**The First Civilizations**

Evidence suggests that an important stimulus behind the rise of early civilizations was the development of settled agriculture, which unleashed a series of changes in the organization of human communities that culminated in the rise of large ancient empires.

The exact time and place that crops were first cultivated successfully is uncertain. Many prehistorians believe that farming may have emerged in dependently in several different areas of the world when small communities, driven by increasing population and a decline in available food resources, began to plant seeds in the ground in an effort to guarantee their survival. The first farmers, who may have lived as long as 10,000 years ago, undoubtedly used simple techniques and still relied primarily on other forms of food production, such as hunting, foraging, or pastoralism. The real breakthrough took place when farmers began to cultivate crops along the floodplains of river systems. The advantage was that crops grown in such areas were not as dependent on rainfall and therefore produced a more reliable harvest. An additional benefit was that the sediment carried by the river waters deposited nutrients in the soil, thus enabling the farmer to cultivate a single plot of ground for many years without moving to a new location. Thus, the first truly sedentary (that is, nonmigratory) societies were born. As time went on, such communities gradually learned how to direct the flow of water to enhance the productive capacity of the land, while the introduction of the iron plow eventually led to the cultivation of heavy soils not previously susceptible to agriculture.

The spread of this river valley agriculture in various parts of Asia and Africa was the decisive factor in the rise of the first civilizations. The increase in food production in these regions led to a significant growth in population, while efforts to control the flow of water to maximize the irrigation of cultivated areas and to protect the local inhabitants from hostile forces outside the community provoked the first steps toward cooperative activities on a large scale. The need to oversee the entire process brought about the emergence of an elite that was eventually transformed into a government.

The first clear steps in the rise of the first civilizations took place in the fourth and third millennia B.C. in Mesopotamia, northern Africa, India, and China. How the first governments took shape in these areas is not certain, but anthropologists studying the evolution of human communities in various parts of the world have discovered that one common stage in the process is the emergence of what are called "big men" within a single village or a collection of villages. By means of their military prowess, dominant personalities, or political talents, these people gradually emerge as the leaders of that community. In time, the "big men" become formal symbols of authority and pass on that authority to others within their own family. As the communities continue to grow in size and material wealth, the "big men" assume hereditary status, and their allies and family members are transformed into a hereditary monarchy.

The appearance of these sedentary societies had a major impact on the social organizations, religious beliefs, and way of life of the peoples living within their boundaries. With the increase in population and the development of centralized authority came the emergence of the cities. While some of these urban centers were identified with a particular economic function, such as proximity to gold or iron deposits or a strategic location on a major trade route, others served primarily as administrative centers or the site of temples for the official cult or other ritual observances. Within these cities, new forms of livelihood appeared to satisfy the growing need for social services and consumer goods. Some people became artisans or merchants, while others became warriors, scholars, or priests. In some cases, the physical division within the first cities reflected the strict hierarchical character of the society as a whole, with a royal palace surrounded by an imposing wall and separate from the remainder of the urban population. In other instances, such as the Indus River Valley, the cities lacked a royal precinct and the ostentatious palaces that marked their contemporaries elsewhere.

The phrase "culminated in" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | reached a high point with |
| B | logically followed from |
| C | partly contributed to |
| D | marked |

According to paragraph 2, which of the following statements is true of early farmers?

|  |  |
| --- | --- |
| A | They used farming to supplement other food sources. |
| B | They were driven out of small communities. |
| C | They were victims of flooding. |
| D | They farmed several plots of land at once. |

The word "undoubtedly" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | increasingly |
| B | certainly |
| C | in general |
| D | apparently |

According to paragraph 2, what are TWO reasons why farmers chose river valleys for cultivation? To receive credit you must select TWO answer choices.

|  |  |
| --- | --- |
| A | The soils in river valleys were rich in nutrients. |
| B | The crops grown in river valleys were not completely dependent on rainwater. |
| C | Farming techniques could not be easily applied to soils far from rivers. |
| D | The heavier weight of river soil resulted in more reliable harvests. |

