MICROVIEWER

{ACTIVITY OF MICROBIOL}

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Editorial

We are happy to publish this 248th issue of our magazine MICROVIEWER, for highly respectful and curious readers, on the occasion of 17th September International Microbiology Day. We are also happy to extend best wishes on the celebration of Marathwada Mukti Diwas and Swami Ramanand Teerth marathwada University foundation Day .

This special issue is focused on one of the fascinating explorations made by NASA in the Mono lake of California, USA which indicated the great adaptability of bacteria persisting in extreme environments. The bacterium surviving on this lake exhibited an unusual character by swapping the phosphorus in DNA by Arsenic.

We hope the article will expand the curiosity horizon and fulfill the thirst for knowledge.

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MONOLAKE, CALIFORNIA

ARSENIC CYCLE OF MICRORGANISM

Bacteria : Thriving in places where nothing else can, just to remind us who is really in charge.

Bacteria are one of the simplest forms of life on Earth. Despite their apparent simplicity, they deploy a variety of strategies to thrive in fluctuating environments. From relying on a hive mind, to hedging their bets like seasoned investors, or rapidly adapting by genetic mutation, bacteria seem to have figured out that the best way to cope with change is to play every possible trick in the book>Out of the hundred-plus elements in existence, life is mostly made up of just six: carbon, hydrogen, oxygen, nitrogen, sulphur and phosphorus. This elite clique is meant to be irreplaceable. But the Mono Lake bacteria may have broken their dependence on one of the group –phosphorus – by swapping it for arsenic.NASA has conducted numerous probes at eastern California's Mono Lake, an unusually salty body of water with high arsenic and mineral levels, as it is likely to reflect conditions under which early life evolved on Earth, or perhaps Mars.>In December 2010, with lead researcher Felisa WolfeSimon,then a fellow in NASA's astrobiology program, announcing that a new form of life had been scooped from a California lake.

The bacterium in arsenic-rich Mono Lake was said to redefine the building blocks of life, surviving and growing by swapping phosphorus for arsenic in its DNA and cell membranes. In 2008, Ronald Oremland (who was also involved in the latest study) discovered bacteria in Mono Lake that can fuel themselves on arsenic. Like plants, they can photosynthesise, creating their own food using the power of the sun. But where plants use water in this reaction, the bacteria used arsenic. Wolfe-Simon has taken these discoveries a step further, by showing that the bacteria are actually incorporating arsenic into their most important of molecules.

By giving the bacteria a mildly radioactive form of arsenic, Wolfe-Simon could also track where the element ended up in the cells. The answer: everywhere. There was arsenic in the bacteria's proteins and in their fat molecules. It had replaced phosphorus in many important molecules including ATP and glucose (a sugar). It was even in their DNA, a conclusion that Wolfe-Simon backed up with a number of other techniques. All other life uses phosphorus to create the backbone of the famous double helix, but GFAJ-1's DNA had a spine of arsenic.It's an amazing result, but even here, there is room for doubt.Would the bacteria have genuinely been able to survive if there was no

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[full article on]

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