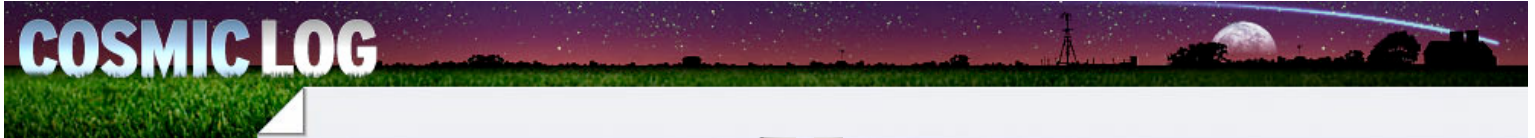




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Quantum fluctuations in space, science, exploration and other cosmic fields... served up regularly by MSNBC.com science editor Alan Boyle since 2002.



Alan Boyle covers the physical sciences, anthropology, technological innovation and space science and exploration for MSNBC.com. He is a winner of the [AAAS Science Journalism Award](#), the [NASW Science-in-Society Award](#) and other honors; a contributor to "[A Field Guide for Science Writers](#)"; and a member of the board of the [Council for the Advancement of Science Writing](#).

Check out Boyle's [biography](#) or send a message to Cosmic Log via cosmiclog@msnbc.com.

Life on Mars?

Posted: Wednesday, August 02, 2006 5:25 PM by Alan Boyle

Categories: [Space](#)

Static buildup may explain a three-decade-old mystery in the search for life on the Red Planet. Researchers say the static electricity generated by Martian dust storms could provide an alternate explanation for chemical reactions that hinted at organic activity – reactions that were detected during the [1976 Viking mission](#). Their findings also imply that the Martian surface would be continually sterilized by hydrogen peroxide.

All that is bad news for astrobiologists looking for signs of Martian life, but there's a flip side as well: The researchers acknowledge that organisms could still lurk [far below the surface](#). And one of them says the new findings raise deeper questions about the [recent detection of methane](#) in Mars' atmosphere, which may (or may not) be an indicator of microbial life.

The Viking mission stirred up a long-simmering controversy because one of the experiments - which involved adding water and nutrients to Martian soil, then cooking the brew - briefly produced the kinds of gases that might be expected to result from organic activity. Those results could not be confirmed, however, leading researchers to wonder whether non-biological chemistry could have explained the reaction.

The prime suspect was hydrogen peroxide. If peroxide accumulated in the Martian soil, that might explain the reaction - but where could all that peroxide come from?

In a pair of studies published in the June issue of *Astrobiology*, researchers say the dust devils and dust storms that sweep over the Red Planet could generate enough static electricity to split carbon dioxide and water molecules in the atmosphere. Those molecules could recombine as hydrogen peroxide and other oxidizing agents that would fall out of the air like snow - and sterilize the surface.

"We actually see some analogs on the earth," the University of Michigan's Sushil Atreya, one of the lead authors of the research, told me Monday. "In terrestrial dust devils, for example, the electric fields are quite large, and there is chemical modification that goes on in the dust devils."

Another lead author, Gregory Delory of the University of California at Berkeley, said in a [news release](#) that



such a scenario "very much affects the interpretation of soil measurements made by the Viking landers in the 1970s." The chemical reactions proposed by the researchers would produce enough peroxide to explain the results of the controversial Viking experiment without organic activity, the researchers said.

If oxidizing snow is indeed falling on Martian soil, that would add just one more factor inimical to any organisms that are even thinking about going topside on Mars. There are plenty of other reasons why life as we know it would have a hard time on the present-day planet - including deadly ultraviolet radiation, [low temperatures](#) and the lack of water.

The findings have implications for future exploration as well. "It is possible there could be long-term corrosive effects that would impact crews and equipment due to oxidants in the Martian soil and dust," Delory said.

As for the search for Martian life, Delory said "the jury is still out." Organisms may have arisen on Mars billions of years ago, when the planet was warmer and wetter, and some form of life may well still exist. But if it's "life as we know it," those organisms would have to be sheltered below the surface, Atreya said.

Mars' deep subsurface has long been considered the most likely place to look for extraterrestrial life, because that's where liquid water may persist - perhaps 1 to 6 miles (2 to 10 kilometers) deep, Atreya said. "I don't believe the peroxide is going to penetrate that far down below the surface," he observed.

