

TEKS 7A analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

1. Given the information in the table below.

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

The closest evolutionary relationship most likely exists between the

- A Human and the gorilla
- B Human and the chimpanzee
- C Chimpanzee and the gorilla
- D Horse and the zebra

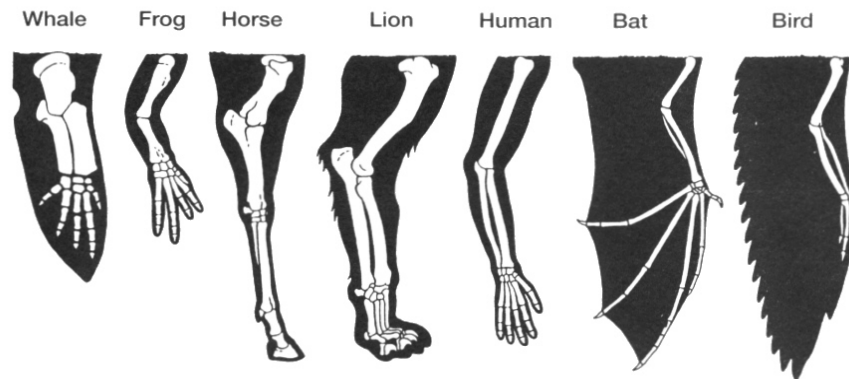
2. Which two species are least_closely related?

Number of Amino Acid Differences between Species

	Species 1	Species 2	Species 3	Species 4
Species 1	0	74	7	65
Species 2	74	0	29	13
Species 3	7	29	0	81
Species 4	65	13	81	0

- A Species 1 & 2
- B Species 1 & 3
- C Species 2 & 3
- D Species 3 & 4

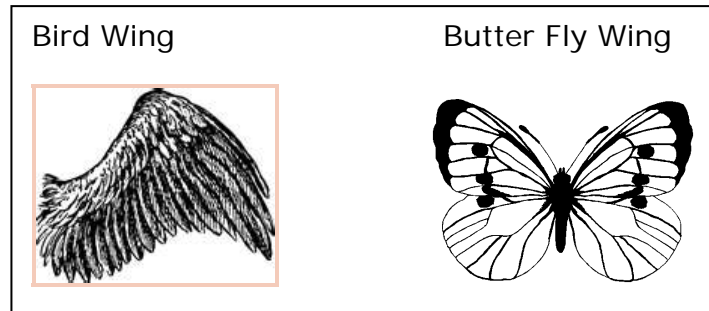
Use the diagram below for questions 3 - 5.



3. The similarities in the human arm and bat wing indicates that they-
 - A May share a common ancestor.
 - B Are competitive with each other
 - C Eat the same foods
 - D Are both birds.

4. Which statement best represents the illustration?
 - A All of the above animals are mammals.
 - B All of the above share homologous structures.
 - C All of the above structures show no evidence of relationship.
 - D All of the above animals evolved in the same habitat.

5. The diagram above #3 represents an example of what type of homology?
 - A Vertebrate homology
 - B Molecular homology
 - C Biogeographical homology
 - D Anatomical homology



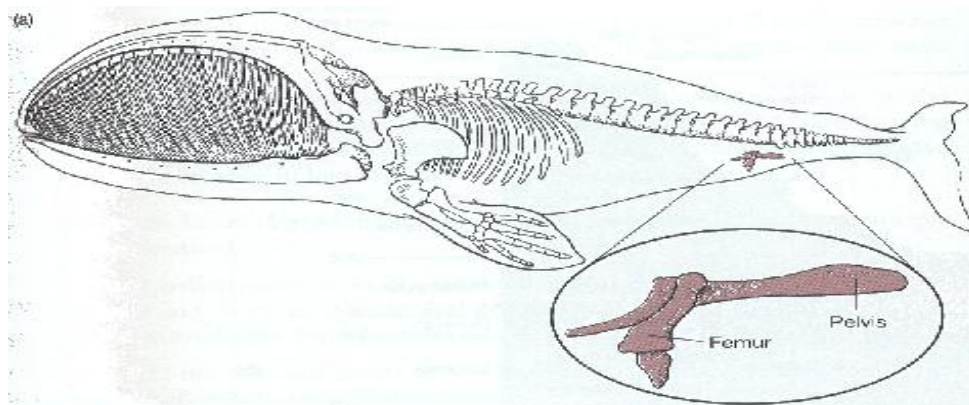
6. The illustration above shows the structures of two unrelated species. Each have a similar function but are different in structure. This is an example of -

- A** Vestigial structures
- B** Cyclic structures
- C** Analogous structures
- D** Homologous structures

7. The fossils of an extinct amphibian can be found in South America, Africa, and Australia. Which of the following statements best describes this occurrence?

