



LETTER TO THE EDITOR

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Water Everywhere?

In the Jan. 6 NASA Jet Propulsion Laboratory press conference on the successful landing of Spirit, a reporter, looking at the fresh image of Mars displayed, questioned whether an area near the lander might be mud.

Despite:

- Mars Viking Mission's thermal data evidencing liquid water on the surface of Mars;
- Two experiments demonstrating the formation of liquid water under the environmental conditions of Mars;
- The application of the water phase diagram to show that water would exist in liquid form on the surface of Mars;
- A model accounting for liquid water in the presence of ice on Mars;
- The Pathfinder surface atmospheric pressure and thermal data showing that the conditions for liquid water prevail on Mars; and
- The recent interpretation showing that Odyssey's detection of the widespread presence of near-surface ice means liquid water on the surface.

The Spirit experimenter questioned replied, "it does look like mud, but cannot possibly be mud," because, he continued, "there is no liquid water on the surface of Mars."

Subsequently, NASA published a paragraph produced by the mini-TES Thermal Emission Spectrometer. The spectroscopic graph showed two features identified in the caption as indicative of carbonates in the soil. The formation of carbonates is generally acknowledged as taking place in liquid water.

The explanation given in the caption was that the carbonates formed from the reaction of the soil minerals with water vapor in the atmosphere. No possibility was mentioned that the required liquid water might have come from the surface material, or that., even if the source were water vapor, that the water vapor would have to convert to liquid in order for the carbonate-forming reaction to proceed. It might have been mentioned that, either way, it might well be possible that sufficient liquid water were present to support micro-organisms.

On Jan. 12, an image of the area dragged by the Spirit air bag was posted. No interpretation is made in the caption, but it might be inferred that the tracks made by the bag exposed moist or muddy soil below a drier surface. Another image of the same area taken a day or two later would make an interesting comparison to see whether the appearance of the gouged areas reverts to that of the rest of the surface, perhaps implying drying. However, the nature of

these gouges and mud-like areas should be clarified when the rover begins its task. Its track, alone, could do much to resolve the issue of liquid water on the surface of Mars.

Liquid water is generally acknowledged to be necessary for the presence of life on Mars, hence the importance of the question raised by the reporter.

The keep it simple principle of Ockham's Razor has frequently been invoked against evidence for microbial life on Mars. Thus, in addition to the references cited above, on behalf of establishing liquid water on the surface of Mars, I would now like to paraphrase a universally accepted application of Ockham's Razor:

If it looks like muck, and it puddles like muck, and it. tracks like muck, it must be muck.

GILBERT V. LEVIN

Executive Officer for Science, Spherix Incorporated

Life Detection Experimenter, Viking Mission to Mars, 1976