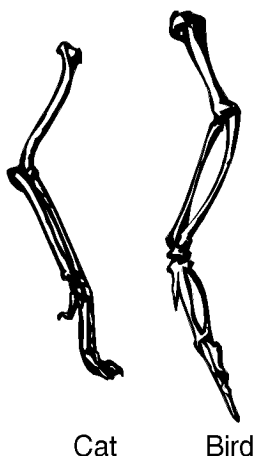


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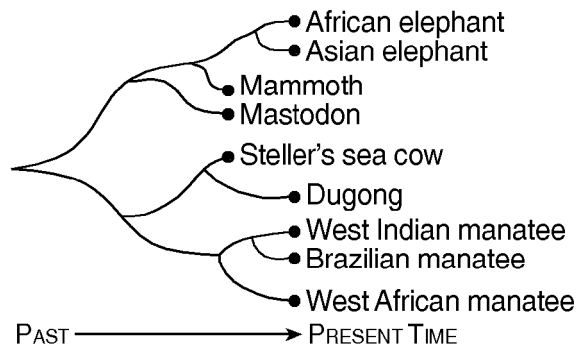
- 1) The diagram below shows the bones in the forelimbs of two different vertebrate species.



The position and structure of these bones could *best* be used to make inferences about the

- A) food preferences of these vertebrate species
 - B) intelligence of these vertebrate species
 - C) history of these vertebrate species
 - D) reproductive behavior of these vertebrate species
- 2) Meiosis and fertilization are important processes because they may most immediately result in
- A) natural selection
 - B) immune responses
 - C) many body cells
 - D) genetic variation
- 3) In an area in Africa, temporary pools form where rivers flow during the rainy months. Some fish have developed the ability to use their ventral fins as "feet" to travel on land from one of these temporary pools to another. Other fish in these pools die when the pools dry up. What can be expected to happen in this area after many years?
- A) The fish using ventral fins as "feet" will develop real feet.
 - B) "Feet" in the form of ventral fins will develop on all fish.
 - C) All of the varieties of fish will survive and produce many offspring.
 - D) The fish using ventral fins as "feet" will be present in increasing numbers.
- 4) Which population of organisms would be in *greatest* danger of becoming extinct?
- A) A population of organisms having many variations living in an unstable environment.
 - B) A population of organisms having many variations living in a stable environment.
 - C) A population of organisms having few variations living in a stable environment.
 - D) A population of organisms having few variations living in an unstable environment.

- 5) The relationship of some mammals is indicated in the diagram below.

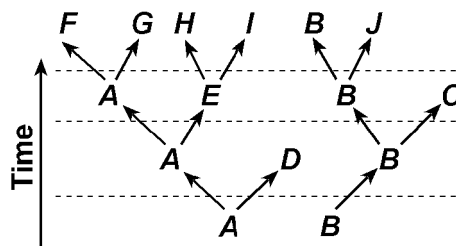


Which statement about the African elephant is correct?

- A) It is more closely related to the West Indian manatee than it is to the mastodon.
- B) It is more closely related to the mammoth than it is to the West African manatee.
- C) It is the ancestor of Steller's sea cow.
- D) It is not related to the Brazilian manatee or the mammoth.

Questions 6 and 7 refer to the following:

Letters *A* through *J* represent different species of organisms. The vertical distances between the dotted lines represent long periods of time in which major environmental changes occurred.