- A** These continents were once next to one another before the process of continental drift separated them.
- B** Underwater tunnels once connected these continents.
- C** Ancient amphibians were able to swim long distances and cross oceans that separated the continents.
- D** The same amphibians evolved separated in three different areas of the world.

8. In the diagram below is a whale, the bones labeled "pelvis" and "femur" appear to be useless.



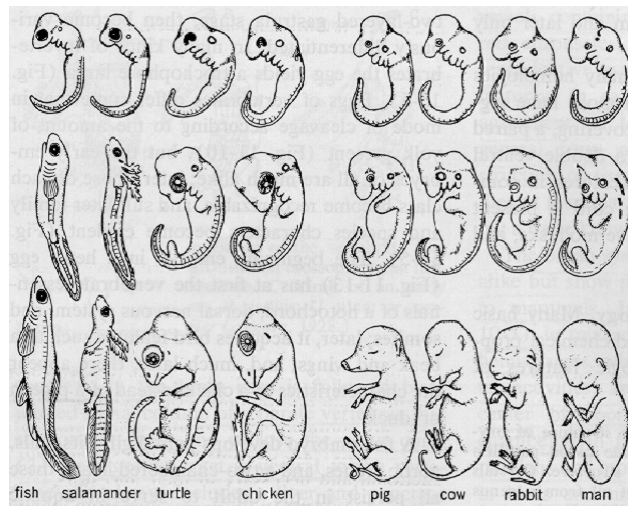
The possibility that these bones were once useful gives support to the -

- A** Method of artificial reproduction
- B** Modern theory of evolution
- C** Process of fossil formation
- D** Concept of regeneration

9. _____ structures are structures found in an organism that serve no known function.

- A** Convergent
- B** Embryonic
- C** Vestigial
- D** Homologous

10. The diagram below represents stages in embryonic development of eight organisms.



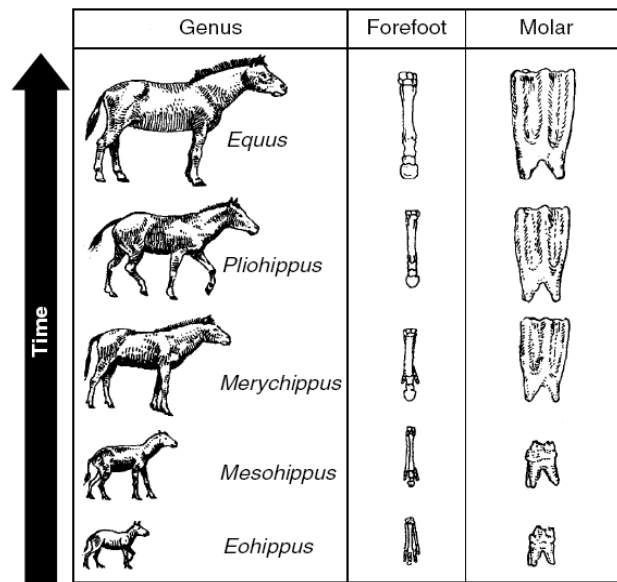
The similarities in embryonic development shown in the diagrams suggest that these organisms -

- A** All undergo external development.
- B** May have evolved from a common ancestor.
- C** Are all members of the same species.
- D** Have adaptation for the same environment as adults.

11. A study of the embryos of a red squirrel, an owl, and a beaver showed that the beaver and the red squirrel appear to be most closely related. This conclusion would be reasonable if the scientist observed that -

- A** the beaver embryo looked most similar to the owl embryo.
- B** the owl embryo looked most similar to the red squirrel embryo.
- C** the beaver, red squirrel, and owl embryos all looked the same.
- D** the red squirrel embryo looked most similar to the beaver embryo.

Evolution of the Modern Horse



12. The diagram illustrates how some characteristics of the horse have changed over time. Which of the following is an anatomical difference between the modern horse and its ancestors?

- A The structure of the tooth has been adapted for eating meat.
- B The length of the forefoot has decreased.
- C The size of the molar has increased.
- D The number of toes has increased.

13. A biologist discovers two new species of birds, one in North America and one in Northern Canada. While slightly different, they resemble each other closely. Which type of evidence would be most useful in determining whether or not these organisms are closely related?

- A The geologic history of the two areas revealed in the fossil record
- B Analysis of the ecosystems in which the two species live
- C Analysis of the breeding and embryo development of the two species
- D A comparison of DNA from the two species

Homologous body structures are anatomical similarities between two or more organisms. An example is the limbs of reptiles, birds, and mammals. While all of these limbs are formed from the same tissue, they have evolved to have different phenotypes; forming arms, wings, and legs.