The word "enhance" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | serve |
| B | improve |
| C | control |
| D | protect |

The word "provoked" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | secured |
| B | coordinated |
| C | modeled |
| D | brought about |

According to paragraph 3, which of the following is NOT a reason why governments first arose among agricultural communities?

|  |  |
| --- | --- |
| A | A significant increase in population |
| B | The desire to control water resources for irrigation |
| C | The need for protection from outside forces |
| D | The demand for organized communication with other communities |

According to paragraph 4, what is not known about the rise of the first civilizations?

|  |  |
| --- | --- |
| A | Where the first steps toward civilization took place |
| B | Who was allowed to replace "big men" after the "big men" died |
| C | Why some individuals became recognized as leaders |
| D | How governments emerged |

What is the relationship between paragraphs 3 and 4 in the passage?

|  |  |
| --- | --- |
| A | Paragraph 3 explains why a need for leadership arose in early civilizations, and paragraph 4 describes how that leadership developed. |
| B | Paragraph 3 suggests that agriculture was first practiced in Asia and Africa, and paragraph 4 discusses how it might have later spread to the rest of the world. |
| C | Paragraph 3 describes several methods of early government, and paragraph 4 gives an extended example of one of them. |
| D | Paragraph 3 discusses a cause of the spread of river valley agriculture in early civilizations, and paragraph 4 discusses an effect. |

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

|  |  |
| --- | --- |
| A | Some cities were associated with economic activities, while others were government or religious centers. |
| B | Emerging cities generally served strategic administrative, economic, and religious purposes. |
| C | The creation of an economic or administrative activity led to the emergence of a city for its proper supervision. |
| D | Some cities emerged as economic centers and later became the sites of administrative or religious activities. |

Paragraph 5 suggests that which of the following was a consequence of the emergence of cities?

|  |  |
| --- | --- |
| A | The decentralization of authority |
| B | An increase in religious activity |
| C | The emergence of service- and production-related jobs |
| D | A decreased reliance on mineral resources |

According to paragraph 5, why were huge walls built around early royal palaces?

|  |  |
| --- | --- |
| A | To protect the inhabitants from invaders |
| B | To mark the urban areas |
| C | To separate the ruling class from the rest of the population |
| D | To represent the prosperity of a city |

This was accompanied by increased professional specialization.

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**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 answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.**This question is worth 2 points.**

The practice of settled agriculture in some areas of Asia and Africa was crucial to the development of early civilizations.

**1**Prehistorians disagree as to whether early farmers first cultivated crops along floodplains or first tried cultivating crops in less successful environments.

**2**Cultivation in fertile river valleys resulted in predictable harvests, which meant that farmers no longer needed to migrate constantly in search of food.

**3**Because crops could be cultivated more successfully where farmers were not completely dependent on rainfall, hostilities between groups arose over control of the river systems.

**4**The need to organize the effort to ensure the food supply and defend the land led to the formation of elite supervising groups that eventually became the first governments.

**5**Increasingly centralized forms of administration resulted in the emergence of social classes and in the development of cities as trade, administration, or religious centers.

**6**Unlike other early civilizations, those that developed in the Indus River Valley did not have any spectacular palaces or areas for exclusive use by the authorities.

**Railroads and Commercial Agriculture in Nineteenth-Century United States**

By 1850 the United States possessed roughly 9,000 miles of railroad track; then years later it had over 30,000 miles, more than the rest of the world combined. Much of the new construction during the 1850s occurred west of the Appalachian Mountains - over 2,000 miles in the states of Ohio and Illinois alone.

The effect of the new railroad lines rippled outward through the economy. Farmers along the tracks began to specialize in corps that they could market in distant locations. With their profits they purchased manufactured goods that earlier they might have made at home. Before the railroad reached Tennessee, the state produced about 25,000 bushels (or 640 tons) of wheat, which sold for less than 50 cents a bushel. Once the railroad came, farmers in the same counties grew 400,000 bushels (over 10,000 tons) and sold their crop at a dollar a bushel.