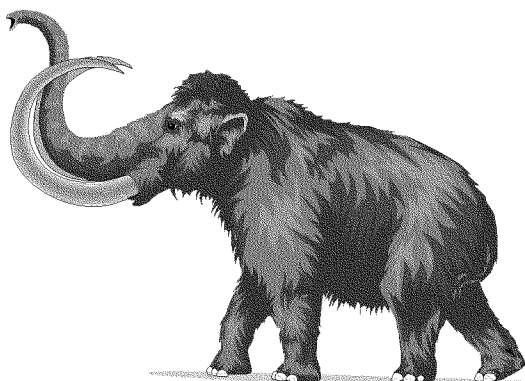


- 6) Which species was the first to become extinct?
- A) *J*
 - B) *E*
 - C) *C*
 - D) *D*
- 7) Which species appears to have been *most* successful in surviving changes in the environment over time?
- A) *A*
 - B) *B*
 - C) *C*
 - D) *H*
- 8) Which statement *best* illustrates a rapid biological adaptation that has actually occurred?
- A) Paving large areas of land has decreased habitats for certain organisms.
 - B) Pesticide-resistant insects have developed in certain environments.
 - C) The characteristics of sharks have remained unchanged over a long period of time.
 - D) Scientific evidence indicates that dinosaurs once lived on land.

- 9) Organism *X* appeared on Earth much earlier than organism *Y*. Many scientists believe organism *X* appeared between 3 and 4 billion years ago, and organism *Y* appeared approximately 1 billion years ago. Which row in the chart below most likely describes organisms *X* and *Y*?

Row	Organism <i>X</i>	Organism <i>Y</i>
(1)	simple multicellular	unicellular
(2)	complex multicellular	simple multicellular
(3)	unicellular	simple multicellular
(4)	complex multicellular	unicellular

- A) Row 1
B) Row 2
C) Row 3
D) Row 4
- 10) Explain why, in a mammal, a mutation in a gamete may contribute to evolution while a mutation in a body cell will *not*.
- 11) The diagram below represents a woolly mammoth, a relative of the modern elephant. Woolly mammoths lived during the Ice Age and eventually became extinct.

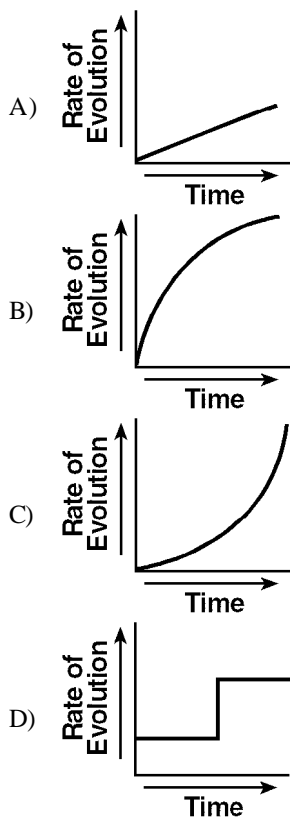


State *one* possible reason this species died out.

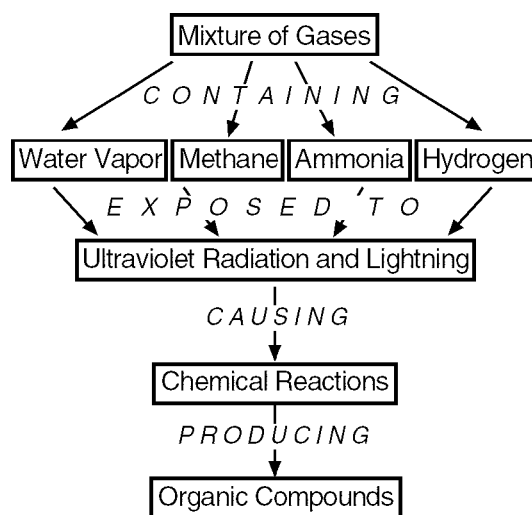
- 12) Evolution can *best* be described as
- A) the formation of fossils
B) a process of growth in an organism
C) a process of change through time
D) the change in size of body structures through use and disuse
- 13) Most species on Earth have changed through time. This change is known as
- A) geology
B) ecology
C) isolation
D) evolution