Atreya noted that the peroxide proposal would raise questions about the methane detected in Mars' atmosphere. If the latest hypothesis pans out, then chemical reactions on Mars would have to produce even more methane than previously thought.

On Earth, the prime method for methane production is biological activity - which is why the methane in Mars' atmosphere is so interesting to astrobiologists. But Atreya pointed out that there are other ways to make methane. For example, the gas could be "produced geologically in the interior, not by a volcanic process, but by some sort of hydrothermal process conducted at low temperatures," Atreya said.

It will take further experiments on Mars itself to resolve these questions. [One experiment](#) slated for inclusion on the Mars Science Laboratory, due for launch in 2009, would measure the proportions of carbon isotopes - which could be an indicator for the presence or absence of [biological activity](#). The mission's scientific instruments would also check for oxidants, which could provide evidence for or against the peroxide proposal, Atreya said.

"Unfortunately we have to be a little bit patient, but it's not that far away," he told me.

In addition to Delory and Atreya, the team members behind the Astrobiology studies include William Farrell of NASA's [Goddard Space Flight Center](#), Nilton Renno and Ah-San Wong of the [University of Michigan](#), Steven Cummer of Duke University, Davis Sentman of the University of Alaska, John Marshall of the SETI Institute, Scot Rafkin of the Southwest Research Institute and David Catling of the University of Washington. The research was funded by NASA.

This year marks a couple of big anniversaries in NASA's search for Martian life, including the [30th anniversary of the Viking landings](#) as well as the [10th anniversary of the announcement](#) that "nanofossils" had been found within a Mars meteorite. [Check out this time line](#) for a chronology of the quest, scan [this 1998 interview](#) with one of the researchers behind the Mars meteorite claims, [watch this video](#), and stay tuned for more in the next few days.

Update for 5:25 p.m. ET Aug. 2: One of the key proponents of a biological explanation for the Viking experiment's results is Gilbert Levin, who was the principal investigator for the [Labeled Release experiment](#), also known as the LR. Levin told me today that the peroxide proposal has been around for about 29 years, and he's definitely not convinced by the latest research.

"Thirty years is time enough for someone to have made a case against the LR. and I point out that no scientific case has ever been made," Levin said.

Until recently, remote observations had not turned up evidence of significant amounts of hydrogen peroxide in the Martian atmosphere. However, two years ago, researchers using the James Clerk Maxwell Telescope in Hawaii said [they had detected levels of peroxide](#) that were consistent with theoretical predictions. Similar reports came from the [Paris Observatory](#).

Even if there is peroxide present, Levin said chemical activity alone wouldn't explain the results from his experiment. He noted that the reactions took place under warm and wet conditions, but did not occur once the samples were warmed to a high temperature, then cooled. Levin saw that as a sign that whatever was causing the reaction at lower temperatures was killed off by the higher temperatures.

"What I want somebody to do is to duplicate those results chemically," Levin told me. "I can duplicate them biologically all the time."

For details, check out [Levin's file of research](#) on the Labeled Release experiment.

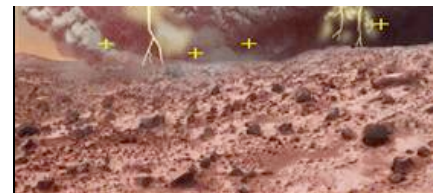
All the research aimed at ruling out life on Mars must make Levin feel like a voice crying out in the wilderness - [but he'll get his say](#) Aug. 14 at an International Society for Optical Engineering conference in San Diego. He's due to present a paper titled "Modern Myths of Mars," and is a co-chair for several provocative sessions on the search for Red Planet life. Who knows? Gilbert Levin may have the last word after all.

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We can be almost certain that life does indeed exist on Mars today. We did not send sterile rovers etc., and microscopic life always amazes in its ability



NASA

Artwork shows a Martian dust storm with electrical charges labeled as positive and negative.

to survive. (We returned from the moon with earth microbes) Perhaps we are inadvertently seeding microbial life (or deliberately?) on our sister planet.
Brent Gray, Chico, California (Sent Wednesday, August 02, 2006 12:28 AM)

I think the only thing that is going to calm down life on this planet is the positive discovery of other life in the universe. Once this happens maybe we can come together as a planet and not be so arrogant about our place at "Gods" table.