14. The given excerpt suggests that all four-limbed animals are descended from a common four-limbed ancestor. Based on this assumption, which of the following statements most accurately explains why all bird species are more closely related to each other than to bats?

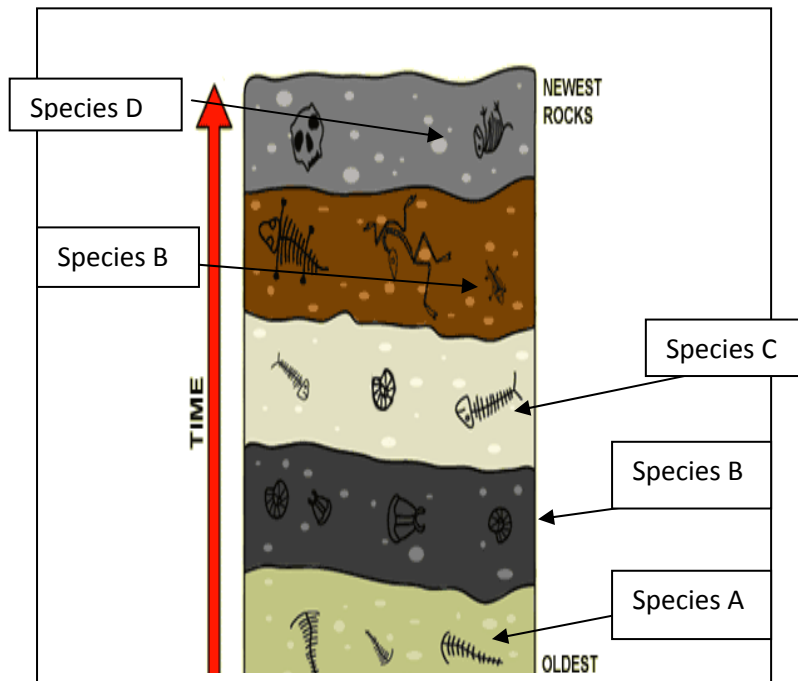
- A** All modern bird species are directly evolved from earlier birds, and bats branched off from a common ancestor.
- B** Modern bird species branched on the evolutionary tree, and bats have not evolved since then.
- C** No modern bird species ever shared a common ancestor with bats.
- D** This is an untrue statement; because bats fly, they are more closely related to flying birds than flying birds are to flightless birds.

15. Which factor may have played a role in the development of the polar bear in Alaska and the brown bear in Russia into separate species?

- A** geographic isolation
- B** mitotic cell division
- C** temporal isolation
- D** artificial selection

TEKS 7B analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record

16. The diagram below represents a section of undisturbed sedimentary rock. The general location of fossils of several closely related species is indicated.



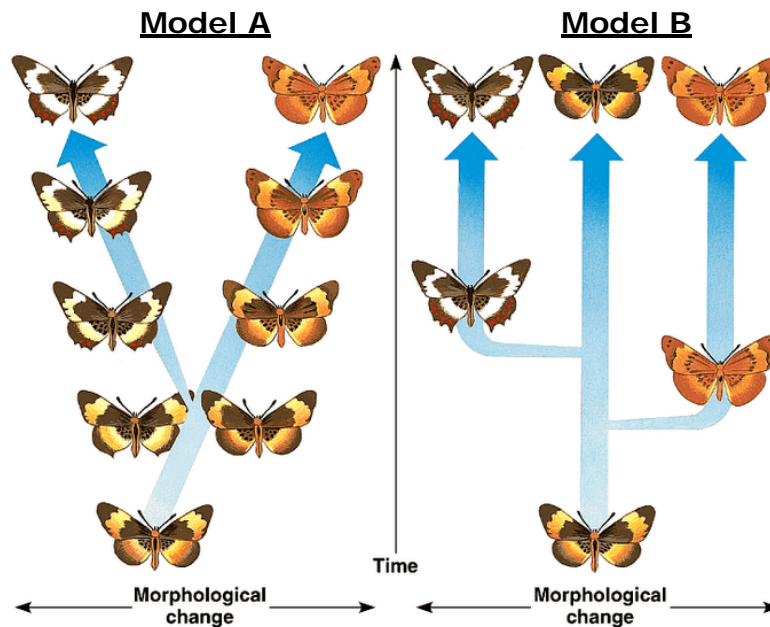
According to recently adapted evolutionary theory, which is the most probable correct assumption to be made concerning species A, B, C, and D?