- 14) In an attempt to explain the diversity of species, scientists have developed the
- A) lock-and-key model of enzyme specificity
B) cell theory
C) fluid mosaic model of the cell membrane
D) theory of evolution
- 15) In Yellowstone National Park, some species of algae and bacteria can survive and reproduce in hot springs at temperatures near the boiling point of water. The ability to survive and reproduce at these temperatures is an example of
- A) adaptation
B) aggregate formation
C) artificial selection
D) reproductive isolation
- 16) Some variations within species are the result of
- A) asexual reproduction
B) vegetative propagation
C) sexual reproduction
D) mitosis
- 17) Who proposed a theory of evolution stating that acquired characteristics can be passed on to the next generation?
- A) Crick
B) Weismann
C) Morgan
D) Lamarck
- 18) Which statement would most likely have been used by Lamarck to explain the development of a long trunk in elephants?
- A) Elephants with longer trunks had a higher survival rate, and the longer trunk was passed on.
B) A mutation occurred, and its frequency increased in later generations.
C) Elephants with short trunks were most likely sterile.
D) Elephants stretched their trunks to reach a food supply, and this longer trunk was passed on.
- 19) The idea that new species of organisms develop by means of variations and natural selection was developed by
- A) Jean Lamarck
B) Charles Darwin
C) August Weismann
D) James Watson
- 20) A wolf in Alaska 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) use and disuse
B) punctuated equilibrium
C) natural selection
D) geographic isolation
- 21) Which individual would have used the theory of natural selection to explain the change in toe structure that occurred in the evolution of the horse?
- A) Lamarck
B) Linnaeus
C) Darwin
D) Mendel

- 22) Which concept was *not* included in Darwin's theory of evolution?
- production of more offspring than can survive
 - struggle for survival between organisms
 - sorting out and recombination of genes
 - development of new species from a common ancestor
- 23) According to Charles Darwin, one factor that affects the evolution of a species is
- exposure to environmental pollutants
 - rapid fossil formation
 - survival of the fittest
 - variation due to genetic mutations
- 24) Which concept states that species have long periods of stability interrupted by geologically brief periods of significant change during which new species may evolve?
- competition
 - gradualism
 - geographic isolation
 - punctuated equilibrium
- 25) Which graph *best* represents the rate of evolution described by the concept of punctuated equilibrium?

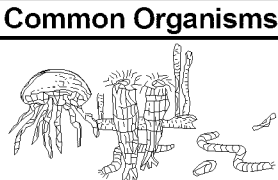





- 26) One theory about the extinction of dinosaurs is that the collision of an asteroid with the Earth caused environmental changes that killed off the dinosaurs in a relatively short time, changing the course of evolution. This theory is an example of which evolutionary concept?
- gradualism
 - competition
 - punctuated equilibrium
 - the heterotroph hypothesis
- 27) 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?
- geographic isolation
 - artificial selection
 - mitotic cell division
 - asexual reproduction
- 28) Which concept is represented in the diagram below?



- gene-chromosome theory
 - heterotroph hypothesis
 - use and disuse
 - theory of natural selection
- 29) Which statement is part of the heterotroph hypothesis?
- Atmospheric oxygen was present before carbon dioxide.
 - Heterotrophs evolved before autotrophs.
 - Proteins were present before amino acids.
 - Aerobes evolved before anaerobes.
- 30) According to the heterotroph hypothesis, what contribution did ultraviolet light, heat, and lightning make to the formation of the first organic molecules?
- They metabolized inorganic substances.
 - They synthesized radioactive materials.
 - They provided energy sources.
 - They hydrolyzed dissolved particles.

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

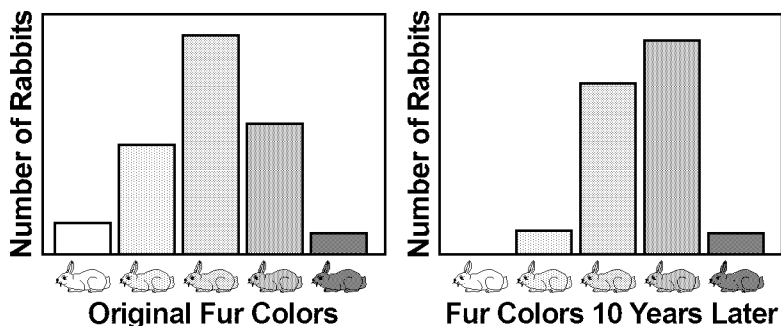
Common Organisms	Time	Era
	4.6 (?) Billion Years Ago	PRECAMBRIAN (Simple Multicellular Organisms and First Protists)
	600 Million Years Ago	PALEOZOIC (Age of Amphibians, Fishes, and Invertebrates)
	200 Million Years Ago	MESOZOIC (Age of Reptiles)
	60 Million Years Ago	CENOZOIC (Age of Mammals)