The new railroad networks shifted the direction of western trade. In 1840 most northwestern grain was shipped south down the Mississippi River to the bustling port of New Orleans. But low water made steamboat travel hazardous in summer, and ice shut down traffic in winter. Products such as lard, tallow, and cheese quickly spoiled if stored in New Orleans' hot and humid warehouses. Increasingly, traffic from the Midwest flowed west to east, over the new rail lines. Chicago became the region's hub, linking the farms of the upper Midwest to New York and other eastern cities by more than 2,000 miles of track in 1855. Thus while the value of goods shipped by river to New Orleans continued to increase, the South's overall share of western trade dropped dramatically.

A sharp rise in demand for grain abroad also encouraged farmers in the Northeast and Midwest to become more commercially oriented. Wheat, which in 1845 commanded $1.08 a bushel in New York City, fetched $2.46 in 1855; in similar fashion the price of corn nearly doubled. Farmers responded by specializing in cash crops, borrowing to purchase more land, and investing in equipment to increase productivity.

As railroad lines fanned out from Chicago, farmers began to acquire open prairie land in Illinois and then Iowa, putting the fertile, deep black soil into production. Commercial agriculture transformed this remarkable treeless environment. To settlers accustomed to eastern woodlands, the thousands of square miles of tall grass were an awesome sight. Indian grass, Canada wild rye, and native big bluestem all grew higher than a person. Because eastern plows could not penetrate the densely tangled roots of prairie grass, the earliest settlers erected farms along the boundary separating the forest from the prairie. In 1837, however, John Deere patented a sharp-cutting steel plow that sliced through the sod without soil sticking to the blade. Cyrus McCormick refined a mechanical reaper that harvested fourteen times more wheat with the same amount of labor. By the 1850s McCormick was selling 1,000 reapers a year and could not keep up with demand, while Deere turned out 10,000 plows annually.

The new commercial farming fundamentally altered the Midwestern landscape and the environment. Native Americans had grown corn in the region for years, but never in such large fields as did later settlers who became farmers, whose surpluses were shipped east. Prairie farmers also introduced new crops that were not part of the earlier ecological system, notably wheat, along with fruits and vegetables.

Native grasses were replaced by a small number of plants cultivated as commodities. Corn had the best yields, but it was primarily used to feed livestock. Because bread played a key role in the American and European diet, wheat became the major cash crop. Tame grasses replaced native grasses in pastures for making hay.

Western farmers altered the landscape by reducing the annual fires that had kept the prairie free from trees. In the absence of these fires, trees reappeared on land not in cultivation and, if undisturbed, eventually formed woodlots. The earlier unbroken landscape gave way to independent farms, each fenced off in a precise checkerboard pattern. It was an artificial ecosystem of animals, woodlots, and crops, whose large, uniform layout made western farms more efficient than the more-irregular farms in the East.

According to paragraph 1, each of the following is true about railroad track in the United States EXCEPT:

|  |  |
| --- | --- |
| A | In 1850 the United States had less than 10,000 miles of railroad track. |
| B | By the end of the 1850s, Ohio and Illinois contained more railroad track than any other state in the country. |
| C | Much of the railroad track built in the United States during the 1850s was located west of the Appalachian Mountain. |
| D | By 1860 there were more miles of railroad track in the United States than in any other country. |

It can be inferred from paragraph 2 that the new railroads had which of the following effects on farm communities?

|  |  |
| --- | --- |
| A | Most new farms were located along the tracks. |
| B | Farmers began to grow wheat as a commercial corp. |
| C | Many farmer decided to grow a wider variety of crops. |
| D | Demand for manufactured goods increased among farmers. |

The word "bustling" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | famous |
| B | important |
| C | growing |
| D | busy |

According to paragraph 3, in what way did the new rail networks change western trade?

