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Red Planet, Wet Planet

Developments in the Search for Life on Mars

Recent discoveries increase the likelihood that Mars might once have had life—or might still hold life today.

First, the twin Mars Exploration Rovers launched last summer by NASA landed successfully in January on different sides of the planet. Their missions have been tremendously productive: They have photographed, brushed, ground up, dug, drilled, and analyzed Martian rocks, and aside from a few technical glitches—a memory-usage malfunction on the "Spirit" rover and a battery-drainage issue on "Opportunity"—both of the $400 million machines performed well. NASA intends to keep operating the rovers until they run out of power or the project runs out of money.

The most important result of the rover missions was discovering that the surface of Mars once had liquid water on it. Today, Mars has frozen water concentrated at the poles, but the planet is too cold for liquid water. Yet the presence of certain minerals, and the appearance of certain patterns and layers in Martian rocks, convinced scientists that the Opportunity rover landed in an area once "drenched" with liquid water, NASA announced in March. "We think Opportunity is parked on what was once the shoreline of a salty sea on Mars," said Steve Squyres, one of the top scientists working on the project. The Spirit rover also landed at a place that once had water, although only "small amounts" that might have been underground—"not water that sloshed around on the surface" like it did at Opportunity's location, a NASA scientist said.

All life on Earth depends on water, so the new evidence of a wet Martian past makes it more plausible that Mars might once have been hospitable to microbial life. But a second discovery, revealed in March, gives more direct evidence that microbes might still be alive on Mars today. Using four different instruments, three teams of researchers separately found an unusually high amount of methane in the Martian atmosphere. The high methane content apparently can't be fully explained by any known chemical or geothermal process, so the "most likely explanation," according to one of the research teams, is that the gas is being produced by "living subterranean organisms"—microbes under the Martian surface.

This explanation jives with the theory of Martian history that the last few decades of research has begun to outline: Mars was once a wet planet where microorganisms might have thrived; as its climate changed (for reasons we don't understand), all liquid water disappeared from the planet's surface; it is possible that pockets of liquid water still exist under the surface; if there

ever was life on Mars, these underground reservoirs may still hold it. The scientists who discovered the high methane levels have said that their results can be explained by "extremely scarce" organisms surviving in subsurface oases, and that the rest of Mars might be "generally sterile."

"It seems like with every set of missions to Mars, instead of a gradual increase in our understanding, we have a quantum leap," one researcher told Space.com. "It's really a complicated place."