- A** B was already extinct when C evolved.
- B** C evolved more recently than A, B, and D.
- C** D is the ancestor of A, B, and C.
- D** A is the ancestor of C and D.

17. Long periods of stasis in the fossil record, followed by short periods of significant evolutionary change, are explained by which model of evolution?

- A** Gradualism
- B** Evolution by genetic drift
- C** Punctuated equilibrium
- D** Evolution through geographic isolation

Use the following models of evolution for question 18.



18. What does Model A in the above diagram represent?

- A Gradualism
- B Evolution by genetic drift
- C Punctuated equilibrium
- D Evolution through geographic isolation

TEKS 7C analyze and evaluate how natural selection produces change in populations, not individuals

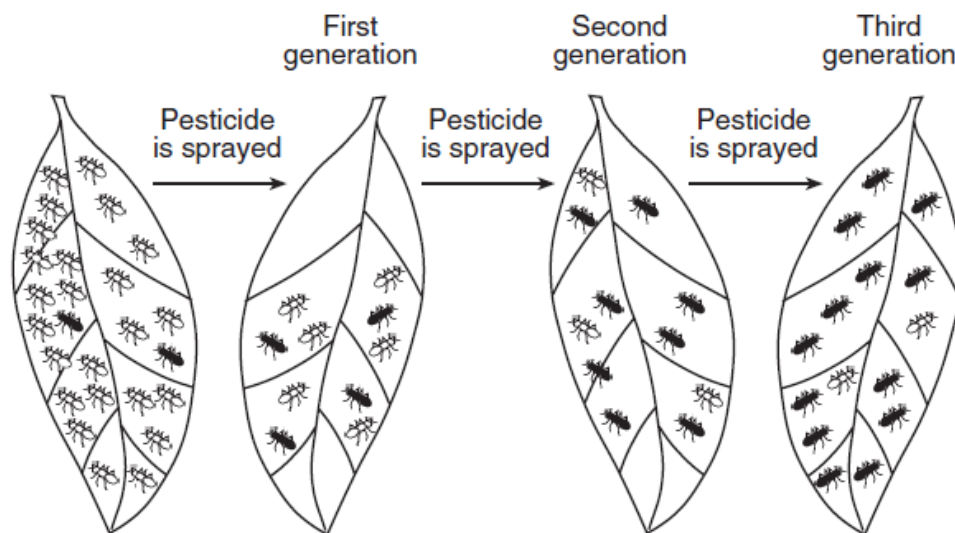
19. An Alaskan wolf tends to attack and kill animals that are weak rather than those that are strong. This tendency is most closely associated with the concept of -

- A Natural selection
- B Geographic isolation
- C Use and disuse
- D Punctuated equilibrium



20. Certain insects resemble the twigs of trees. Based on modern evolutionary theory, the most probable explanation for this is that -

- A** A mutation that caused the resemblance.
- B** The insects ate the wood
- C** Genes were transferred from the trees to the insects.
- D** Predation of insects resembling twigs of trees occurred.



21. The diagram above 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

22. Which of the following best explains how natural selection occurs?

- A** Individuals acquire traits during their lives that they pass on to offspring.
- B** Only individuals with adaptive traits want to reproduce and pass their traits to offspring.
- C** Traits are genetically based, and individuals with adaptive traits are more likely to survive and pass on their traits to offspring.
- D** When organisms reproduce, they pass along only their most useful traits to offspring.

TEKS 7D analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

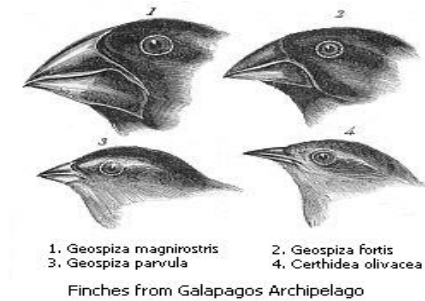
23. According to fossil records, the horses that lived 50 million years ago were much smaller, weaker, and slower than modern horses. Which process is most likely responsible for the changes that have led to the increased size, strength, and speed in horses?

