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News Features

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Green microbes key To Finding Life On Mars?

https://www.dailymail.co.uk/sciencetech/article-8179529/Glowing-green-microbes-Earth-hold-key-life-Mars.html/

Glowing green microbes found living in mineral-rich rocks deep below the ocean floor could hold the key to finding life on Mars

Daily Mail 2nd April 2020 >

- Researchers from densely packed bacteria communities in deep ocean rocks
- These rocks were filled with clay-rich minerals that were good fuel for microbes
- It's thought the same minerals are present on Mars and may hold signs of life

ars could be teeming with glowing green microbes, according to researchers who found the bacteria living in volcanic rocks deep beneath the ocean floor.

A wide variety of bacteria have been found thriving in rocks deep below the Earth's oceans in densely packed communities and the same is likely true of Mars.

Researchers from the University of Tokyo discovered the single-celled organisms after spending a decade studying rocks found in the South Pacific Ocean in 2010.

Last year NASA's rover Curiosity identified clay-rich regions on the Red Planet and the Tokyo team expect it to be similar to the minerals holding the green bacteria.

The team, led by Yohey Suzuki say the microbes 'glow green' inside the tiny iron-rich 'veins of clay' discovered 400ft below the seafloor.

To find the green globules of life, Suzuki had to slice rock samples very thin and coat them in a dye that highlighted DNA under a microscope.

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NASA is already planning to look for them following the remarkable discovery - possibly as part of the Mars Perseverance rover mission launching this year.

'I am now almost over-expecting I can find life on Mars', said Suzuki.

'If not, it must be life relies on some other process that Mars does not have, like plate tectonics.'

His team identified bacteria living in dense communities within balsamic lava samples up to 104 million years old.

Tiny fissures, thinner than a human hair, were home to trillions of bacteria - more than 328ft below the sea floor and packed with nutrients.

Measuring less than 0.04 inches across, the cracks fill up with clay minerals over millions of years - the same material used to make pottery.

Somehow, bacteria find their way into them and multiply.

'These cracks are a very friendly place for life,' Suzuki said. Adding: 'Clay minerals are like a magic material on Earth - if you can find clay minerals, you can almost always find microbes living in them.'

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The search for bacteria in deep sea rocks started with a mission to the Pacific Ocean in 2010 when Suzuki joined a team drilling into the ocean surface for samples.

They used a metal tube 3.5 miles long to reach the ocean floor - then they drilled 410ft below the seafloor to pull out core samples.

This included mud sediment - which is where most scientists look for extreme examples of life on Earth - as well as 131ft of solid rock.

'I was making loud noises with my hammer and chisel, breaking open rocks while everyone else was working quietly with their mud,' said Suzuki.

None of the sites were near any hydrothermal vents or sub-seafloor water channels, showing the bacteria arrived independently rather than being forced in by a current.

The rocks were sterilised to prevent surface contamination using an artificial seawater wash and a quick burn - a process similar to making flame-seared sushi, said Suzuki

Whole genome DNA analysis identified the different species of bacteria that lived in the cracks from different locations had similar but not identical species.

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Suzuki and his colleagues speculate that the clay mineral-filled cracks concentrate the nutrients that the bacteria use as fuel.

This might explain why the density of bacteria in the rock cracks is eight orders of magnitude greater than the density of bacteria living freely in mud sediment where seawater dilutes the nutrients.

Researchers estimate that the rock cracks are home to a community of bacteria as dense as that of the human gut, about 10 billion bacterial cells per 0.06 cubic inch.

In contrast, the average density of bacteria living in mud sediment on the seafloor is estimated to be 100 cells per 0.06 cubic inch.

Suzuki said: 'I thought it was a dream, seeing such rich microbial life in rocks.'

The study published in Communications Biology provides fresh clues to finding life on Mars. Billions of years ago it was an ocean-covered planet - just like Earth.

The microbes are what's known as aerobic bacteria. They use a process similar to how human cells make energy, relying on oxygen and organic nutrients.

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'Honestly, it was a very unexpected discovery. I was very lucky, because I almost gave up,' said Suzuki.

The clay minerals filling cracks in deep ocean rocks are likely similar to the minerals that may be in rocks now on the surface of Mars.

'Minerals are like a fingerprint for what conditions were present when the clay formed,' the professor said.

'Neutral to slightly alkaline levels, low temperature, moderate salinity, iron-rich environment, basalt rock - all of these conditions are shared between the deep ocean and the surface of Mars.'

His researchers have now launched a joint project with NASA to examine rocks collected from the Martian surface by rovers.

Ideas include keeping the samples locked in a titanium tube and using a CT (computed tomography) scanner, a type of 3D X-ray, to look for life inside clay mineral-filled cracks.

Suzuki added: 'This discovery of life where no one expected it in solid rock below the seafloor may be changing the game for the search for life in space.'

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WHAT EVIDENCE DO SCIENTISTS HAVE FOR LIFE ON MARS?

The search for life on other planets has captivated mankind for decades.

But the reality could be a little less like the Hollywood blockbusters, scientists have revealed.

They say if there was life on the red planet, it probably will present itself as fossilized bacteria - and have proposed a new way to look for it. Here are the most promising signs of life so far >

Water

When looking for life on Mars, experts agree that water is key.

Although the planet is now rocky and barren with water locked up in polar ice caps there could have been water in the past.

In 2000, scientists first spotted evidence for the existence of water on Mars.

The Nasa Mars Global Surveyor found gullies that could have been created by flowing water.

The debate is ongoing as to whether these recurring slope lineae (RSL) could have been formed from water flow.

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Meteorites

Earth has been hit by 34 meteorites from Mars, three of which are believed to have the potential to carry evidence of past life on the planet, writes Space.com.

In 1996, experts found a meteorite in Antarctica known as ALH 84001 that contained fossilised bacteria-like formations.

However, in 2012, experts concluded that this organic material had been formed by volcanic activity without the involvement of life.

Signs of Life

The first close-ups of the planet were taken by the 1964 Mariner 4 mission.

These initial images showed that Mars has landforms that could have been formed when the climate was much wetter and therefore home to life.

In 1975, the first Viking orbiter was launched and although inconclusive it paved the way for other landers.

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Many rovers, orbiters and landers have now revealed evidence of water beneath the crust and even occasional precipitation.

Earlier this year, Nasa's Curiosity rover found potential building blocks of life in an ancient Martian lakebed.

The organic molecules preserved in 3.5 billion-year-old bedrock in Gale Crater — believed to have once contained a shallow lake the size of Florida's Lake Okeechobee — suggest conditions back then may have been conducive to life.

Future missions to Mars plan on bringing samples back to Earth to test them more thoroughly.

Methane

In 2018, Curiosity also confirmed sharp seasonal increases of methane in the Martian atmosphere.

Experts said the methane observations provide 'one of the most compelling' cases for present-day life.

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Curiosity's methane measurements occurred over four-and-a-half Earth years, covering parts of three Martian years.

Seasonal peaks were detected in late summer in the northern hemisphere and late winter in the southern hemisphere.

The magnitude of these seasonal peaks – by a factor of three – was far more than scientists expected.