

# Re: Secrets of Mars' Suitability for Life May Be Down in the Dirt (Phoenix)

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For Immediate Release

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## SECRETS OF MARS' SUITABILITY FOR LIFE MAY BE DOWN IN THE DIRT

Shortly after NASA's Phoenix lander settles onto Mars' frigid, northern plains on May 25, it will undertake what is literally a microscopic examination of the red sand beneath its feet. By doing so, it may find evidence that liquid water – generally agreed to be a prerequisite of life – once pooled here.

Examination of the Martian soil is part of the task of a sophisticated on-board instrument package known as MECA, for Microscopy, Electrochemistry, and Conductivity Analyzer (MECA). Two microscopes are part of this package, and it is their close-up views that might supply conclusive evidence for a watery past. According to John Marshall, a planetary geologist with the Carl Sagan Center at the SETI Institute, "this very detailed examination of the sand grains could supply a vital clue as to whether Mars was ever conducive to life – or if microscopic life might still have a foothold there."

Imaging is a big part of the Phoenix mission. On the main deck of the lander is a stereo camera that will provide landscape views. The

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camera on the robotic arm can see sand and pebbles. But the MECA has both a low-power optical microscope for scrutinizing a field-of-view only millimeters in size, and an atomic force microscope able to make a "topographic map" of soil particles with detail a thousand times finer than its optical counterpart. The atomic force microscope works by means of a tiny stylus that "feels" its way over the sample.

Marshall's job is to interpret close-ups from the optical microscope from a geologic perspective. The size of the soil particles, as well as their shape and surface texture, are all indicators of whether or not liquid water was present.

"If you see little clay particles," Marshall notes, "you say ah, hah! There's been aqueous weathering here – chemical alteration of the grains. It would be just like the clay you find in your back yard."

While that would be exciting, it's also possible that the soil particles have simply been processed by the stirring up of ground ice over thousands and millions of years. "That would be interesting, but not revolutionary," says Marshall.

Richard Quinn, also at the SETI Institute's Carl Sagan Center, is using MECA instruments to do a different kind of soil analysis: using the type of wet chemistry you may remember from high school. Within the MECA package are four box-like receptacles, or reaction chambers, each the size of a demitasse cup. Their inside walls are covered, polka-dot like, with 24 sensors. As Phoenix's robotic arm pulls soil off the landscape, it deposits some samples into these water-filled chambers..

"Adding these soil samples to water allows us to look for is soluble salts," says Quinn. Finding these would help establish what the prior water history was at the landing site, and might give an indication if this area of Mars was habitable."

In his lab at NASA's Ames Research Center, Quinn has set up equipment that duplicates the reaction chambers aboard Phoenix. He's also collected samples of "Mars analog" soil samples from places on Earth where conditions mimic those on the Red Planet. On the basis of data coming back from Phoenix, Quinn's assistants at Ames will choose a soil sample and see if they can duplicate the results coming from tens of millions of miles away. It's a way of doing analysis by "remote control."

"If MECA finds a sample with a significant salt content, and if that same sample – when run through Phoenix's Thermal and Evolved-Gas Analyzer instrument – also turns out to contain organics – Well, that would be the best I could hope for." says Quinn.

Marshall is philosophical about doing laboratory science from a distance to learn if Mars was ever a kinder, gentler world. "In a

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hundred years, our view of the Red Planet has gone from a small, ruddy dot imperfectly seen in an Earth-bound telescope to a detailed scrutiny of the tiniest irregularities on a grain of martian sand," he notes. "It's more than remarkable."

First Photos back from Mars lander, shows a big no no from under the lander's legs!:

[http://farm1.static.flickr.com/105/302704354\\_960df31f14.jpg?v=0](http://farm1.static.flickr.com/105/302704354_960df31f14.jpg?v=0)