|  |  |
| --- | --- |
| A | Northwestern farmers almost completely stopped shipping goods by steamboat. |
| B | Many western goods began to be shipped east by way of Chicago rather than south to New Orleans. |
| C | Chicago largely replaced New York and other eastern cities as the final market for goods for the West. |
| D | The value of goods shipped west soon became greater than the value of goods shipped east. |

According to paragraph 3, what was a disadvantage of shipping goods from northwestern areas to New Orleans?

|  |  |
| --- | --- |
| A | There was no reliable way to get goods from New Orleans to eastern cities. |
| B | The cost of shipping goods by river to New Orleans continued to increase. |
| C | Goods shipped from New Orleans' neighboring areas had a significant competitive advantage because of their lower transportation costs. |
| D | The temperatures and humidity. |

Paragraph 4 supports the idea that the price of wheat more than doubled between 1845 and 1855 because

|  |  |
| --- | --- |
| A | the price of corn nearly doubled during that same period |
| B | demand for grain increased sharply outside the United States |
| C | farmers in the Northeast and Midwest began to specialize in cash crops |
| D | many farmers had borrowed heavily to purchase land and equipment for raising wheat |

The word "transformed" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | dominated |
| B | changed |
| C | improved |
| D | created |

The word "erected" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | looked for |
| B | lived on |
| C | preferred |
| D | built |

Why does author point out that "Indian grass, Canada wild rye, and native big bluestem all grew higher than a person"?

|  |  |
| --- | --- |
| A | To provide a reason why people from the eastern woodlands of the United States were impressed when they saw the prairie |
| B | To identify an obstacles to the development of the railroad lines fanning out from Chicago |
| C | To explain why the transformation of the prairies by commercial agriculture was so remarkable |
| D | To provide evidence supporting the claim that the prairies had fertile, deep black soil |

According to paragraph 5, the first settlers generally did not farm open prairie land because

|  |  |
| --- | --- |
| A | they could not plow it effectively with the tools that were available |
| B | prairie land was usually very expensive to buy |
| C | the soil along boundaries between the forest and the prairie was more fertile than the soil of the open prairie |
| D | the railroad lines had not yet reached the open prairie when the first settlers arrived |

The word "surpluses" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | extra goods |
| B | commercial goods |
| C | unprocessed goods |
| D | transportable goods |

According to paragraph 8, prairie farmers changed the landscape by doing all of the following EXCEPT:

|  |  |
| --- | --- |
| A | Reducing annual fires |
| B | Dividing the land into large, regularly-shaped lots |
| C | Planting trees that eventually formed woodlots |
| D | Fencing off their farms |

The problems were not limited to routes of transport.

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**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 answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.**This question is worth 2 points.**

The huge expansion of rail lines in Midwestern United States during the 1850s had major economic and environmental effects.

**1**Construction of new rail lines into the Midwest had been effectively stopped by the Appalachian Mountains, but by 1850 improved construction technology had made further advances possible.

**2**Rail lines to Chicago and on to the East made it easier to get Midwestern goods to distant markets, while growing demand encouraged crop specialization and led to higher crop prices.

**3**Because of the growing volume of traffic coming by rail from the Northeast and Midwest, the value of goods arriving in New Orleans for shipment to markets abroad increased dramatically.

**4**Access to rail lines combined with the development of more-efficient farming equipment allowed e fertile land of the open prairies to be used for large-scale commercial agriculture.

**5**Reduction of annual prairie fires allowed trees to reappear, and native grasses were replaced by a few commercially grown plants as previously unbroken grasslands were divided into large fenced fields.

**6**Native Americans had grown corn on the prairies for years but had not produced large surpluses because the varieties they planted had far poorer yields than those introduced by commercial farmers.

**Extinction Episodes of the Past**

It was not until the Cambrian period, beginning about 600 million years ago, that a great proliferation of macroscopic species occurred on Earth and produced a fossil record that allows us to track the rise and fall of biodiversity. Since the Cambrian period, biodiversity has generally risen, but there have been some notable exceptions. Biodiversity collapsed dramatically during at least five periods because of mass extinctions around the globe. The five major mass extinctions receive most of the attention, but they are only one end of a spectrum of extinction events. Collectively, more species went extinct during smaller events that were less dramatic but more frequent. The best known of the five major extinction events, the one that saw the demise of the dinosaurs, is the Cretaceous-Tertiary extinction.

