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Paleontologists have argued for a long time that the demise of the dinosaurs was caused by climatic alterations associated with slow changes in the positions of continents and seas resulting from plate tectonics. Off and on throughout the Cretaceous (the last period of the Mesozoic era, during which dinosaurs flourished), large shallow seas covered extensive areas of the continents. Data from diverse sources, including geochemical evidence preserved in seafloor sediments, indicate that the Late Cretaceous climate was milder than today's. The days were not too hot, nor the nights too cold. The summers were not too warm, nor the winters too frigid. The shallow seas on the continents probably buffered the temperature of the nearby air, keeping it relatively constant. At the end of the Cretaceous, the geological record shows that these seaways retreated from the continents back into the major ocean basins. No one knows why. Over a period of about 100,000 years, while the seas pulled back, climates around the world became dramatically more extreme: warmer days, cooler nights; hotter summers, colder winters. Perhaps dinosaurs could not tolerate these extreme temperature changes and became extinct. If true, though, why did cold-blooded animals such as snakes, lizards, turtles, and crocodiles survive the freezing winters and torrid summers? These animals are at the mercy of the climate to maintain a livable body temperature. It's hard to understand why they would not be affected, whereas dinosaurs were left too crippled to cope, especially if, as some scientists believe, dinosaurs were warm-blooded. Critics also point out that the shallow seaways had retreated from and advanced on the continents numerous times during the Mesozoic, so why did the dinosaurs survive the climatic changes associated with the earlier fluctuations but not with this one? Although initially appealing, the hypothesis of a simple climatic change related to sea levels is insufficient to explain all the data. Dissatisfaction with conventional explanations for dinosaur extinctions led to a surprising observation that, in turn, has suggested a new hypothesis. Many plants and animals disappear abruptly from the fossil record as one moves from layers of rock documenting the end of the Cretaceous up into rocks representing the beginning of the Cenozoic (the era after the Mesozoic). Between the last layer of Cretaceous rock and the first layer of Cenozoic rock, there is often a thin layer of clay. Scientists felt that they could get an idea of how long the extinctions took by determining how long it took to deposit this one centimeter of clay and they thought they could determine the time it took to deposit the clay by determining the amount of the element iridium (Ir) it contained. Ir has not been common at Earth's since the very beginning of the planet's history. Because it usually exists in a metallic state, it was preferentially incorporated in Earth's core as the planet cooled and consolidated. Ir is found in high concentrations in some meteorites, in which the solar system's original chemical composition is preserved. Even today, microscopic meteorites continually bombard Earth, falling on both land and sea. By measuring how many of these meteorites fall to Earth over a given period of time, scientists can estimate how long it might have taken to deposit the observed amount of Ir in the boundary clay. These calculations suggest that a period of about one million years would have been required. However, other reliable evidence suggests that the deposition of the boundary clay could not have taken one million years. So the unusually high concentration of Ir seems to require a special explanation. In view of these facts, scientists hypothesized that a single large asteroid, about 10 to 15 kilometers across, collided with Earth, and the resulting fallout created the boundary clay. Their calculations show that the

impact kicked up a dust cloud that cut off sunlight for several months, inhibiting photosynthesis in plants; decreased surface temperatures on continents to below freezing; caused extreme episodes of acid rain; and significantly raised long-term global temperatures through the greenhouse effect. This disruption of food chain and climate would have eradicated the dinosaurs and other organisms in less than fifty years.

question 1

According to paragraph 1, which of the following is true of the Late Cretaceous climate?

- A Summers were very warm and winters were very cold.
- B Shallow seas on the continents caused frequent temperature changes.
- C The climate was very similar to today' s climate.
- D The climate did not change dramatically from season to season.

question 2

Which of the following reasons is suggested in paragraph 2 for the extinction of the dinosaurs?

- A Changes in the lengths of the days and nights during the late Cretaceous period
- B Droughts caused by the movement of seaways back into the oceans
- C The change from mild to severe climates during the Late Cretaceous period
- D An extreme decrease in the average yearly temperature over 10,000 years

question 3

Why does the author mention the survival of "snakes, lizards, turtles, and crocodiles" in paragraph 3?

- A To argue that dinosaurs may have become extinct because they were not cold-blooded animals
- B To question the adequacy of the hypothesis that climatic change related to sea levels caused the extinction of the dinosaurs

C To present examples of animals that could maintain a livable body temperature more easily than dinosaurs

D To support a hypothesis that these animals were not as sensitive to climate changes in the Cretaceous period as they are today

question 4

According to paragraph 3, which of the following is true of changes in climate before the Cretaceous period and the effect of these changes on dinosaurs?

A Climate changes associated with the movement of seaways before the Cretaceous period did not cause dinosaurs to become extinct.

B Changes in climate before the Cretaceous period caused severe fluctuations in sea level, resulting in the extinction of the dinosaurs.

C Frequent changes in climate before the Cretaceous period made dinosaurs better able to maintain a livable body temperature.

D Before the Cretaceous period there were few changes in climate, and dinosaurs flourished.

question 5

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? In correct choices change the meaning in important ways or leave out essential information.

A The fossil record suggests that there was an abrupt extinction of many plants and animals at the end of the Mesozoic era.

B Few fossils of the Mesozoic era have survived in the rocks that mark the end of the Cretaceous.

C Fossils from the Cretaceous period of the Mesozoic up to the beginning of the Cenozoic era have been removed from the layers of rock that surrounded them.

D Plants and animals from the Mesozoic era were unable to survive in the Cenozoic era.

question 6

In paragraph 4, all the following questions are answered EXCEPT:

- A Why is there a layer of clay between the rocks of the Cretaceous and Cenozoic?
- B Why were scientists interested in determining how long it took to deposit the layer of clay at the end of the Cretaceous?
- C What was the effect of the surprising observation scientists made?
- D Why did scientists want more information about the dinosaur extinctions at the end of the Cretaceous?

question 7

Paragraph 5 implies that a special explanation of Ir in the boundary clay is needed because

- A the Ir in microscopic meteorites reaching Earth during the Cretaceous period would have been incorporated into Earth's core
- B the Ir in the boundary clay was deposited much more than a million years ago
- C the concentration of Ir in the boundary clay is higher than in microscopic meteorites
- D the amount of Ir in the boundary clay is too great to have come from microscopic meteorites during the time the boundary clay was deposited

question 8

Paragraph 6 mentions all of the following effects of the hypothesized asteroid collision EXCEPT

- A a large dust cloud that blocked sunlight
- B an immediate drop in the surface temperatures of the continents
- C an extreme decrease in rainfall on the continents
- D a long-term increase in global temperatures

question 9

Look at the four squares [] that indicate where the following sentence could be added to the passage. Where would the sentence best fit?

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question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

- A. A simple climate change does not explain some important data related to the extinction of the dinosaurs at the end of the Cretaceous.
- B. The retreat of the seaways at the end of the Cretaceous has not been fully explained.
- C. The abruptness of extinctions at the end of the Cretaceous and the high concentration of Ir found in clay deposited at that time have fueled the development of a new hypothesis.
- D. Extreme changes in daily and seasonal climates preceded the retreat of the seas back into the major ocean basins.
- E. Some scientists hypothesize that the extinction of the dinosaurs resulted from the effects of an asteroid collision with Earth.
- F. Boundary clay layers like the one between the Mesozoic and Cenozoic are used by scientists to determine the rate at which an extinct species declined.