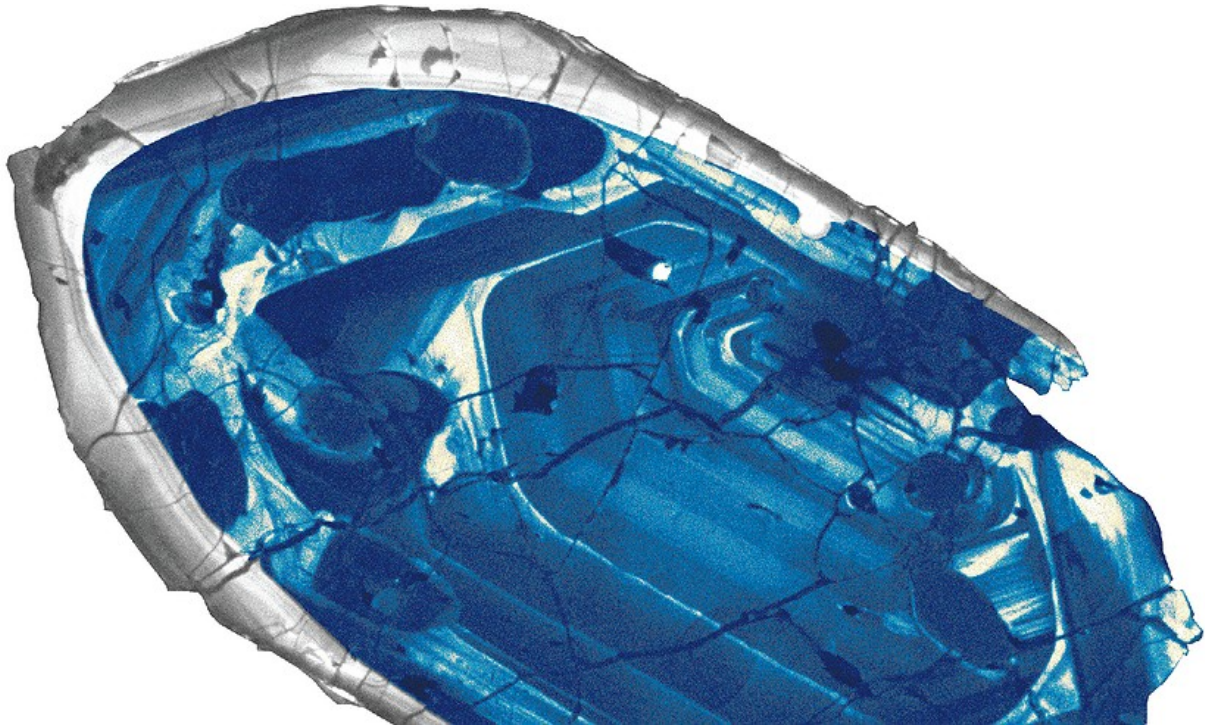


Tiny crystal carries tremendous importance

By Milwaukee Journal Sentinel, adapted by Newsela staff on 03.07.14
Word Count **730**



This 4.4 billion-year-old zircon crystal is providing new insight into how the Earth cooled from a ball of magma and formed continents much earlier than previously believed. Photo: John Valley

A zircon crystal found on a sheep ranch in Australia is the oldest piece of the Earth's crust to be discovered. The finding provides new clues on how our planet was formed.

The zircon was stuck in a piece of sandstone, the journal *Nature Geoscience* said. It is about 4.4 billion years old and much smaller than a grain of rice. But the tiny crystal carries tremendous importance. The Earth was once a superheated ball of liquid rock. It later formed a solid surface. Once the crust hardened, Earth eventually became capable of supporting life. The zircon discovery is evidence that by 4.4 billion years ago the earth's surface was already hard.

Studying how the conditions of life came together on our planet can help the space program. Scientists believe it will teach us what to look for on other planets.

"One of the main goals of the space program is to understand if there's life elsewhere in the universe," said John Valley, a University of Wisconsin professor who led the study. Scientists in Australia, Canada and Puerto Rico also took part in the work.

Proving Its Age

For years scientists have argued over the earliest rocks and first evidences of life. For example, some scientists insist that the earliest evidence of life is about 3.8 billion years old and found in Isua, Greenland. Others, however, note that no fossils were found in the Greenland rock. They point instead to 3.5 billion-year-old fossilized bacteria found in rocks in Pilbara, Australia.

That's no small difference — 300 million years.

However, nobody is arguing about the age of the zircon described by Professor Valley's team. The Valley team used a new method called atom-probe tomography. It allowed them to prove the crystal's age. The new instrument determines age by identifying the number of protons in the atoms of the elements found in the zircon.

They've shown "beyond a shadow of a doubt, that this grain is that old," said Samuel Bowring, an expert in the early history of the Earth. He's also a geology professor at the Massachusetts Institute of Technology. Bowring was not involved in the new study.

"It's only one grain, mind you," he added, "but it's very significant."

"Earth's Geologic Records"

Jim Mattinson is a professor of earth science at University of California, Santa Barbara. He said zircons have been found previously that were about the same age as the one in the current paper. But, people doubted the earlier discoveries.

The new study puts an end to those doubts, Mattinson said. "We're really getting back as far as we can go in the Earth's geologic records."

Zircon crystals are composed mainly of the elements zirconium, silicon and oxygen. Small amounts of uranium also appear in zircon.

The uranium decays at a predictable speed. Then it forms into lead. Because of this, scientists can determine the age of zircon by measuring the lead and any remaining uranium.

Zircon is found embedded in younger rock. Valley found the zircon used for the current study in sandstone collected in the dry Jack Hills of western Australia. That region is known to contain some of the oldest pieces of the planet's crust.

"The oldest rock in Australia was collected not far from where we were working," Valley said.

When The Earth Cooled

Dating of the zircon helps shed light on an early chapter in the Earth's history. Scientists have thought that one of the critical early events occurred when an asteroid roughly the size of Mars hit the Earth. The crash vaporized the mantle and crust, two of the Earth's three areas. At the Earth's center is the superhot core, which is surrounded by the mantle — the thick, middle layer of the earth. The crust is the top layer, on which we live.

Dust from the asteroid crash fused together to form the moon.

The enormous energy from the crash reshaped the surfaces of the Earth and moon into oceans of rock that had turned to liquid by the heat of the crash. Both later cooled. Zircon was one of the minerals formed when the planet cooled.

Minerals also were formed as far back in history. Yet, what makes zircon so valuable to scientists is its ability to endure. Zircon is a very hard mineral with stable chemistry able to survive extreme temperatures.

“We like to say that zircons are forever,” Valley said.

Quiz

1 Select the paragraph from "When The Earth Cooled" that describes when zircon formed.

2 What information regarding zircon is of great importance to scientists?

- (A) Zircon is found embedded in younger rocks.
- (B) Zircon has been found in both Greenland and Australia.
- (C) Zircon can help scientists study when life began forming on Earth.
- (D) Zircon's age can be determined by studying the decay of uranium present in it.

3 Which of the following sentences contains a word that is a synonym for "evidence"?

- (A) A zircon crystal found on a sheep ranch in Australia is the oldest piece of the Earth's crust to be discovered.
- (B) The finding provides new clues on how our planet was formed.
- (C) But the tiny crystal carries tremendous importance.
- (D) The Valley team used a new method called atom-probe tomography.

4 Read the sentence from the article.

The uranium decays at a predictable speed.

What is the meaning of the word "predictable" as used in the above sentence?

- (A) unclear
- (B) expected
- (C) known
- (D) reasonable

Answer Key

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Paragraph 17:

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