Starting about 280 million years ago, reptiles were the dominant large animals in terrestrial environments. In popular language this was the era “when dinosaurs ruled Earth,” when a wide variety of reptile species occupying many ecological niches. However, no group or species can maintain its dominance indefinitely, and when, after over 200 million years, the age of dinosaurs came to a dramatic end about 65 million years ago, mammals began to flourish, evolving from relatively few types of small terrestrial animals into the myriad of diverse species, including bats and whales, that we know today. Paleontologists label this point in Earth's history as the end of the Cretaceous period and the beginning of the Tertiary period, often abbreviated as the K-T boundary. This time was also marked by changes in many other types of organisms. Overall, about 38 percent of the families of marine animals were lost, with percentages much higher in some groups Ammonoid mollusks went from being very diverse and abundant to being extinct. An extremely abundant set of planktonic marine animals called foraminifera largely disappeared, although they rebounded later. Among plants, the K-T boundary saw a sharp but brief rise in the abundance of primitive vascular plants such as ferns, club mosses, horsetails, and conifers and other gymnosperms. The number of flowering plants (angiosperms) was reduced at this time, but they then began to increase dramatically.

What caused these changes? For many years scientists assumed that a cooling of the climate was responsible, with dinosaurs being particularly vulnerable because, like modern reptiles, they were ectothermic (dependent on environmental heat, or cold-blooded). It is now widely believed that at least some species of dinosaurs had a metabolic rate high enough for them to be endotherms (animals that maintain a relatively consistent body temperature by generating heat internally). Nevertheless, climatic explanations for the K-T extinction are not really challenged by the ideas that dinosaurs may have been endothermic, because even endotherms can be affected by a significant change in the climate.

Explanations for the K-T extinction were revolutionized in 1980 when a group of physical scientists led by Luis Alvarez proposed that 65 million years ago Earth was stuck by a 10-kilometer-wide meteorite traveling at 90,000 kilometers per hour. They believed that this impact generated a thick cloud of dust that enveloped Earth, shutting out much of the incoming solar radiation and reducing plant photosynthesis to very low levels. Short-term effects might have included huge tidal waves and extensive fires. In other words, a series of events arising from a single cataclysmic event caused the massive extinctions. Initially, the meteorite theory was based on a single line of evidence. At locations around the globe, geologists had found an unusually high concentration of iridium in the layer of sedimentary rocks that was formed about 65 million years ago. Iridium is an element that is usually uncommon near Earth's surface, but it is abundant in some meteorites. Therefore, Alvarez and his colleagues concluded that it was likely that the iridium in sedimentary rocks deposited at the K-T boundary had originated in a giant meteorite or asteroid. Most scientist came to accept the meteorite theory after evidence came to light that a circular formation, 180 kilometers in diameter and centered on the north coast of the Yucatan Peninsula, was created by a meteorite impact about 65 million years ago.

The word "proliferation" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | decline |
| B | extinction |
| C | increase |
| D | migration |

Paragraph 1 supports which of the following statements about life on Earth

before the Cambrian period?

|  |  |
| --- | --- |
| A | Biodiversity levels were steady, as indicated by the fossil record. |
| B | Levels of biodiversity could not be tracked. |
| C | The most dramatic extinction episode occurred. |
| D | Few microscopic species existed. |

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

|  |  |
| --- | --- |
| A | The dominance of dinosaurs came to an end 65 million years ago, at which time mammals began to flourish and diversify. |
| B | Because no group of species can remain dominant forever, mammals became the dominant group when dinosaurs became extinct. |
| C | After being the dominant group for more than 200 million years, the age of dinosaurs came to a dramatic end 65 million years ago. |
| D | The diverse group of mammals that we know today, including bats and whales, evolved from small terrestrial forms that had been dominated by dinosaurs. |