- A** commensalism
- B** inbreeding
- C** migration
- D** natural selection

24. The long-term survival of any species of organism is possible only if the organisms can -

- A** migrate when temperatures change
- B** reproduce successfully
- C** find protection from predators
- D** locate a constant food source

25. Why might a species of finch have a slightly shorter beak than its ancestors' beaks?



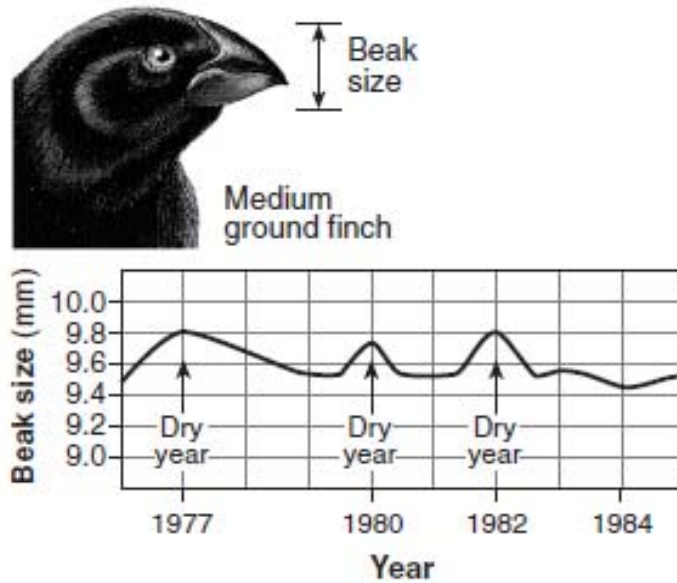
- A** The ancestor finches had a viral fungi that eroded the keratin of the beaks to the size they are today.
- B** The shorter-beaked finches had a feeding advantage that became more successful over time.
- C** The shorter-beaked finches had beaks that were worn down from overuse.
- D** The shorter beaked finches resulted from a finch mating with a different species.

26. What is the survival value of a fish or frog species that lays hundreds of eggs each time it reproduces compared to a species which lays only a single egg?

- A** More eggs laid increases the likelihood that more males will be attracted to the eggs for fertilization.
- B** Single-egged laying species are generally more reproductively efficient and do not need to lay multiple eggs.
- C** More eggs laid increases the likelihood that more offspring will survive predation or failed fertilization.
- D** There is no survival value for the species, only for the individual.

Use the following information for questions 27 and 28.

Average beak sizes of the seed-eating medium ground finch on one of the Galapagos Islands are shown in the diagram below. During wet years, all types of seeds are abundant. The medium ground finch prefers to eat small seeds that are easy to crush. However, during droughts (dry years), when small seeds are not as abundant, they eat the larger seeds on the island.



27. How might an extended period of drought influence the ground finch population?

- A The birds with smaller beaks would be more numerous.
- B The birds with larger beaks would be more numerous.
- C Drought decreases seed availability, but has no influence on the ground finch.
- D Drought increases seed availability, and all ground finches would be more numerous.

28. The most likely explanation for this variation in the beak size of the medium ground finch is that –

- A the birds acquired larger beaks so they could take advantage of the supply of small seeds
- B the birds with smaller beaks mutated due to the drought so they produced more offspring
- C different adaptations gave some birds a better chance for survival
- D the environment caused the birds to exercise their beaks

TEKS 7E analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species

29. How does genetic diversity help the process of natural selection and aid the survival of a population?

- A** There are fewer mutations within the gene pool
- B** There is a reduced predation of the population members.
- C** There is an increased chance for beneficial traits within the gene pool.
- D** There is less competition between the population members.

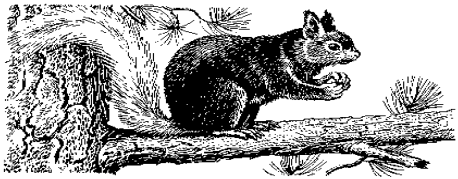
30. Natural selection and its evolutionary consequences provide a scientific explanation for each of the following except—

- A** the fossil record
- B** protein and DNA similarities between different organisms
- C** similar structures among different organisms
- D** a stable physical environment



31. Some variants of white clover produced cyanide (CN), which is a powerful poison. What advantage does a plant gain by producing cyanide?

- A** Cyanide increases its ability to resist predation because the snails that eat it die.
- B** Cyanide makes it more efficient at gas exchange in respiration and photosynthesis.
- C** Cyanide toxins leach into the ground water and eliminated competitive plants within it niche.
- D** Cyanide makes the clover plant larger so it can withstand some predation and still survive.



