Ancient streambed found on surface of Mars

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This set of images compares the Link outcrop of rocks on Mars (left) with similar rocks seen on Earth (right). Credit: NASA

Rounded pebbles on the surface of Mars indicate that a stream once flowed on the red planet, according to a new study by a team of scientists from NASA's Curiosity rover mission, including a University of California, Davis, geologist. The study will be published in the May 31 issue of the journal *Science*.

Rounded pebbles of this size are known to form only when transported through water over long distances. They were discovered between the north rim of the planet's Gale Crater and the base of Mount Sharp, a mountain inside the crater.

The finding represents the first on-site evidence of sustained water flows on the Mars landscape, and supports prospects that the planet could once have been able to host life.

As a co-investigator for NASA's Mars Science Laboratory team, UC Davis geologist and study co-author Dawn Sumner played a key role in choosing Gale Crater as the landing site for Curiosity. Finding the rounded pebbles, which were deposited more than 2 billion years ago, was a matter of landing in the right place, she said.

"The main reason we chose Gale Crater as a landing site was to look at the layered rocks at the base of Mount Sharp, about five miles away," she said. "We knew there was an alluvial fan in the landing area, a cone-shaped deposit of sediment that requires flowing water to form. These sorts of pebbles are likely because of that environment. So while we didn't choose Gale Crater for this purpose, we were hoping to find something like this."

The finding comes from Curiosity's exploration of the Mars surface during its first 100 sols (102.7 days on Earth), or Martian days. During that time, the rover traveled about a quarter mile from its landing site, examining multiple outcrops of pebble-rich slabs. Curiosity took high-resolution images of these pebbles at three locations known as Goulburn, Link and Hottah. The grain size, roundness and other characteristics of the pebbles led the researchers to conclude they had been transported by water.

Sumner said the discovery involves some of the most basic principles of

geology.

The study area, which has been named 'Hottah', is by all accounts the remains of sediments from the bottom of an ancient stream, which had a relatively strong current. Credit: Malin Space Science Systems

"On the first day of my sedimentary class, I have the students measure grain size and the rounding," Sumner said. "It's simple, and it's

important."

Sumner's work in South Africa and Australia studying signs of past microbial life in rocks and her work on living microbial communities in Antarctica helped land her the spot on the Mars Science Laboratory team. NASA recognized her skills could be critical to the mission's goal: to determine whether there ever could have been life on Mars.

As part of the MSL team, Sumner helped coordinate the first scientific interpretations of what was seen during Curiosity's first few days on Mars, helps direct the rover, via computer, to shoot photographs of the planet, and continues to work on the mission from UC Davis. She will soon go on sabbatical to work on the mission at the Jet Propulsion Laboratory in Pasadena, Calif.

More information: "Martian Fluvial Conglomerates at Gale Crater," by R.M.E. Williams et al. *Science*, 2013.

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