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Mars's Peroxide Snow Would Kill Any Surface Life

Richard A. Lovett
for [National Geographic News](#)
August 7, 2006

Dust storms on Mars appear to be creating a snow of bleachlike chemicals that make their way into the planet's soil—rendering life as we know it impossible on the red planet's surface, scientists report.

The announcement comes close to the tenth anniversary—August 6, 1996—of the now discredited claim by NASA scientists that they had discovered evidence of life on Mars inside a Martian meteor found in Antarctica.



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The toxic chemicals cited in the new study, including hydrogen peroxide, are created by the action of static electricity generated by dust devils.

Dust devils are swirling vortexes that can tower several miles high and a quarter-mile (about a half a kilometer) wide at the base. They're not tornados, but on

Earth they can pack enough punch to knock people off their feet.

Frequently seen on Mars, dust devils have unexpectedly extended the lives of NASA rovers by blasting light-blocking dust off their solar panels. (See ["Mars Rovers Exceed 1-Year Mark—And](#)

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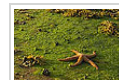
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The new research applies what is known about Earthly dust devils to conditions in the thinner Martian atmosphere.

"We spent years chasing dust devils in the Arizona desert with a special instrumented truck," said Gregory Delory, a physicist from the University of California, Berkeley. Delory is the lead author of one of two papers on the subject published in the most recent issue of the journal *Astrobiology*.

The researchers found that Martian dust devils would create large amounts of static electricity.

"It's analogous to rubbing your feet against the carpet and shocking someone," Delory said.

The static fields aren't strong enough to produce lightning bolts, but they do produce sparks.

(See a [gallery of Mars images](#).)

Sterile Soil

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These sparks break water and carbon dioxide molecules in the atmosphere apart and allow them to recombine into bleachlike chemicals, including hydrogen peroxide, the scientists say.

So much hydrogen peroxide is formed, in fact, that it would fall to the ground as snow.



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This explains a conundrum dating back to 1976, when the first Mars landers, Viking 1 and Viking 2, failed to find any trace of organic matter in the Martian soil.

Hydrogen peroxide is a potent oxidant and antiseptic that rapidly destroys living matter. The old Viking result was surprising, says the lead author of the second

study, Sushil Atreya.

That's because, even if Mars never had life, its soil should have contained substantial amounts of organic matter—certain types of carbon compounds that can be created through life-creating processes or geological processes.

"Organic material has been raining down from meteorites and comets for four and a half billion years," said Atreya, who is director of the Planetary Science Laboratory and professor at the University

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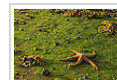
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of Michigan.

"So where is it? This has been a big puzzle for 30 years. Something must be oxidizing the organic material" and thereby destroying it, he said.

Peroxide isn't a new culprit, but until now the only known Martian mechanism for creating it was decomposition of the atmosphere by ultraviolet light from the sun. That doesn't produce enough hydrogen peroxide to oxidize all organic matter in the soil.

Dust devils, on the other hand, can produce hydrogen peroxide 10,000 times more quickly and much closer to the planet's surface, where it can easily reach the soil.

Peter Smith, a scientist at the University of Arizona's Lunar and Planetary Laboratory who was not involved in the study, calls the new findings interesting and important.

Until now, he said, scientists have been unable to come up with a mechanism that would put enough oxidants into the soil "to really scour and sterilize" it, as detected by the Viking crafts.

The idea that dust devils might be contributing isn't new, he said, but it had never before gone beyond the realm of brainstorming. Now, he said, "they've actually done the science and have a set of calculations that show it's not just a small effect—it's a very large effect."

Underground Life?

The finding has enormous implications for the search for life on Mars.

"We can't say how life would adapt," Berkeley's Delory said. "The best we can say is that [the Martian surface] is inhospitable to most life as we know it. It's not inconceivable that there are forms of life that thrive under those conditions. We don't know the limits of life."

The University of Michigan's Atreya, however, finds it unlikely that life could exist in the corrosive Martian soils.

"The surface is not where we should be looking," he said.

But he agrees that the search for life should go on.

The peroxide, he says, wouldn't penetrate very deep beneath the surface. And like Earth, Mars gets warmer as you burrow into it: warm enough that there should be liquid water—a necessity for life as we know it—within one to six miles (two to ten kilometers) of the surface.

"If life exists on Mars, it resides below the surface," Atreya said.

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