Vance (Sent Wednesday, August 02, 2006 2:46 AM)

I agree with Vance. We humans are full of ourselves when it comes to who knows the truth with God. I hope that life will be found so all of those religious "scholars" will have to rewrite some of their own textbooks. And in the end, maybe this world will come together and reach for something higher than itself.

James, Springfield, TN (Sent Wednesday, August 02, 2006 8:52 AM)

Nothing will calm life down on this planet as long as two different groups of people can each believe that a super powerful man living in the sky gave them a particular bit of land along with the right to kill the other people for it.

Dennis, Richmond, Virginia (Sent Wednesday, August 02, 2006 9:11 AM)

The fact that some people believe that Earth is the only place that life could possibly be proves how arrogant that we humans are. The universe is so ridiculously big that there is almost no way that we could be the only life out there.

Sean, Kansas City (Sent Wednesday, August 02, 2006 9:29 AM)

While I agree with Vance, I think it will take a lot more than some microbes to change people as a whole. Obviously, intelligent life is the big one, but I think we'd at least need something big enough to see with the naked eye to have any real impact at all. I suppose only time will tell.

Kraven, Canada (Sent Wednesday, August 02, 2006 9:53 AM)

Assuming that life did evolve on Mars during a more hospitable period in its history, and given that the change in conditions from then to what we see now took long enough, AND given that the life that evolved there was not overspecialized when environmental changes set in, there certainly SHOULD be something alive there that can tolerate present conditions...maybe even something that exploits those conditions somehow.

However, given Mars' atmosphere's very thinness and the amount of UV that reaches the surface, it is unlikely that electrostatic charges would separate very far or for very long. I experiment w/ high voltage electrostatic contraptions all the time (here on Earth) and doubt very seriously that a charge would accumulate to a significant degree in an atmosphere as "grounded out" as Mars' should be.

[Patrick Bishop, Caldwell, NJ](#) (Sent Wednesday, August 02, 2006 10:20 AM)

I cannot wait for the day that life is discovered somewhere else, and that the notion that life needs the exact requirements that we have here on earth is busted.

As the saying goes "Life will find a way..."

Mark (Sent Wednesday, August 02, 2006 12:16 PM)

Aside from the fact that life, once established, is tenacious, eventually things could get too tough. The only way to get a final determination is to put boots on the surface (hopefully sterilized!) and do some aseptic technique digging.

If there is no indigenous life on Mars, we can occupy, terraform and go from there. What the heck, Johnny Appleseed redux! The Mars flag should be red, green and blue, because those are the stages it might go through if we get off our bottoms and get moving. Prognostications from the burning shrub not withstanding.

I strongly suspect that Vance will be disappointed in the response of the god believers. They have a remarkable ability to lie, distort and dodge the facts so that they can remain in their fantasy world. See the \$25 million dollar museum in Kentucky. What good could have been done with that money?

Here about the \$100K given to the professional global warming doubter? Scholarly prostitution if I ever heard of it! Ought to have his degrees revoked.

Wade Whitlock, Aberdeen, MD (Sent Wednesday, August 02, 2006 12:37 PM)

News Flash!

Intelligent life may have been found evolving in Kansas. Recent findings had cast some doubt that intelligent life existed in flatland. The state-wide school board elections may have removed the religious right's grasp. Stay tuned!

We don't move Atlantis to the pad because of a couple of thunderstorms. OK. Soooo, we now move it out with Chris becoming a hurricane wannabe and Cape Carnival in the 5-day cone? Oh, and it is supposed to sit there for how long before launch? Did I miss something?

Wade Whitlock, Aberdeen, MD (Sent Wednesday, August 02, 2006 12:47 PM)

Life is durable and will find a way to survive and thrive where most people would consider conditions "Sterile". Examples are the Earth microbes found on one of the Lunar Lander and brought back by Apollo 12. Microbes were exposed to UV light, radiation, extreme high low temperatures. The fish in the Antarctic Ocean that thrive in waters that are below freezing. Microbes and fish that thrive in deep ocean vents where pressures & temperatures are hellish. These microbes would say it is "Miller time" in an autoclave. Pictures of fish swimming at the bottom of the "Challenger deep" in the Marianas trench, seven miles under the ocean.

a p garcia (Sent Wednesday, August 02, 2006 1:00 PM)

The Universe is a large place, probability alone- using our star and solar system as a model, proves that there must be life in existence elsewhere.

