate inheritance
  - variation leads to adaptation
- Most species on Earth have changed through time. This change is known as
    - isolation
    - ecology
    - geology
    - evolution

7. The photograph below shows a recently discovered all-black penguin chick and several typical black-and-white chicks.



The appearance of this penguin chick with all black feathers might

- A) increase the types of foods penguins can eat
  - B) decrease the diversity of the penguin population
  - C) decrease the number of variations present in the black penguin population
  - D) result in an increase in black penguins over time if the trait provides a reproductive advantage
8. 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

- A) natural selection
- B) succession
- C) reproduction
- D) mouse extinction

9. Ancestors of the giant panda had rounded paws with five very short toes. Today, the giant panda has a sixth toe, often referred to as a thumb, even though it develops from a wrist bone. This unique thumb is an adaptation that allows the panda to easily hold and eat bamboo shoots. The presence of the giant panda's thumb is most likely the result of

- A) natural selection
- B) selective breeding
- C) asexual reproduction
- D) ecological succession

10. A photograph of a polar bear in its environment is shown below.



Source: [http://www.bbc.co.uk/schools/gcsebitesize/science/ocr\\_gateway/environment/3\\_adapt\\_to\\_fit1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/environment/3_adapt_to_fit1.shtml)

One possible reason why polar bears might not be able to survive if the environment they live in changes is because

- A) the species will experience decreased competition for mates
- B) the new environment will cause greater variation in the species
- C) there will be a larger variety of food sources available
- D) they are adapted to the specific environment in which they now live

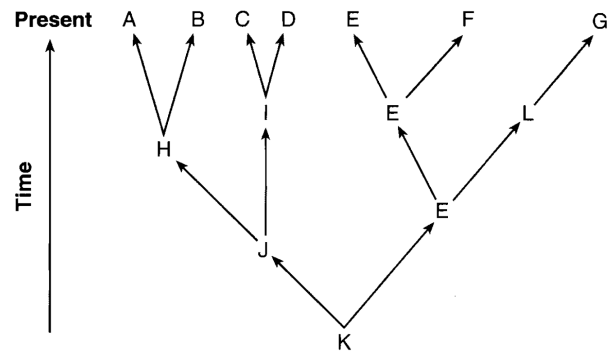
11. The crucian carp, a Scandinavian fish, thrives in shallow ponds that freeze over during winter. While other creatures in the pond die from lack of oxygen, these carp are able to obtain energy through a biochemical pathway that does not require oxygen. This characteristic is an example of a

- A) feedback mechanism common to carnivores that inhabit shallow pond ecosystems
- B) favorable adaptive trait that has led to increased survival
- C) stage of succession that leads to a new community
- D) gene mutation that occurred because carp need to survive to maintain ecological stability

12. Parrots are tropical birds. However, in some areas of New York City, some parrots have been able to survive outdoors year-round. These parrots survive, while most others cannot, due to

- A) overproduction of offspring
- B) extinction of previous species
- C) asexual reproduction of parrots with a mutation
- D) a variation that allows these parrots to live in colder climates

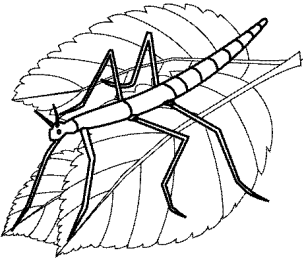
13. The evolutionary pathways of several species are represented in the diagram below.



Which species was best adapted for survival in changing environmental conditions?

- A) *A*
- B) *E*
- C) *K*
- D) *L*

14. The illustration below shows an insect resting on some green leaves.



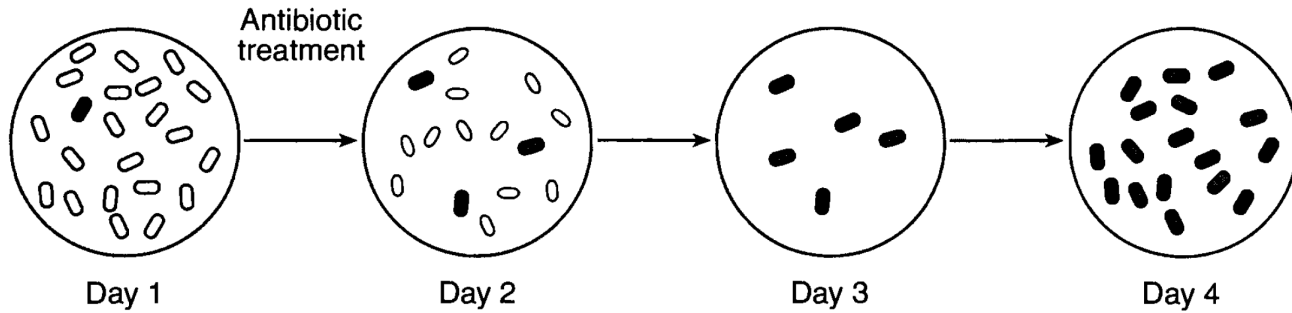
The size, shape, and green color of this insect are adaptations that would most likely help the insect to