Kaibab Squirrel (North Rim)
Sciurus kaibabensis

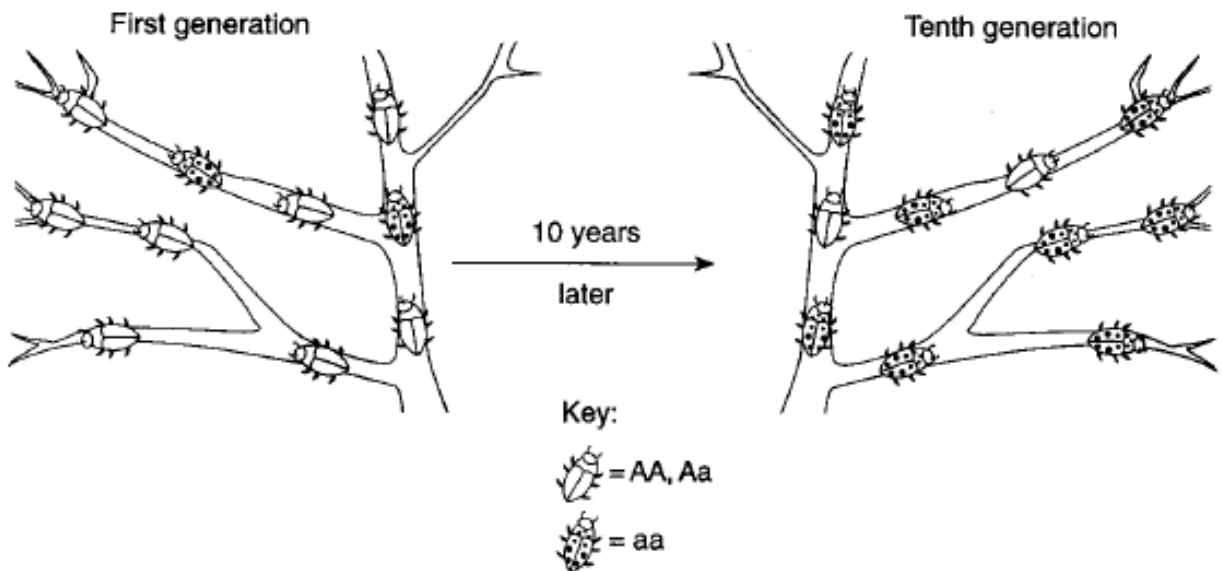


Abert Squirrel (South Rim)
Sciurus aberti

Two squirrel varieties (the Abert squirrel and the Kaibab squirrel) have a common ancestor that lived in Northern Arizona. About 10,000 years ago, the Grand Canyon was carved out of land in Northern Arizona, leaving populations of the ancestral squirrel species separated from one another. Today, in the area of the Grand Canyon, the Abert squirrel lives only on the canyon's south rim, while the Kaibab squirrel lives on the north rim.

32. What type of speciation has occurred between these two varieties of squirrels?

- A Reproductive isolation
- B Disruptive selection
- C Temporal isolation
- D Behavioral isolation

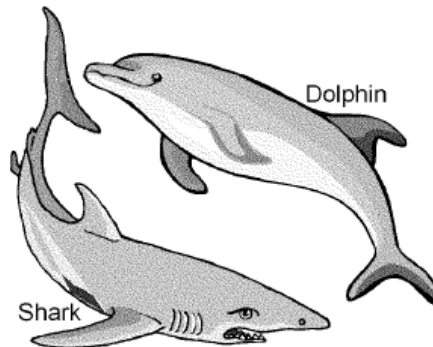


33. The diagram above illustrates the change that occurred in a bug population over 10 years, a probable explanation for this change would be that over time there was –

- A A decrease in the ability of gene "a" to adapt
- B An increase in the ability of gene "a" to adapt
- C An increase in the population of the insect
- D A decrease in the mutation rate of gene "A"

34. For many decades, doctors prescribed penicillin to fight bacterial infections. As explained by natural selection, how did so many bacterial populations become resistant to the original form of penicillin?

- A** The presence of penicillin was an environmental pressure that selected for bacteria that were resistant to it.
- B** The use of penicillin induced mutations that promote penicillin resistance.
- C** Different bacterial species evolved due to behavioral isolation.
- D** Different bacterial species evolved due to geographic isolation.



