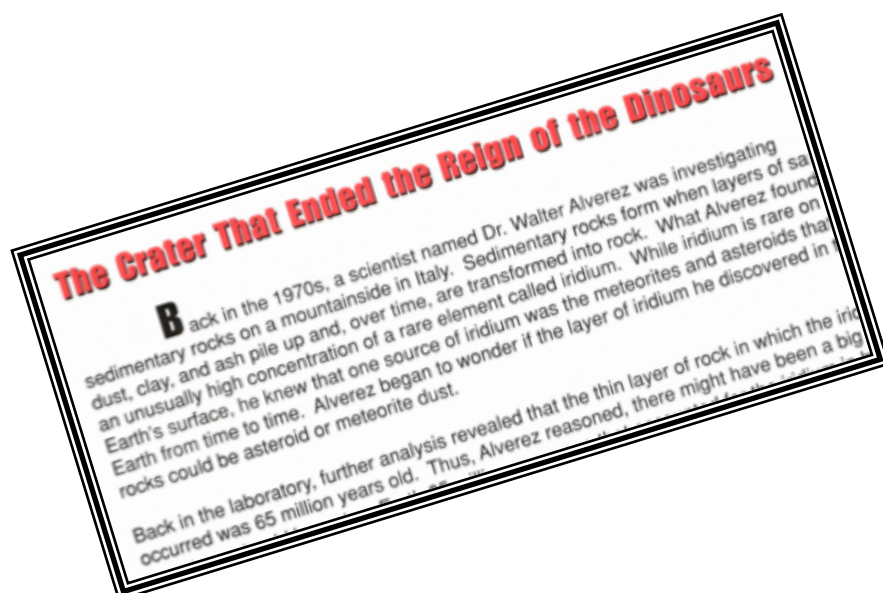


Close Reading and Text Dependent Questions in Science

The Crater That Ended The Reign Of the Dinosaurs (Planetary Science – Grade 8)

The text selection, *The Crater That Ended The Reign Of the Dinosaurs*, is found in
FOSS Student Resource Book, Planetary Science, pgs. 67-68.



Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: <http://bpsscience.weebly.com/> You will find the Student Learning Outcomes documents organized there by grade level.

The Crater That Ended the Reign of the Dinosaurs

Back in the 1970s, a scientist named Dr. Walter Alvarez was investigating sedimentary rocks on a mountainside in Italy. Sedimentary rocks form when layers of sand, dust, clay, and ash pile up and, over time, are transformed into rock. What Alvarez found was an unusually high concentration of a rare element called iridium. While iridium is rare on Earth's surface, he knew that one source of iridium was the meteorites and asteroids that hit Earth from time to time. Alvarez began to wonder if the layer of iridium he discovered in the rocks could be asteroid or meteorite dust.

Back in the laboratory, further analysis revealed that the thin layer of rock in which the iridium occurred was 65 million years old. Thus, Alvarez reasoned, there might have been a big comet or asteroid impact on Earth 65 million years ago that accounted for the iridium in his rock samples.

But Alvarez and his research group still had more questions. They wondered if an iridium layer would be found in 65-million-year-old sedimentary rocks from other places on Earth. When they looked, they did find high concentrations of iridium in 65-million-year-old rocks in many other places around the planet. Now they wondered what process or processes might have resulted in the layering of iridium into rocks all over Earth at the same time. The answer that they came up with was one huge impact that blasted a huge amount of dust into the atmosphere. The dust circled the globe for a long time, carried by circulating winds. The dust, including iridium from the asteroid that exploded, settled out of the atmosphere, all over the planet.

The other interesting event that happened at the same time involves dinosaurs (and many other kinds of plants and animals). For years paleontologists (scientists who study fossils) had known that many species of dinosaurs disappeared from Earth about 65 million years ago. Alvarez and his group wondered if the extinction of the dinosaurs and the suspected asteroid impact could be related. How could one asteroid impact cause the extinction of dinosaurs all over the world?