- A) compete successfully with all birds  
B) make its own food  
C) hide from predators  
D) avoid toxic waste materials
15. In 1889, August Weismann, a German biologist, conducted an experiment attempting to produce mice without tails. He cut the tails off adult mice and then permitted them to mate. All offspring had long tails. He repeated the experiment many times, always with the same results. This experiment helped to *disprove* the work of
- A) Darwin                      B) Lemark  
C) Mendel                      D) Redi
16. Geographic and reproductive isolation are most closely associated with
- A) speciation                      B) extinction  
C) overproduction                      D) competition
17. The separation of a small group of individuals from the main population is known as
- A) chromosomal mutation  
B) fossil formation  
C) geographic isolation  
D) reduction division
18. Geographic isolation of a small population from a main group may contribute to the development of new species. This speciation is more likely to happen if the members of the geographically isolated population, compared to the members of the main group, have
- A) an inability to survive environmental conditions  
B) the ability to resist genetic mutations  
C) different environmental factors acting on them  
D) the same initial gene frequencies

19. Over a long period of time the organisms on an island changed so that they could no longer interbreed with the organisms on a neighboring island. This inability to interbreed is known as

- A) hybridization  
B) reproductive isolation  
C) artificial selection  
D) survival of the fittest

20. The diagram below represents some changes that took place in a bacterial population recently exposed to an antibiotic.



Which statement would best explain the presence of bacteria on day 4?

- A) A bacterial population cannot survive exposure to antibiotics.
  - B) This bacterial population cannot survive exposure to this antibiotic.
  - C) Bacteria can change whenever it is necessary to survive antibiotic treatment.
  - D) Some of the bacterial population was resistant to this antibiotic.
- 
21. The diagram below represents the bones of the forelimbs of two animals alive today that most likely evolved from a common ancestor. Members of the original ancestral population were isolated into two groups by natural events.
- 
- The diagram shows two forelimb skeletons. The top skeleton is a bat's wing, with a long, thin humerus, radius, and ulna, and several long, thin metacarpals. The bottom skeleton is a human arm, with a shorter humerus, radius, and ulna, and shorter, thicker metacarpals. The bones are arranged in a similar pattern, illustrating homologous structures.
- If these two animals did have a common ancestor, which statement would best explain why there are differences in the bones?
- A) Changes occurred to help the animals return to their original environment.
  - B) Changes contributed to the survival of the organisms in their new environment.
  - C) Changes helped reduce competition within each group.
  - D) Changes indicate the species are evolving to be more like the ancestral species.
22. Which observation provides the best evidence that two different animals most likely have a common ancestor?
- A) They choose the same plants for food.
  - B) They both burrow into the ground for shelter.
  - C) They have similarities in early embryonic development.
  - D) They both inhabit the same environment.
23. The diagrams below show embryos of three different vertebrate species.
- 
- The diagram shows three embryos of different vertebrate species. Each embryo has a similar body plan: a large head with eyes, a small tail, and a curved body. The embryos are shown in a similar orientation, with the head at the top and the tail at the bottom. This illustrates the concept of common ancestry through similar embryonic development.
- According to one theory, similarities in these embryos suggest common ancestry. As these embryos mature, they will most likely
- A) develop new organs according to the nutritional requirements of each organism
  - B) continue to closely resemble each other as adults
  - C) show no similarity as adults
  - D) develop the distinctive characteristics of their species

24. When the scientists compared the molecular sequences in the collagen proteins of the *Tyrannosaurus rex* to those of modern animals, they were most likely seeking information about

- A) patterns of behavior
- B) reproductive cycles
- C) common ancestry
- D) changing environmental conditions

25. A researcher recently discovered a new species of bacteria in the body of a tubeworm living near a hydrothermal vent. He compared the DNA of this new bacterial species to the DNA of four other species of bacteria. The DNA sequences came from the same part of the bacterial chromosome of all four species.

