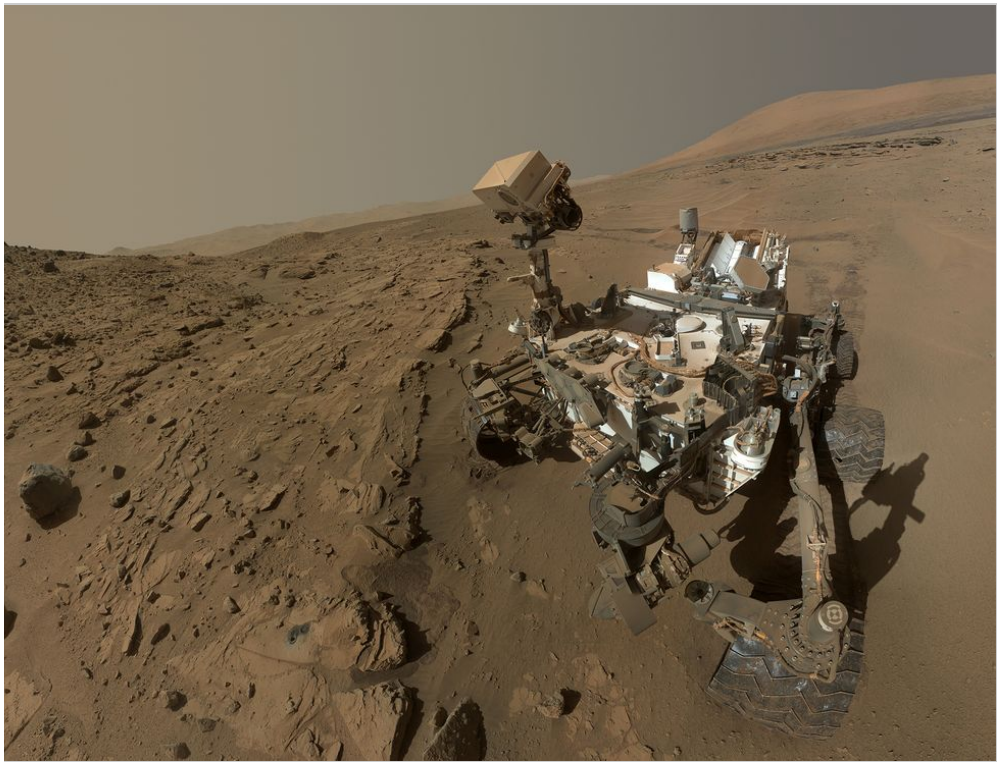
Alien Life on Mars? NASA Rover Spots Methane, a Possible Sign of Microbes

Unexpected geology, or perhaps even alien life, may explain intriguing gas plumes.



NASA's Curiosity rover arrived on Mars in 2012 and has reported tentative signs of life, past or present, including bursts of methane that might have been biologically produced.

PHOTOGRAPH BY NASA/JPL-CALTECH/MSSS

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PUBLISHED DECEMBER 16, 2014

SAN FRANCISCO—NASA's Curiosity rover team reported on Tuesday surprising spikes in methane gas, raising the possibility of microbial alien life on the red planet.

On Earth, most methane, better known as natural gas, is released by microbes that belch out the gas as they digest food. The rover mission scientists hedge the new results carefully, saying there's no way to tell whether the methane spikes have a geological or biological origin.

"It is a very, very puzzling result," says planetary

scientist Joel Levine of the College of William and Mary in Williamsburg, Virginia, who was not part of the study team. "Either Mars is geologically alive, which would be surprising, or Mars is biologically alive, which would have profound implications."

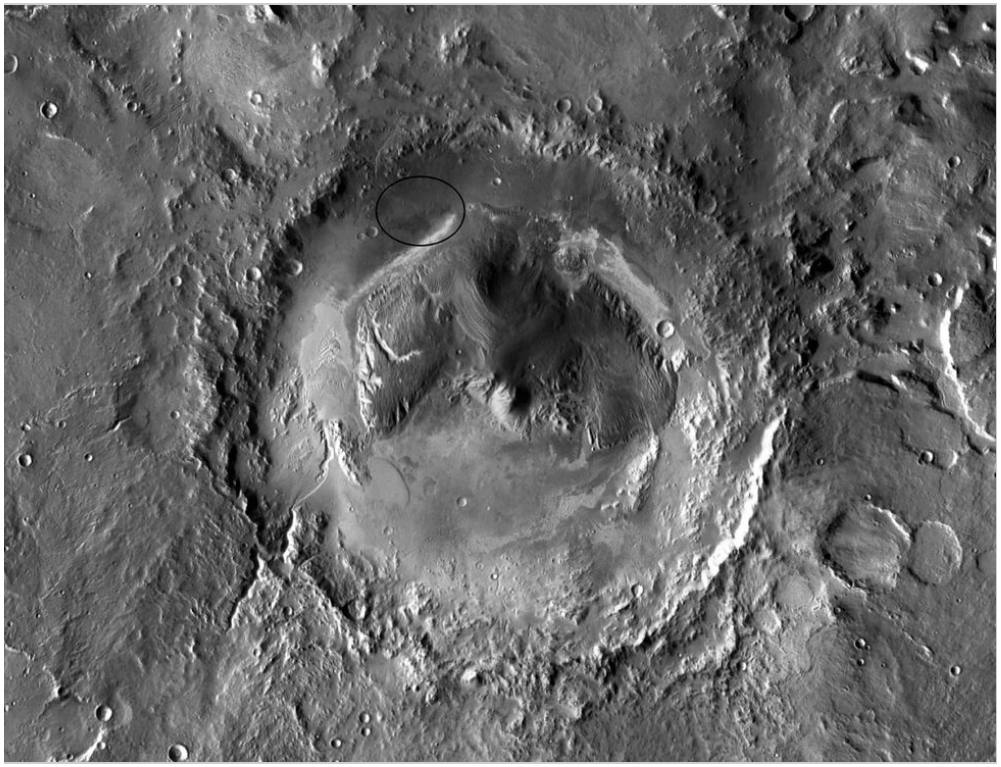
Decades of up-and-down measurements of methane in the Martian atmosphere have intrigued scientists hunting for signs of life on Mars. So when Curiosity first recorded a sudden tenfold increase in methane in November 2013, scientists were startled. (Read "Field Trip on Mars"in *National Geographic* magazine.)

