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## Life damper from Mars

### - Rover can't find methane, the gas microbes belch

G.S. MUDUR



A mosaic self-portrait image of the Curiosity rover taken with the help of a robotic arm that is not visible here. Curiosity has been on Mars since August 2012, and this image was taken earlier this year. Credit: Nasa-JPL

**New Delhi, Sept. 19:** The most precise search yet for methane on Mars has failed to detect any trace of the gas and virtually demolished expectations that methane-belching microbes may be lurking on the planet.

Scientists who used an instrument aboard Curiosity, America's mobile robotic laboratory on Mars, to study samples of the planet's atmosphere over the past year announced today they had been unable to find any methane.

Their findings, published in the US journal *Science*, come as a surprise because observations from Earth-based telescopes and spacecraft orbiting round Mars over the past decade had indicated what appeared to be plumes of methane on the planet.

More than 90 per cent of methane on Earth is of biological origin ---- from microbes or fossils ---- and the Mars plumes, although controversial, had generated expectations of

rocks and the Mars plains, although controversial, had generated expectations of microbial life.

The Curiosity science team has, given the instruments' limitations, set an "upper limit" --- even if there is methane in the Martian atmosphere, it is less than 1.3 parts per billion by volume.

"It's disheartening. This greatly reduces the probability that Mars currently has methane-generating microbial life," Sushil Atreya, an Indian-born director of the planetary science laboratory at the University of Michigan and a team member, told **The Telegraph**.

But, Atreya said, methane-generating microbes account for only about 25 per cent of microbial life on Earth. "So, this absence of methane does not rule out the possibility of other forms of microbial life."

The upper limit calculated by the Curiosity science team is significantly lower than the typical tens of parts per billion earlier reported by Earth-based telescopes and Mars-orbiting spacecraft.

Astronomers using a telescope in Hawaii had four years ago described what they believed was the release of methane at three Mars sites, with the largest methane plume calculated to have contained 19,000 tonnes of the gas in 2003.

Two years ago, an instrument aboard a spacecraft called Mars Express had indicated an average abundance of methane at about 15 parts per billion. The Curiosity measurements challenge the validity of such observations.

Some scientists had earlier speculated that geological processes and meteorites and interplanetary debris falling on Mars may also have contributed to methane in the Martian atmosphere.

"Our results represent the most precise measurement of methane ever made outside Earth," said Chris Webster, programme manager at the planetary science instrumentations office at the National Aeronautics and Space Administration's Jet Propulsion Laboratory.

The Curiosity science team used an instrument called the Tunable Laser Spectrometer to sample atmospheric gas on Mars about one metre from the surface on six Martian days --- on the 79th, 81st, 106th, 292nd, 306th and 313th days after landing.

The Curiosity mission's failure to detect atmospheric methane through its on-the-ground search, scientists say, highlights the challenge that India's planned Mars orbiter spacecraft, scheduled for launch next month, will encounter in trying to detect methane from orbit.

"Measurements from Earth-based telescopes or orbiting spacecraft are very difficult to make and interpret," said Atreya, who had graduated from the University of Rajasthan before moving to the US in the 1960s.

"An instrument aboard an orbiting spacecraft would need to have very high spectral resolution and very high sensitivity," he said. "The advantage with orbiters is (that) they can cover vast areas of the planet quickly."

Webster told this newspaper: "Because methane production is a possible signature of biological activity, our result could be disappointing for many. However, Curiosity is not a life-detection mission; it is there to assess the habitability of the planet, and the excitement from the many important observations from its payloads eclipses any disappointment from the methane result."

The Curiosity rover was placed on Mars in August 2012 and has been exploring the planet through its multiple scientific payloads. Within eight weeks after landing, Curiosity discovered what scientists believe is an ancient stream bed where water flowed.

An instrument that drilled into Martian rock earlier this year too detected chemical ingredients of life: carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulphur.

The mobile laboratory will continue to make measurements of both atmosphere and rock samples to discover whether organic compounds other than methane exist on Mars.

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