Species	DNA Sequence
unknown species	ACT GCA CCC
species I	ACA GCA CCG
species II	ACT GCT GGA
species III	ACA GCA GGG
species IV	ACT GCA CCG

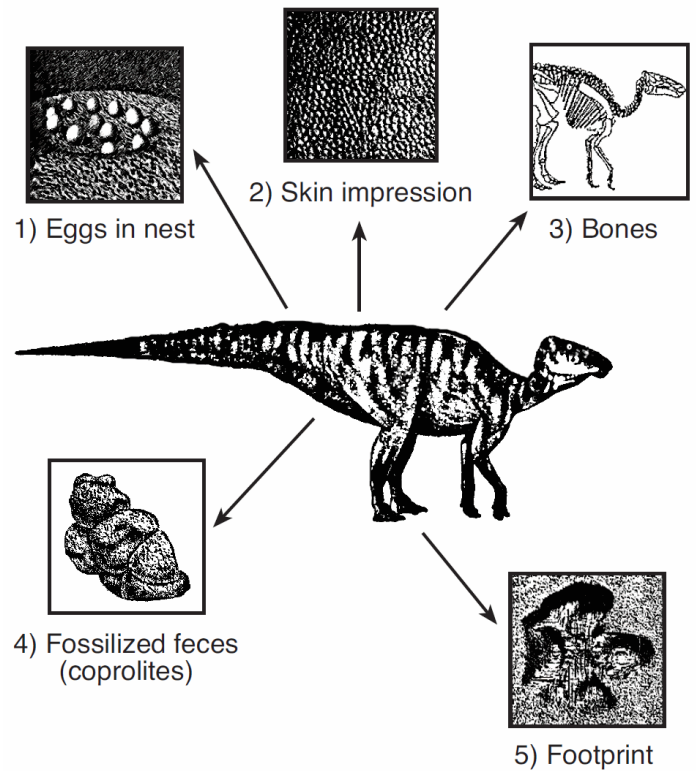
According to these data, the unknown bacterial species is most closely related to

- A) species I
- B) species II
- C) species III
- D) species IV

26. The fossil record of ancient life forms provides scientific evidence of

- A) direct harvesting
- B) selective breeding
- C) gene manipulation
- D) evolutionary changes

27. The diagram below represents a variety of fossil types, which can be found in many rocks.

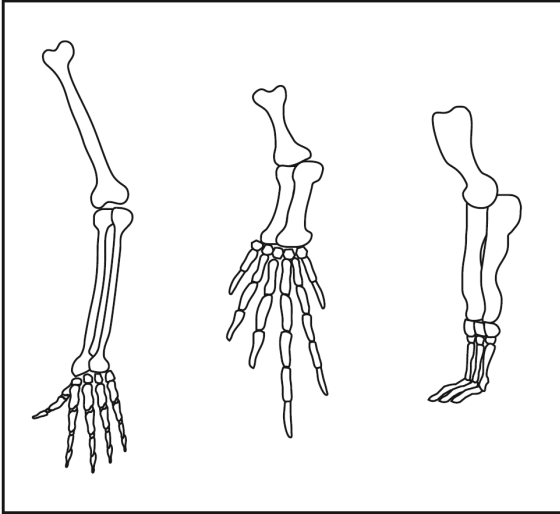


Source: Audesir, Audesir, Byers, *Biology: Life on Earth*, Prentice Hall, 2002

These fossils can be best used to provide information that could be used in a study of

- A) the structures of prehistoric organisms
- B) dynamic equilibrium with a species
- C) selective breeding of living organisms
- D) cell specialization and tissue creation