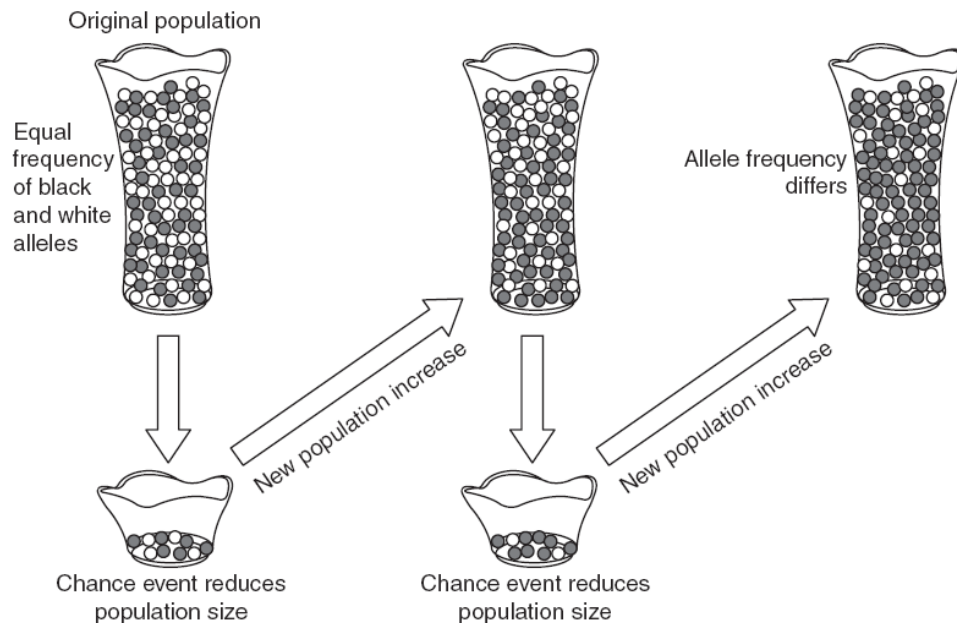
35. Sharks and dolphins are very different organisms even though they look very much alike. The process in which these unrelated organisms evolved to resemble each other is known as –

- A** adaptive radiation
- B** convergent evolution
- C** punctuated equilibrium
- D** gradualism

36. In regards to Darwin's finches, more than a dozen species evolved from a single species. Which of the following patterns of evolution does this represent?

- A** coevolution
- B** convergent evolution
- C** extinction
- D** adaptive radiation

TEKS 7F analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination



37. The model shows a demonstration a student prepared using black and white marbles to show how populations of organisms can change. Which of the following concepts is best illustrated by this demonstration?

- A Evolution of a predatory species
- B Genetic drift accompanying natural selection
- C Environmentally induced genetic mutations
- D Immunity from virulent microorganisms

38. A small spider mite species has populations on several islands in the South Pacific. They live inside coconuts and exclusively eat smaller insects on the outer husk of the coconuts. During heavy storms, coconuts containing the spider mites can be carried from one island to another where the mites successfully breed with members of the same species on the new island. This is an example of –

- A Bottleneck
- B Mutation
- C Gene flow
- D Gene recombination

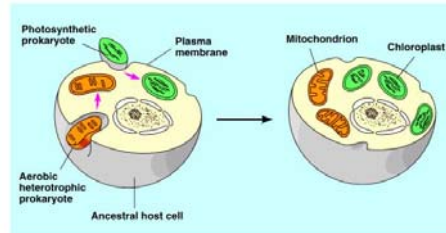
TEKS 7G analyze and evaluate scientific explanations concerning the complexity of the cell

39. Which of the following best describes early cellular life?

- A** The first cells were photosynthetic and did not require oxygen.
- B** The first cells were anaerobic and broke apart small molecules for energy.
- C** The first cells took in oxygen from fresh water.
- D** The first cells were very similar to present-day eukaryotic cells.

40. The endosymbiotic theory is a scientific explanation concerning the complexity of the cell.

Endosymbiotic Hypothesis for the Origin of Mitochondria and Chloroplasts

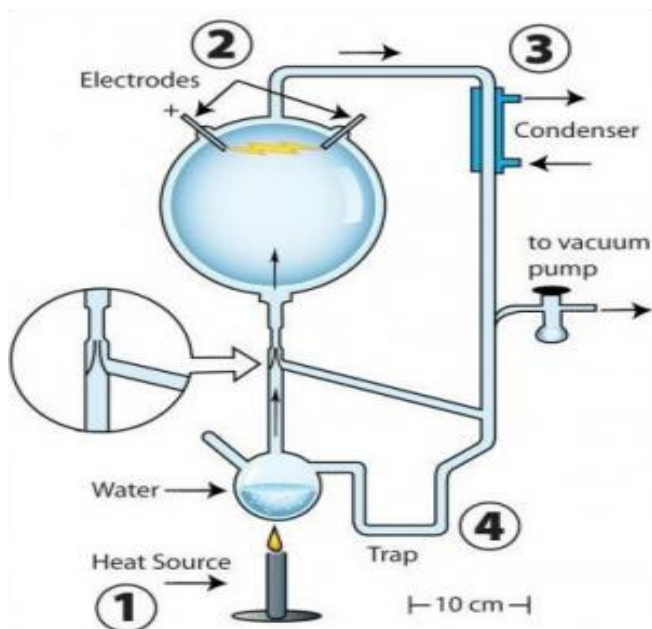


It is the theory that the mitochondria and chloroplasts contained within modern animal and plant cells were once free living bacteria that were engulfed by another bacterial cell leading to the _____ cell.

