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MARS

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In Billings, Richard Brown was thrilled about the news because his family's business, Wyo-Ben Inc., supplied NASA with bentonite that helped calibrate Curiosity's instruments.

"What we gave them was reference materials, so they'd know what they are looking at when they got to Mars," Brown said.

Tests from the Mars sample showed X-ray diffraction patterns that were similar to the Wyoming bentonite. That suggests the Earth and Martian rocks contained the same clay mineral called smectite, which is the principle component of bentonite and can only be formed in water, Brown said.

"It could be sea water or lake water, but it has to have some amount of salts in it or it could be hot thermal water like the water in Yellowstone National Park," Brown said.

However, the careful Brown, who has a deep interest in science, quickly added that Wyo-Ben can only take credit for playing "a tiny part" in helping NASA recognize some clay minerals on Mars. The discovery suggests Mars once had enough water over an extended period perhaps 3 billion years ago to possibly support extremophiles — life that can live in extreme environments.

Curiosity isn't equipped to test directly for life. But the rover found carbon, sulfur and oxygen and other elements present in forms that life on earth uses, NASA said.

Richard Brown is a long-time member and past president of The Clay Minerals Society, where he met NASA scientists who later asked him for bentonite samples.

With an undergraduate biology degree and a master's degree in plant genetics from Arizona State University, Brown is keenly interested in clay.

Wyo-Ben shipped fist-sized samples of bentonite to NASA when the Opportunity and Spirit rovers headed to Mars in 2003.

When NASA scientists called asking for more bentonite for Curiosity's trip, they wanted loaf-size samples.

"That apparently was so they could drill them and test them before trying to drill into Martian rock," Brown said.

This isn't the first discovery of water on Mars.

"Almost a decade ago, Opportunity and Spirit found evidence of water on Mars, but it would have been acidic and very salty or inhospitable for life," Brown said.

Last year, Curiosity found evidence that Mars once had scarce and acidic water at a site called Yellowknife Bay.

After last week's discovery of evidence of purer water, computer problems sidelined the six-wheeled Curiosity, delaying exploration for two days on this \$2.5 billion Mars mission. Next month, Curiosity will go dark when the sun comes between Mars and Earth, blocking clear communications.

In 2016, NASA plans on sending up another stationary probe to look for evidence of seismic activity, including "marsquakes," on a planet where "volcanoes once raged," scientists said.

But the curious scientist in Billings is waiting for another seven years to pass.

By 2020, a more advanced Mars rover will head to what NASA calls a "rocky, cold and sterile" planet with instruments capable of detecting extremophile life.

"That's when things get really interesting," Brown said.

Because intense cosmic radiation appears to have destroyed Mar's atmosphere, scientists will likely have to dig for water, Brown said.

"Mars is too cold, so water has either sublimated — gone directly into vapor and vanished — or it's in the form of ice under the surface, with the exception, perhaps of the poles," he said.

If life is found on Mars and Earthlings realize they aren't alone in the universe, Brown anticipates that knowledge may shift the way humans view themselves, and perhaps relate with each other.

"All the math says there's no reasonable way to expect we are alone," he said.

Kepler, a NASA mission to discover new planets using an infrared telescope in space, has identified 2,740 stars with planets since its launch in March 2009, according to NASA. NASA estimates there are at least 100 billion planets in the galaxy.

At the very least, finding microbes on Mars would intensify humans' search for a rocky planet in a "Goldilocks" zone. That means the planet is "close to a star, but not too close so the water boils away, and not so far away that it freezes," Brown said. "Then you've got the possibility of finding the building blocks of life."

When Earth is closest to Mars, the planets are about 35 million miles apart. At their farthest orbit, the distance is more like 250 million miles. Sending humans to Mars would mean six months to get there, a year waiting for the planets to reach their nearest orbit again, and then a six-month return voyage.

"If they were asking for volunteers, my hand would go up," Brown said. "That would be an adventure of a lifetime."



FOR MORE ...

For updates on NASA's Curiosity rover, visit the Mars Science Laboratory website at nasa.gov.

This rectangular version of a self-portrait of NASA's Mars rover Curiosity combines dozens of exposures taken by the rover's Mars Hand Lens Imager during the 177th Martian day of Curiosity's work on Mars on Feb. 3.

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Wyo-Ben Bentonite Used In Mars Rover (continued)

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