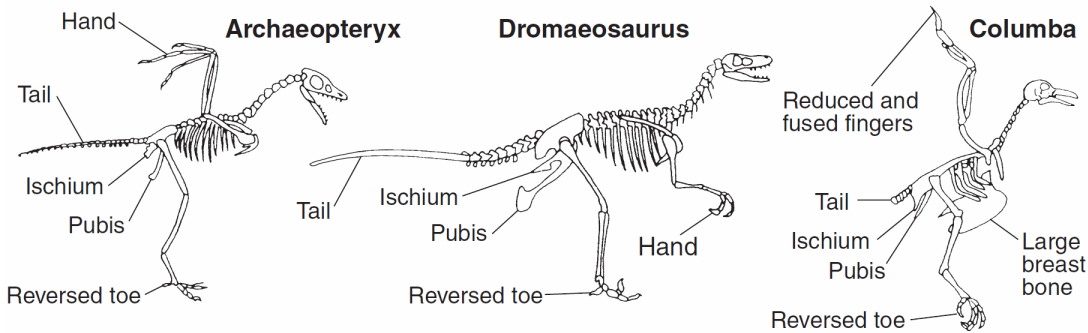
28. The diagram below represents the bone arrangements in the front limbs of three different species of mammals.



The similarities and differences in these limbs suggest that all three species developed from the same ancestor, but

- A) produced different numbers of offspring
- B) lived in different time periods
- C) adapted to different habitats
- D) migrated to similar habitats

29. The remains of three organisms are shown below.

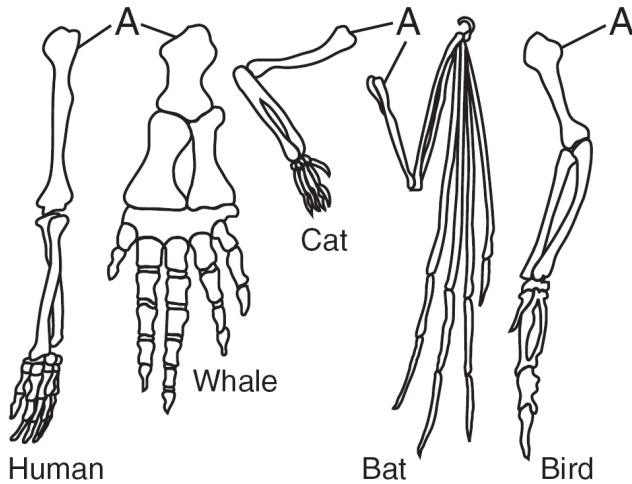


A study of these remains would indicate that these organisms have

- A) identical food preferences
- B) identical body sizes
- C) structural similarities
- D) habitat similarities



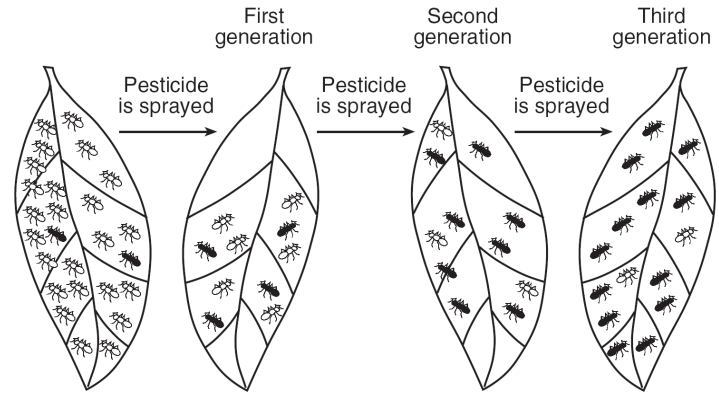
30. Base your answer to the following question on the diagram below.



What do the similarities of the bones labeled *A* provide evidence for?

- A) homologous structures
  - B) vestigial structures
  - C) analogous structures
  - D) biochemical evidences of evolution
31. The bones in the wing of a bird, the flipper of a whale, and the arm of a human are considered by many scientists to be
- A) heterotrophic aggregates
  - B) abiotic factors
  - C) complex organelles
  - D) homologous structures
32. According to the heterotroph hypothesis, which gas given off by autotrophic activity made the evolution of aerobes possible?
- A) oxygen
  - B) hydrogen
  - C) carbon dioxide
  - D) nitrogen

33. The diagram below shows the effect of spraying a pesticide on a population of insects over three generations.



Which concept is represented in the diagram?

- A) survival of the fittest
  - B) dynamic equilibrium
  - C) succession
  - D) extinction
34. Which process is least likely to add to the variety of traits in a population?
- A) deletion of bases from DNA
  - B) genetic engineering
  - C) accurate replication of DNA
  - D) exchange of segments between chromosomes
35. Chloroplasts of eukaryotes evolved from which of the following?
- A) Cyanobacteria
  - B) Photosynthetic prokaryotes
  - C) Photosynthetic protista
  - D) Plants
  - E) Any kind of eukaryote
36. The mitochondria of eukaryotes evolved from what type of organism?
- A) Anaerobic bacteria
  - B) Aerobic bacteria
  - C) Euglena
  - D) Ameoba
  - E) Any kind of eukaryote
37. Mitochondria and bacteria share which similarities?
- A) They both have circular DNA.
  - B) They both have cell walls.
  - C) They both reproduce sexually.
  - D) There are no similarities.