A. Eukaryotic

B. Prokaryotic

TEKS 9D analyze and evaluate the evidence regarding formation of simple organic molecules and their organization into long complex molecules having information such as the DNA molecule for self-replicating life



41. Scientists have duplicated the chemical conditions of the early oceans and atmosphere inside an apparatus in a controlled laboratory experiment. The chemicals were subjected to an energy source in the form of electric sparks. The resulting compounds of the classical experiment were

- A Unchanged from the original compounds.
- B Functional mitochondria and chloroplasts.
- C Organic molecules and simple amino acids.
- D Inorganic molecules and electrons.

42. Which two scientists conducted an experiment that simulated conditions present on the primitive Earth and tested for the occurrence of chemical evolution?

- A Miller and Urey
- B Oparin and Haldane
- C Watson and Crick
- D Darwin and Lamarck

TEKS 12B compare variations and adaptations of organisms in different ecosystems

Plant Characteristics

- Grows in clusters and low to the ground
- Able to grow under a layer of snow
- Carries out photosynthesis at temperatures below freezing
- Flowers very quickly and briefly during summer
- Produces small, moisture-retaining leaves

43. The box lists some characteristics of a plant that has adapted to conditions in its environment. To which type of environment is the plant best adapted?

- A** Desert
- B** Grassland
- C** Tundra
- D** Rain forest

44. Some mesquite trees have deeper roots than any other plant in the desert. How are deep roots an adaptation for survival in the desert?

- A** Deep roots can protect the tree from predators.
- B** Roots encounter cooler conditions far below the desert surface.
- C** Roots can extend great distances to reach water.
- D** Deep roots interact with beneficial bacteria below the surface.

45. Cacti grow slowly compared to most other plants. The fact that cacti keep their stomata closed for much of the day can help explain this growth characteristic. Which of these best explains the advantage of keeping stomata closed during the day?

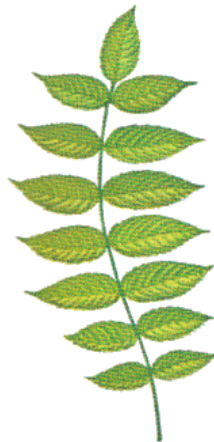
- A It limits water loss through transpiration.
- B It conserves oxygen produced in photosynthesis.
- C It recycles carbon dioxide within plant systems.
- D It protects plant tissues from predators.

Questions 46-47 refer to the following:

Leaves vary in form; each leaf form is an adaptation that helps the plant survive in certain environments. The leaves in the figure are similar in size and come from different plant species.



Simple Leaf



Compound Leaf




Succulent Leaf

46. The compound leaf shown in the diagram is an adaptation that has advantages over the simple leaf in certain environments. These leaves have most likely adapted for what type of environment?

- A Windy environments; The compound leaf lets the wind pass more easily between the leaflets the wind pass more easily between the leaflets while the simple leaf is likely to tear in high winds.
- B Dry environments; The compound leaf has less surface area through which to lose water than the simple leaf.
- C Insect-infested damp areas; The compound leaf allows the plant to survive since the leaflets don't support the weight of predatory insects.
- D Cold environments; The compound leaf allows the plant to survive because the smaller leaflets lose less heat than the large simple leaf.


47. The succulent leaf shown in the diagram is an adaptation that has advantages over the simple leaf in a certain environment. These leaves have most likely adapted for what type of environment?

- A Drought conditions; The fleshy succulent leaf allows the plant to store more water than the simple leaf.
- B Flood conditions; The succulent leaf is lighter which allows it to float and replant itself better than the simple leaf.
- C Windy environments; The spongy succulent leaf bends more easily than the simple leaf.
- D Cloudy environments; The succulent leaf's thick, rounded shape is more efficient at capturing sunlight from all directions than the flat simple leaf.

	<p>Burro</p> <p>Adaptation: can tolerate water loss as much as 30% of their body weight and replenish it only in 5 minutes.</p>
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48. Which of the following ecosystems does the organism above live in?

- A Cold Environment
- B Wet Environment
- C Dry/Hot Drought Environment
- D Moderate Temperature and Rainfall Environment

	<p>Lung-less Salamanders</p> <p>Adaptation: They survive by breathing entirely through their skin and the tissue lining in their mouths. Their skin and mouths must keep moist in order to respire.</p>
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49. Which of the following ecosystems does the organism above live in?

- A Cold Environment
- B Wet Environment
- C Dry/Hot, Drought Environment
- D Moderate Temperature and Rainfall Environment