Vance, I do not believe the discovery of life elsewhere in the solar system let alone within the Galaxy we reside, either intelligent or microbial will ever

take "Mans" arrogance away from him. Rather, "Man" would gloat in his own "genius" to have made such a discovery. However my friend, we can always hope. :)

Raymond Barber, Albany, NY (Sent Wednesday, August 02, 2006 1:14 PM)

I think Vance brings up a very valid point. When we are able to prove that life has or does exist on another planet we are going to have a big debate on our hands. I am really curious as to how religions will respond to those findings and what course religion as a whole will take in our world.

Brian, Dallas, Texas (Sent Wednesday, August 02, 2006 1:52 PM)

I think we should be spending the money here on earth helping people and quit running around the universe in hopes of finding others. This planet is going to crap fast with today's society and we all should hope there is a God. No way did this planet just happen on it's own. The way everthing interacts with each other is amazing and is overwhelming. We need to save the earth and ourselves and find out as much as we can about where we live and not where others may live.

Paula, Forest Lake, MN (Sent Wednesday, August 02, 2006 1:59 PM)

I really do not understand how large amounts of UV or hydrogen peroxide's oxidizing effects can be considered to be inimical to life. Maybe UV radiation and electrostatic differentials is what life on Mars uses to power its processes! After all, a corrosive, poisonous atmosphere, containing large amounts of the dangerous gas oxygen is an excellent argument against any possibility of life on planet earth. The problem with "life as we know it" is that we really don't know much about life except DNA-based life. In order to keep an open mind, we should be looking for energy sources that can organize very long chains of molecules. Instead of dismissing UV radiation, we should consider it a possible energy source and the oxidative effect of hydrogen peroxide might be exactly what life needs to live there.

Byron Raum, Beverly Hills, CA (Sent Wednesday, August 02, 2006 3:07 PM)

I love it when people mock religion and then state that our salvation will come from the discovery of life from other planets. This strikes me as just as much of a religious statement since it is based completely on faith (faith that there are other beings out there, faith that they will somehow make us stop fighting each other). I don't have a problem with anyone who believes in that, but I do have a problem with people who believe that way and also mock people for believing in God.

J. B. (Sent Wednesday, August 02, 2006 3:14 PM)

New variants on the old theories attempting to explain away the Viking lander "labeled release" experiment results seem to appear on a regular basis. Why is the opinion about those results of the experiment's principal investigator, Dr. Gilbert Levin, never even acknowledged in these articles?

Levin has consistently argued that the results could only be an indication of life and that the conditions on Mars are not favorable to the existence "superoxides" on the surface of the planet in concentrations that would prevent life from existing. There is no empirical evidence whatsoever to support this theory; only more theories on top of the old ones.

For anyone interested in the other side of the argument, Levin lays out his position in a paper that can be found at:

<http://mars.spherix.com/spie2/Spie2001Oxides/Spie2001-oxides.htm>

Aside from the Viking results, one wonders why the scientists who allow that life might exist "far" (as in many kilometers) under the martian surface never consider the possibility that it might exist a few centimeters under the surface. Several years ago, a failure to detect life in the surface soil of the arid Atacama desert in South America was bally-hoed in the media as yet more evidence that life is unlikely on Mars. But subsequent analysis by another team of researchers found there were in fact living organisms just a few centimeters below the surface where the first team looked. This second team concluded that in order to find signs of life, sometimes you need to "dig a little deeper" -- but not kilometers deeper.

It almost seems as if scientists who have staked their reputations on theories against life on Mars are averse to considering any possibilities that might undermine those theories.