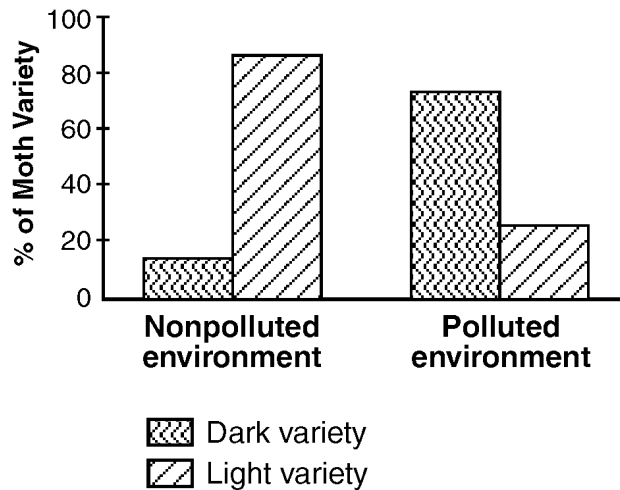
38. Molecular biologists cite as evidence for evolution similarities in

- A) amino acid sequences
- B) carbohydrate chains
- C) cellular components

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

Color in peppered moths is controlled by genes. A light-colored variety and a dark-colored variety of a peppered moth species exist in nature. The moths often rest on tree trunks, and several different species of birds are predators of this moth.

Before industrialization in England, the light-colored variety was much more abundant than the dark-colored variety and evidence indicates that many tree trunks at that time were covered with light-colored lichens. Later, industrialization developed and brought pollution, which killed the lichens, leaving the tree trunks covered with dark-colored soot. The results of a study made in England are shown below.



Which conclusion can best be drawn from the information given?

- A) The trait for dark coloration better suits the peppered moth for survival in non-polluted environments.
- B) The trait for light coloration better suits the peppered moth for survival in polluted environments.
- C) The variation of color in the peppered moth has no influence on survival of the moth.
- D) A given trait may be a favorable adaptation in one environment, but not in another environment.

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40. Base your answer to the question below on the information and statement below.

Information

The Galápagos Islands in the Pacific were probably never connected to South America. However, in the various habitats on the islands, there are about 14 species of finch- like birds that appear to be related to finches on the South American mainland. Though the Galápagos finches vary in structure, there is a close resemblance between these species in plumage, calls, nests, and eggs. These species do not interbreed and do not compete for food.

Statement

Isolation from the South American mainland and different habitats on the Galápagos Islands are important factors in the production of new species.

What is the relationship between the statement and the information given?

- A) The statement is supported by the information given.
  - B) The statement is not supported by the information given.
  - C) The statement is contradicted by the information given.
  - D) No relevant information is given regarding the statement.
-

41. Information related to the organisms found on Earth during various geological time periods is represented in the chart below.

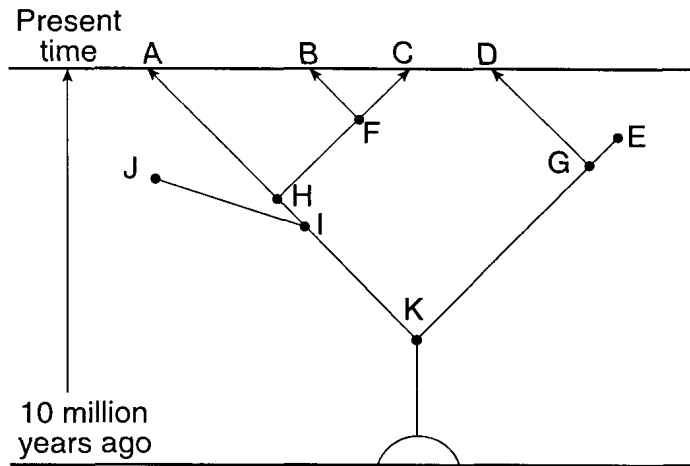
Common Organisms				
Time	4.6 (?) Billion Years Ago	600 Million Years Ago	200 Million Years Ago	60 Million Years Ago
Era	Precambrian (Simple Multicellular Organisms and First Protists)	Paleozoic (Age of Amphibians, Fishes, and Invertebrates)	Mesozoic (Age of Reptiles)	Cenozoic (Age of Mammals)

Past ←————— Geologic Time —————→ Present

Which statement concerning the first appearance of the organisms over the time period represented in this chart is most likely correct?