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

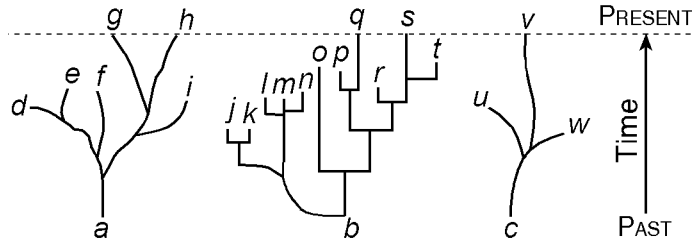
32) The diagram below illustrates the change that occurred in the physical appearance of a rabbit population over a 10-year period.



Which condition would explain this change over time?

- A) an increase in the advantage of having white fur
- B) an increase in the chromosome number of the rabbits with black fur
- C) a decrease in the mutation rate of the rabbits with black fur
- D) a decrease in the advantage of having white fur

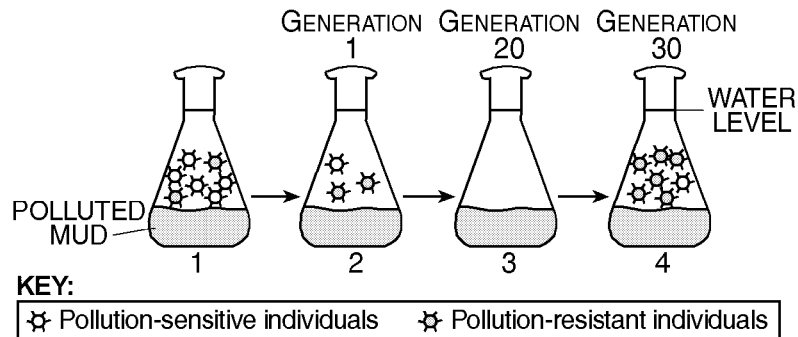
33) According to some scientists, patterns of evolution can be illustrated by the diagrams below.



Which statement *best* explains the patterns seen in these diagrams?

- A) The organisms at the end of each branch can be found in the environment today.
 - B) These patterns cannot be used to illustrate the evolution of extinct organisms.
 - C) Evolution involves changes that give rise to a variety of organisms, some of which continue to change through time while others die out.
 - D) The organisms that are living today have all evolved at the same rate and have undergone the same kinds of changes.
- 34) Over the last 30 years, a part of the Hudson River known as Foundry Cove has been the site for many factories that have dumped toxic chemicals into the river. Some of these pollutants have accumulated in the mud at the bottom of the river. The polluted cove water contains many single-celled organisms and simple multi-cellular animals. Curiously, when the same species from nearby regions with non-polluted sediments are moved to the polluted cove water, they die.

Scientists hypothesized that the organisms living in the cove have evolved so that they are able to survive in polluted water. To test this hypothesis, biologists tried to duplicate the history of the cove in the laboratory. They took a large number of one species of simple animal from a cove with unpolluted mud and placed them in a flask that contained polluted mud from Foundry Cove (diagram 1). Most of the animals died, but a few survived (diagram 2). The scientists then bred the survivors with each other for several generations producing offspring that were descendants of the survivors. When placed in Foundry Cove, most of these descendants survived. The diagrams below represent the steps in this investigation.



On the diagram of the flask below, sketch the animals that would be present in flask 3 after several generations of breeding in the laboratory.