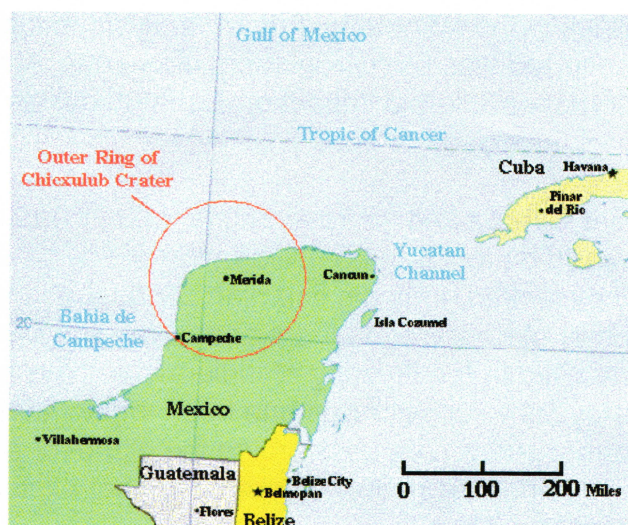
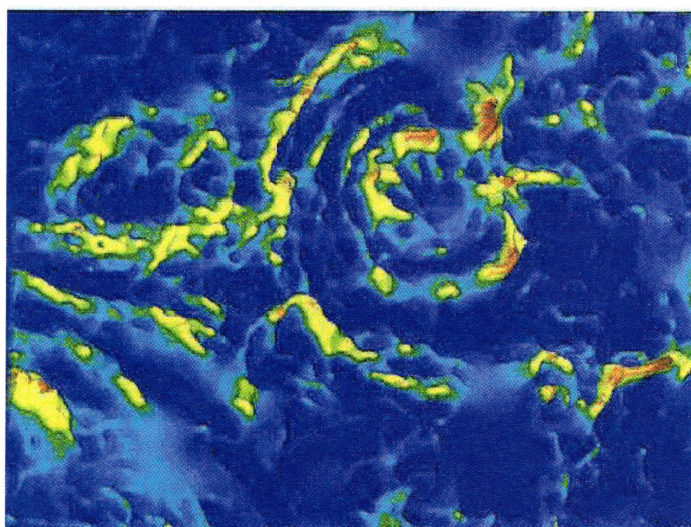
Alvarez's group, and other groups of scientists, worked up some scientific models that suggested that an asteroid about 10 km across could throw enough material into the atmosphere to obscure the Sun for a year. If this happened, much of the plant life on Earth would die from lack of solar energy, and the foundation for the food chain would fail. With a large percentage of the food removed from the planet, many species would starve to death outright, or their vitality would be reduced so that the result would be a gradual but steady decline toward extinction.

There was one problem, however. A 10-km asteroid would produce a crater at least 100 km across, and search as geologists would, they could find no evidence of such a crater. Many suggested that the impact site might be hidden under the sea, which covers about two-thirds of the planet's surface.

What do you think? Does it seem reasonable that a huge Earth impact did occur 65 million years ago? If so, where do you think the impact might have occurred?

Since geologists first mounted a search for the impact crater that killed the dinosaurs, new technologies have emerged. Scientists now have advanced X-ray scanners that can “see” through water to look for obscure, ancient features of the land. An interesting structure was discovered in the Gulf of Mexico. This is an image of that structure.

This murky image may not look like much to the untrained eye, but now that you have studied craters and know what to look for, you can see the distinctive shapes that suggest a crater.



This structure is named Chicxulub Crater, located just off the tip of the Yucatan Peninsula of Mexico in the Gulf of Mexico. The crater is huge—the size predicted by the Alvarez team. It represented the size of impact that would be needed to cause the extinctions described above. What do you think? Could the dust and smoke thrown into the atmosphere from the impact that made this buried crater have darkened the skies for months, killing many plants and animals?

Think Questions

What kinds of animals might have survived the period of reduced light?

If a massive impact like the Chicxulub impact were to happen today, what might be the result worldwide?

Look at the outer ring of the Chicxulub Crater in the illustration above. How destructive would that crater be in your area? Get a local map and position a model of the crater in your area to get an idea of the massive size of this event.

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Student Questions

1. Based on the text, paraphrase how sedimentary rocks are formed.
2. The article states that iridium is a rare element. Based on the text, what explanation is offered to explain the unusually high concentration found in the rocks that Dr. Alvarez was studying?
3. What possible explanation did Alvarez and his research group provide for the reason why they found “high concentrations of iridium in 65-million-year-old rocks” all over the planet?

4. Based on the evidence in the text, what was the scientific model Alvarez's group worked up regarding what happened to the extinction of the dinosaurs?
5. What was one challenge to the model?
6. How did scientists address this challenge? What did they find?
7. What conclusions could the scientists reasonably draw, based on the presence of the Chicxulub Crater, for their model?

The Crater That Ended The Reign Of the Dinosaurs (Planetary Science – Grade 8)

Sample Answers

- 1. Based on the text, paraphrase how sedimentary rocks are formed.**

They are made when layers of sand, dust, clay, and ash are pressed together over time into rock.

- 2. The article states that iridium is a rare element. Based on the text, what explanation is offered to explain the unusually high concentration found in the rocks that Dr. Alvarez was studying?**

Alvarez reasoned that there might have been a big comet or asteroid impact on Earth 65 million years ago that accounted for the iridium in his rock samples.

- 3. What explanation did Alvarez and his research group provide for the reason why they found “high concentrations of iridium in 65-million-year-old rocks” all over the planet?**

He found other rocks with the same concentration of iridium from 65 million years ago – the same as his rocks. A single large crash could have caused a large dust cloud to circle the globe and deposit the iridium everywhere.

- 4. Based on the evidence in the text, what was the scientific model Alvarez’s group worked up regarding what happened to the extinction of the dinosaurs?**

He postulated that a 10 km across meteor could have kicked up enough dust to blot out the sun for a year, disrupting the food chain for animals and causing mass extinctions.

- 5. What was one challenge to the model?**

A meteor that size should have left a sizable crater – one at least 100 km in diameter, yet no such crater has been recorded on land.

- 6. How did scientists address this challenge? What did they find?**

They decided to look for the crater in the ocean using X-ray scanners that allowed them to look through water, leading them to find a similarly sized crater just off the Yucatan Peninsula.

- 7. What conclusions could the scientists reasonably draw, based on the presence of the Chicxulub Crater, for their model?**

The Chicxulub Crater offers further confirmation of the model Alvarez postulated for his rocks and the extinction of the dinosaurs.