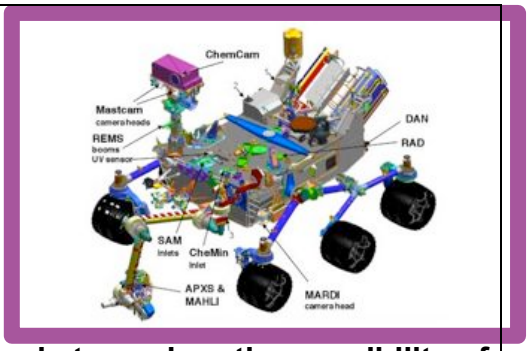
For Scientists, Excitement Around Mars Rover Is Just Beginning



By **By LISA M. KRIEGER of the San Jose Mercury News**
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SAN JOSE, Calif. — **The whole purpose of the Mars rover is to explore the possibility of life. So why is it so obsessed with rocks?**

Only moments after Curiosity's safe landing — decelerating from mind-bending speeds to a gentle and accurate touch down — it began sending home photos: **Dust. Shadows. Rock**.

For a public raised on pulp Sci Fi films and literary thrillers, the images fell short of the hoped-for glimpse of dramatic vistas, green goblins or aliens. Now that Curiosity has landed safely, the thrill is gone. We can return our attention to the Olympics.

But for 200 to 300 scientists, turning toward many 16-hour days in Curiosity's two-year search for signs of life, the excitement is just starting.

"You can see a gravel field," said an elated John Grotzinger, project manager of NASA's Mars Science Laboratory mission, describing a grainy black-and-white photo at a Monday briefing at NASA's Jet Propulsion Laboratory in Pasadena, Calif..

The rocks, say scientists, will reveal if Mars ever supported germ-sized life. If so, what did it look like? Where did it go? And is it still there, hiding?

Curiosity will look for carbon-based building blocks of life. **It will look for habitats that could have once supported life. And it will look for chemical** "**biosignatures" in rocks that will suggest that Mars may once have sustained life.**

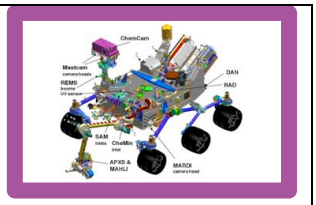
On Aug. 5, Curiosity landed in a swirl of fine-grained soil in a crater, thought to have once been one of the planet's wettest places. It's just north of the sand dunes that fringe "Mount Sharp," a mountain higher than California's Mount Whitney.

For the next several days, the rover will start a gradual rev-up of the 10 science instruments and cameras it carries, to make sure nothing was damaged during the long journey and dramatic landing.

One of the early tasks will be to check the health of a small nuclear battery. Then the rover will unpack, raising a mast and weather-monitoring instruments. By **"sol 10"** — the tenth of the planet's 24.66-hour days — it will begin wheeling and working.

On Earth, researchers will be living on the slightly longer Mars day, incrementally pushing downloaded data and uploaded instructions 40 minutes later every day. Eventually, the Jet Propulsion Laboratory team will be attending 3 a.m. science and planning meetings.

One of their main interests will be in Martian soil. A robotic arm will scoop and dig the iron-laden sands to test in the rover's mini-laboratories. It is not looking for signs of life — but signs that life may be or have been possible.



Life needs energy and water and certain elements. Energy? Check. It's there. Water? Check, although not liquid.

Chemical elements that serve as the building blocks of life? That's the $64,000 question. No one knows.

"**So we're searching for things like carbon, oxygen, hydrogen, sulfur and nitrogen,"** said Bruce Barraclough, designer of the **ChemCam** instrument, in a radio interview.

"We are not designed to find microbes or fossils but find the elements that life could have evolved from, in specific environments that are hospitable to life," he said.

Another tool, known as Sample Analysis at Mars, or **SAM**, can detect methane in the Martian atmosphere. Methane breaks down quickly, so there must be some ongoing source. On Earth, it comes from biological creatures like cows. What creates it on Mars?

SAM can break down the distribution of carbon isotopes to determine whether the gas was created through biologically or geochemically, perhaps by volcanos.

In the San Francisco Bay Area, NASA Ames senior scientist David Blake designed **CheMin**, short for chemistry and mineralogy, which uses X-ray diffraction to analyze soil and rock samples.

The Red Planet has been a source of legends since early human history. In the **1950s**, some scientists concluded that some of its colors that mimicked those of chlorophyll that gives a green color to plants.

But we lost interest in the **1960s**, when early Mariner missions sent home photos of a rocky, barren and apparently dead planet.

Hopes were raised — prematurely — in **1976**, when Mars Viking mission scientists asserted that they saw evidence of biological activity on the Red Planet. It happened again in **1996**, when researchers at Johnson Space Center said they had found **nanofossils** inside a meteorite from Mars.

In 2004, other researchers suggested that methane gases detected on Mars hinted at the presence of life.

So NASA is very cautious, and uses the "L word" — life — very carefully.

No one expects to find living bacteria or fossils in this rock.

But if Mars ever bore life, once-wet sediments from 4 billion years ago preserved in neatly layered years would be the perfect place to find its record.

"Things may seem slow," said NASA Ames' Blake. "But we have a precious resource up there. It's worth much much more than the $2.5 billion that has been invested.

"We want to preserve it, and keep it doing things for years. We will not hazard this rover. We're here for the long haul."