

MARTIAN 'BLUEBERRIES' FIND A PARALLEL ON EARTH

Relevant for: Science & Technology | Topic: Space Technology & related matters

Geochemistry: Investigations of the haematite concretions in the Jhuran formation (left) revealed the resemblance to the ones on Mars (right). | Photo Credit: [NASA](#)

In 2004, NASA's Mars exploration rover 'Opportunity' found several small spheres on the planet, informally named Martian blueberries. Opportunity's mini spectrometers studied the mineralogy and noted they were made of iron oxide compounds called haematites. This caused excitement, as the presence of haematites suggests that there was water present on Mars.

"The widely accepted formation mechanism of haematite concretion [hard solid mass] is precipitation from aqueous fluids. Haematite is known to form in oxidising environments, and based on our experience on Earth, we infer that water must have also played a crucial role in the formation of grey haematite on Mars," explains Dwijesh Ray from the Planetary Sciences Division of Physical Research Laboratory, Ahmedabad in an email to *The Hindu*. He has been studying haematite concretions in Kutch. His recent paper notes that the 'blueberries' in India and Mars share similar characteristics.

The team has been studying the Jhuran formation in Gujarat which is between 145 and 201 million years old. Detailed geochemistry and spectroscopic investigations of the haematite concretions in this area revealed that they resemble the ones on Mars. They have similar morphology – spherical, often doublet and triplet – and similar mineralogy – a mixture of haematite and goethite. The results were published in *Planetary and Space Science*.

"The haematites on Mars not just show the presence of water, they also indicate that the planet had an atmosphere with oxygen as haematites need oxygen to stabilise. We do not know if the concentration was high enough to permit lifeforms, but there was indeed more oxygen than the present day scenario," explains Saibal Gupta from the Department of Geology and Geophysics at IIT Kharagpur, one of the authors of the paper.

About the age of the 'blueberries' on Mars, he explains: "The exact time correlation is not possible. Water is believed to have disappeared from Mars rocks about three billion years ago. Studies from the newly landed Perseverance rover may help find new clues and signs of life and other organic compounds, thus helping us paint a detailed picture of the history of Mars."

Several researchers have shown that the Kutch area is a potential Martian analogue locality. A 2016 paper argued that the occurrences of hydrous sulphate in the Matanumadh area of Kutch, resemble Martian surficial processes. It has been also argued that the transformation from the wet and humid to dry and arid environment on Mars is mimicked by the history of Kutch. Dr. Ray explains that there may be several other localities in Kutch that share a geologic history of the surface to near-surface processes that appear to be similar to ancient Mars. "The concretions in the Jhuran Formation of Kutch represent another data point that reinforces the need to use the Kutch area for further analogue studies of the Martian surface," he says. The paper concludes that the Kutch area could also be a potential testing site for carrying out future Mars exploration studies on Earth.

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