According to paragraph 2, why are dinosaurs popularly said to have "ruled Earth" during the Cretaceous period?

|  |  |
| --- | --- |
| A | Dinosaurs were the only species of reptile that existed during the whole of the Cretaceous period. |
| B | Dinosaurs won the battle for food resources over mammals during the Cretaceous period. |
| C | Dinosaurs survived extinction during the Cretaceous period, whereas many other animal species did not. |
| D | Dinosaurs were the physically and ecologically dominant animals during the Cretaceous period. |

According to paragraph 2, which of the following species initially increased in number at the K-T boundary?

|  |  |
| --- | --- |
| A | Dinosaurs |
| B | Foraminifera |
| C | Ferns |
| D | Ammonoid mollusks |

Why does the author note that "even endotherms can be affected by a significant change in the climate"？

|  |  |
| --- | --- |
| A | To argue that there was a significant climate at the time that endothermic dinosaurs became extinct |
| B | To argue that climate change caused some dinosaurs to evolve as endotherms |
| C | To support the view that at least some of the dinosaurs that became extinct were endotherms |
| D | To defend climate change as possible explanation for the extinction of dinosaurs |

The word "generated" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | collected |
| B | produced |
| C | spread |
| D | added |

The word "extensive" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | widespread |
| B | sudden |
| C | numerous |
| D | subsequent |

According to paragraph 4, all of the following contributed to the massive extinctions of the K-T period EXCEPT:

|  |  |
| --- | --- |
| A | tidal waves |
| B | fires |
| C | insufficient solar radiation |
| D | iridium |

According to paragraph 4, which of the following statements explains the importance of the discovery of high levels of iridium rocks?

|  |  |
| --- | --- |
| A | It provided evidence that overexposure to solar radiation led to the K-T extinction. |
| B | It showed that more than one cataclysmic event was responsible for the K-T extinction. |
| C | It suggested that the cause of the K-T extinction may have been a meteorite striking Earth. |
| D | It provided evidence that the K-T extinction occurred 65 million years ago. |

According to paragraph 4, which of the following is true about the Yucatan Peninsula?

|  |  |
| --- | --- |
| A | The circular formation there was caused by a meteorite impact 65 million years ago. |
| B | Sedimentary rocks from that area have the lowest iridium concentration of any rocks on Earth. |
| C | There is evidence that a huge tidal wave occurred there 65 million years ago. |
| D | Evidence found there challenged the meteorite impact theory. |

Which of the following can be inferred from paragraph 4 about the meteorite theory?

|  |  |
| --- | --- |
| A | The data originally presented as evidence for the theory were eventually rejected. |
| B | Many scientists did not accept it when it was first proposed. |
| C | It has not been widely accepted as an explanation for the K-T extinction. |
| D | Alvarez subsequently revised it after a circular formation was found in the Yucatan Peninsula. |

This focused on the chemical composition of ancient rocks.

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**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 answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.**This question is worth 2 points.**

The K-T extinction 65 million years ago is the best known of the five major extinction episodes since the Cambrian period.

**1**Collectively, the five major extinction episodes resulted in the elimination of a larger number of species than did all the minor extinction events.

**2**The K-T extinction eliminated the dinosaurs and ammonoid mollusks but was followed by the diversification of mammals and gymnospermous plants.

**3**An extreme cooling of the climate could not have caused the K-T extinction of dinosaurs, because, while most dinosaurs depended on environmental heat, some did not.

**4**The K-T extinction of the dinosaurs is the only mass extinction that has been explained by the impact of a meteorite.

**5**In 1980 Luis Alvarez proposed that the K-T extinction was caused by ecological disasters brought about by the impact of a meteorite striking Earth.

**6**A high concentration of iridium in sedimentary rocks at the K-T boundary and a large impact crater in the Yucatan Peninsula from 65 million years ago strongly support Alvarez' hypothesis.