- A) Life on Earth has remained the same.
- B) Life on Earth has changed from primitive organisms to more complex organisms.
- C) Life on Earth began with complex organisms and changed to more complex organisms.
- D) Life on Earth has changed rapidly.

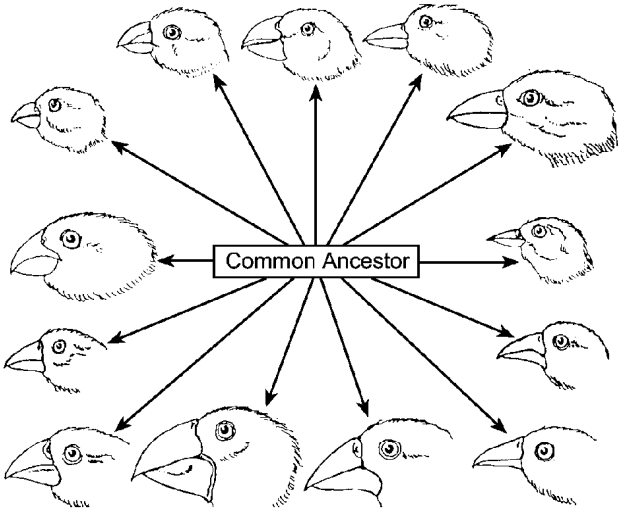
42. Base your answer to the following question on the diagram below. The diagram shows an interpretation of relationships based on evolutionary theory. The letters represent different species.



The diagram indicates that a common ancestor for species C and E is species

- A) F
- B) G
- C) H
- D) K

43. The diversity within the wild bird species in the diagram below can best be explained by which process?



- A) natural selection
- B) asexual reproduction
- C) ecological succession
- D) mitotic cell division

Base your answers to questions 44 and 45 on the chart below and on your knowledge of biology.

Species	Sequence of Amino Acids in the Same Part of the Hemoglobin Molecules
Human	Lys-Glu-His-Iso
Horse	Arg-Lys-His-Lys
Gorilla	Lys-Glu-His-Lys
Chimpanzee	Lys-Glu-His-Iso
Zebra	Arg-Lys-His-Arg

44. The information in the chart provides data that can help in the identification of possible evolutionary relationships from the study of comparative

- A) cytology
- B) embryology
- C) anatomy
- D) biochemistry

45. According to this information, the closest evolutionary relationship most likely exists between the

- A) human and the chimpanzee
- B) human and the gorilla
- C) chimpanzee and the gorilla
- D) horse and the zebra

46. People with diabetes can be treated with insulin extracted from cows and pigs. The fact that the insulin of cows, pigs, and humans is similar suggests that

- A) cows, pigs, and humans are of the same genus
- B) chemicals can readily adapt to changing environmental conditions
- C) an evolutionary relationship exists between mammals
- D) human cells are unable to recognize and destroy foreign chemicals

47. The results provided by the Miller-Urey experiment involving a simulated primitive environment, as described in the heterotroph hypothesis, shows that in this environment

- A) only inorganic molecules can be synthesized
- B) there is little possibility for the synthesis of complex molecules
- C) organic molecules can be synthesized from inorganic material
- D) only complex nucleic acid molecules can be synthesized

48. Evolution that results from a shift in the genotypic frequencies because of a random reduction in population size is known as

- A) natural selection
- B) genetic drift
- C) chromosomal mutation
- D) speciation

49. Which of the following best describes the theory of endosymbiosis?

- A) A prokaryotic cell takes up genes from the surrounding environment.
- B) An organism will benefit from the symbiotic relationship, while neither is harmed.
- C) Some organelles were once small prokaryotes.
- D) Prokaryotes are composed of elements from the nonliving components of the environment.

50. The tonsils and appendix are examples of

- A) vestigial structures
- B) balance polymorphism
- C) divergent evolution
- D) homologous structures
- E) analogous structures