"It was an 'oh, my gosh' moment," said planetary scientist Christopher Webster of NASA's Jet Propulsion Laboratory, who led the study team. Reported in the journal *Science* and presented Tuesday at the American Geophysical Union meeting, the spikes, he said, "disappeared only six weeks later."

Curiosity went on to record a total of four sharp jumps in methane concentrations in the Martian air during its travels. The pulses lasted only a few weeks and lingered over a small area, roughly 2,625 feet (800 meters) of the rover's path. That points to a local, concentrated vent as the origin of the releases, says team scientist Sushil Atreya of the University of Michigan at Ann Arbor, most likely to the north of the rover inside Gale Crater.

Biological explanations aside, interactions between water and rock could produce methane, as could sunlight cooking off meteorite debris on the Martian surface, the Curiosity team cautions. But the scientists leave the possibility open that microbes could be the methane's origin.

"As to biological versus geological, we are really not in a position from these data to say what the origin is," says Atreya.



The Curiosity rover has explored Gale Crater (above) and will spend the next one to three years ascending Mount Sharp, an eroded mountain in the crater's center. (Circle indicates the rover's landing site.)

PHOTOGRAPH BY NASA/JPL-CALTECH/ASU

Methane Mystery

The discovery is puzzling even apart from the possibility of microbes on Mars.

Previous estimates suggested that methane delivered by meteorite impacts on the planet's surface, or otherwise released there, should linger in the atmosphere for 300 years. Instead, Curiosity found, the gas vanished within weeks.

Another puzzle: The background amount of methane in the thin Martian air was about half the level expected based on past telescope and spacecraft measurements.

Despite caution by the rover mission scientists, some experts outside the team voiced more optimism for someday finding microbes on Mars. As evidence against a geologic origin for the methane spikes, Mars has been volcanically dead for at least the past few million years, notes geophysicist Vladimir Krasnopolsky of the Catholic University of America in Washington, D.C.

In his view, "methanogenic [methane producing] bacteria are the most plausible source of methane on Mars."

Levine similarly said he would "put my money" on Martian microbes as the source of the methane spikes, though he places that bet cautiously.

But Atreya says that even if the methane spikes came from microbes, that doesn't mean any are alive on Mars now. Methane produced long in the past by microbes or rocks might have been preserved under the surface of Mars for "billions of years," he says, in frozen deposits called clathrates. Those might have slowly surfaced and released the gas as Mars eroded in dust storms. (Learn more about the history of mystery objects on Mars.)

Long Roads Ahead

NASA delivered the rover to Mars in 2012, in a thrilling "Seven Minutes of Terror" descent from a rocket-powered crane. Inside the 96-mile-wide (155 kilometers) Gale Crater, the rover has sought to find out whether past chemistry on the desert planet once could, or might still, support life.

Along with the methane spikes, the mission scientists reported tentative signs of organic chemicals, simple building blocks of more complex biological molecules, in a sample of clay rocks taken by the rover.

The rover is in good health, the team said, and will continue to ascend Mount Sharp, an eroded mountain in the center of the crater, for the next one to three years, looking for more signs of organic chemistry in rock layers.

If the rover lucked out, a sufficiently large plume of methane might permit its instruments to distinguish whether carbon atoms in the outburst bore a chemical signature consistent with life on Earth.

But Curiosity rover team science chief John Grotzinger of Caltech warned that Curiosity's search for life on Mars will likely always give "ambiguous" results, given the difficulty of making scientific measurements on the red planet. (Related: "Mars Curiosity Milestone: Top 5 First-Year Discoveries.")

"We're just going to have to respect that possibility [of life]," Grotzinger says, and keep exploring on Mars.