James, Houston (Sent Wednesday, August 02, 2006 3:28 PM)

I tried to get in touch with Dr. Levin on Tuesday but didn't have any luck. However, he responded to my e-mail today, and you can look forward to a meaty update up top in the next little while. He'll also be presenting a paper on Aug. 14 during the SPIE conference. Here's the link (which I'll repeat in the up-top update):

<http://spie.org/Conferences/Programs/06/op/conferences/index.cfm?fuseaction=6309>

Alan Boyle (Sent Wednesday, August 02, 2006 4:42 PM)

Wonder if anyone has recreated current conditions on Mars and seen what kinds of organisms if any can survive there on the surface and underground.

Gary

Garyb (Sent Wednesday, August 02, 2006 5:04 PM)

Life on Mars? Life on Earth? Which is it? Quite a paradox of conjecture at this point. Life on Mars as we know it? I doubt it. I would imagine many can consider Mars as a dead planet unable to sustain life as we know it and justifiably so. I will have to say there is probably some life form (possibly microscopic) that can survive comfortably in a Martian environment either under the ground or atmospherically borne carried about by the many dust storms.

What about the intelligence level of these micro particles? Are they able to replicate and communicate? Are they in a state of suspended animation waiting to receive the needed ingredients to flourish once again? What will be the consequences of these forms should we disturb them? Can our life forms benefit from these microbes or will they be our curse?

A lot of questions to be answered before we start digging around in an Alien world. I would hate to see us open up a pandoras box that will cause catastrophic consequences for the explorers on Mars or the inhabitants on Earth. Here we have two planets. One that appears baren and desolate (might consider it a dead planet). The other a planet that is abundant with thousands of different life forms that sustain life in the sea and land. Short of the possibility that a massive celestial object bombarded the planet and decimated life, why does it appear so lifeless and baren. It does have the capacity to be a flourishing planet with life forms possibly close to what we consider intelligent life forms capable of surviving in the Mars atmosphere.

I would imagine the erosive effects, gravitational or magnetic pull, UV radiation, and other elements that we may not be aware of yet may have dealt this planet it's death keel and prevented it from evolving any further than it's present condition.

On a positive note there may be many minerals there that may be beneficial to our economy but other worlds and moons in our solar system are a better gold mine of minerals and gases that would be more beneficial for exploration or exploitation considering our depleting natural resources here on earth.

Larry Hughes (Sent Wednesday, August 02, 2006 10:19 PM)

No one knows exactly how big is the universe. There could be life on Mars, there could be life elsewhere nearby or far far away.

Why is there so much debate over the existance of life on the little red planet for decades? Because:

- (a) it is nearest to Earth,
- (b) its a planet where we have most knowledge of compared to others,
- (c) it is possibly a planet where humans can physically explore and visit when science and technology allow,
- (d) we all want to satisfy our curiosity.

Until the day it can be scientifically proven that Earth is the one and only, I believe that we are not the only ones around.

Lim Jyh Ren, Singapore (Sent Thursday, August 03, 2006 1:31 AM)

Life other than on Earth? There are 5 billion stars in our Solar system alone, and 5 billion Solar systems, many larger than our Milky Way. Do the math. It's most likely that there is other life in our own Galaxy. The odds that we are the only life in the entire Universe is inane. There has to be another planet within the uncountable trillions that can support life.

George, Naples, Fla (Sent Friday, August 04, 2006 2:11 AM)

How can anyone be certain whether or not life exists beyond earth? I do think that some are jumping the gun by saying there is no chance for life on Mars. Some seem to forget that not everything requires the same environment as we do, to survive. There may be life on mars, creatures that may have evolved.

Angel, St. James, Missouri (Sent Friday, August 04, 2006 2:36 PM)

Finding life on other planets would be nice, but I think NASA and the gov'tments main priority is to find planets we can exploit and possible habitate in the future when this planet become unhabitable due to overcrowding, pollution, global warming, etc. If we found intelligent life we would probably kill it or imprison it.

Quinton, Austin, Texas (Sent Tuesday, August 08, 2006 3:24 PM)

When it comes to find life forms on other planets to me there is life forms on all planets, not just Mars but all planets. The energies flow into planets of all, electricity of positive of nature is there. [...] I predict in a couple of years you will find some neat and interest things and life that we never thought of that could be, and far as now you will find some now, more than you know. Open your minds, it will be there.

[Kerri Stanley Antlers Oklahoma](#), (Sent Wednesday, August 09, 2006 12:31 AM)

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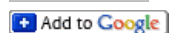
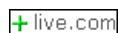
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