DiscoveryNews

Crystals Break Slow Growth Record

Buried 1,000 feet below Mexico's Naica mountain, the "Cave of Crystals" are the slowest growing ever measured.

By Jessica Marshall | Tue Sep 13, 2011 07:09 AM ET

The massive gypsum crystals found in Mexico's Naica mine are spectacular to behold. The meter-thick beams of translucent crystal stretch across a life-threateningly hot and humid chamber deep within a Mexican mountain. Light passing through the crystals, some as long as 36 feet, creates a moonlight-like glow.

Now new research shows that they are record-breakers in another respect: they are the slowest growing crystals ever measured, stretching their girth by the width of a hair every century. To reach their current size, some may have grown over a million years.

NEWS: The Mega Crystals of Naica Mine

"This is the slowest growth rate ever measured, not only in nature but in general," said study author Juan Manuel García-Ruiz of the University of Granada and the Spanish National Research Council (CSIC).

The crystals are not growing now. In 2000, the so-called "Cave of Crystals" was discovered after the chamber had been pumped free of its waters for mining operations. (The chamber was actually drained in 1975, but remained unexplored until 2000.) Without the mineral-rich waters to provide material for the crystals, their growth is on hold.

But in a new study, published today in *Proceedings of the National Academy of Sciences,* researchers used a sample of the crystal and some water from the mine to recreate crystal growth conditions in the laboratory. Using specialized microscopic techniques capable of detecting such slow growth, the team measured the crystal growth at different temperatures.

A combination of conditions allowed the crystals to reach their unparalleled size. First, the mineral-rich underground waters provided the calcium and sulfate minerals that comprise the crystals. But a nearby magma chamber heats the site, providing the warm, consistent temperatures necessary for crystal growth.

VIDEO: Find Out Why Iron Meteorites Are Sensitive To the Touch

At temperatures hotter than 136 Fahrenheit (58 Celsius), gypsum crystals cannot form, and they persist in forming at least down to down to the temperature of 129 Fahrenheit (54 Celsius), the current water temperature. Therefore, as the chamber temperature passed through this range, the minerals came out of solution and deposited slowly onto the crystal surfaces.

"As the chamber has cooled over millennia, the appropriate conditions for crystal growth have arisen. From our estimation, this range of temperatures was obtained in the last million years," Garcia-Ruiz told Discovery News from Mexico, on his way to the Naica site for further studies."

NEWS: Super-Hard Diamonds Found in Meteorite

It is the slow steady pace of cooling that was critical to the giant crystals' growth. In another

part of the mine, the chamber cooled much faster, driving the nucleation of many more, much smaller crystals. "The faster the cooling, the larger the number of crystals and the smaller they are." García-Ruíz said.

"Measuring these very slow growth rates is a huge technical challenge and they've done a nice job on that," said Jeffrey Derby of the University of Minnesota and the current president of the American Association for Crystal Growth. The findings are consistent with what is known about how crystals grow.

"I think you've just got to step back and say these are beautiful things," he said. "It's even more beautiful that with careful investigation, we can actually explain these things."

The cave temperature is about 115-117 Fahrenheit (46 or 47 degrees Celsius) right now, García-Ruíz said, and about 96 percent humidity. "Every time we enter the cave, we can stay about 10 minutes. Every time we enter, we lose 2 kilograms of water," he said. "If you stay more than 10 minutes, if you remain there you can die."

Fortunately for their preservation, the giant gypsum crystals have no commercial use. But in Roman times, before the advent of glass slabs, gypsum crystals were used as window panes for the wealthy, García-Ruíz said.

These are not the worlds largest crystals, he said. There are larger crystals of garnet and emerald, for example. But they are embedded in rocks, so you can't see their size with a glance the way you can see the exposed beams of gypsum crystals at Naica.

Once the mine is stripped of its valuable ores, perhaps decades from now, the pumps will be turned off and the chamber will again fill with water. "In my opinion, this should be preserved as a national monument," García-Ruíz said. "The probability to have another Naica in the world is almost zero. We should preserve this."