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Discovery of Life in Solid Rocks, on Seabed Inspires New Search for Martian Life - A Review

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Abstract

Life on Mars has been considered a possibility only in the wildest of wild dreams and that too only among scientists. It was considered a far from happening possibility as it wasn't based on the environment of Earth but of a different planet as a whole. Newly found microorganisms could help in finding the proof of life on the planet Mars. If successful, it could help in various ways for our planet, Earth. Researchers have found billions of bacteria live in tiny cracks in volcanic rocks below the ocean floor, more than nine miles below the ocean surface and a further 300 feet below the ocean floor. And they think similar tiny, clay-filled cracks in rocks on or below Mars' surface could be a life containing hub. To find a correlation between the environment on the surface of Mars and that of which is beneath the seabed. A thorough literature search was performed using the database like PubMed, Google scholar, BioRxiv, MESH, Google Cochrane database using the keywords 'Martian surface' and 'rocks beneath seabed' with no date and year restrictions. The language is restricted to English. 16 articles with similar data have been found which were analyzed and have been included in this study. The recent articles discussed in this study help us in gaining further knowledge about the 'relation between Mars and Earth' and how it affects life on earth. We could come to a result that there are slight correlations between the environments of both the planets. This review would also help us be enlightened about how far we humans have come to realize the correlation between life on earth and that of the possibility of Mars.

Keywords : *Microorganisms, seabed, volcanic rocks, environment*

Introduction

Life on Mars has been considered a possibility only in the wildest of wild dreams and that too only among scientists. It was considered a far from happening possibility as it wasn't based on the environment of Earth but of a different planet as a whole.[1] This had brought doubts on the possibility of the research being successful. This review would help us be enlightened about how far we humans have come to realize the correlation between life on earth and that of the possibility in Mars.[2] Researchers have found billions of bacteria live in tiny cracks in volcanic rocks below the ocean floor, more than nine miles below the ocean surface and a further 300 feet below the ocean floor. And they think similar tiny, clay-filled cracks in rocks on or below Mars' surface could be a life containing hub. For around 3.8 billion years, the upper oceanic crust, known as the ocean floor, was continuously formed on Earth. Underwater volcanoes release 2,200 degrees Fahrenheit lava which solidifies into basaltic rock as the hot rock reacts to the depths of the cold oceans. It has been established that hydrothermal vents along the ocean floor support bacteria and other life that turn minerals into energy rather than light. Like Earth, Mars also has a basaltic crust, which was formed four billion years ago. And sub-surface water and methane were found on the

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Red Planet in the last few years.

When the lava from the underwater volcanoes cool, the cracks form creating narrow spaces of less than one millimeter across. They 're packed with mineral-infused clay from millions of years of sediment and accumulation. Bacteria then find a nice home inside them and settle in. These 'clay-filled-crack' solid rocks are considered to be a million years old hence these newly discovered single celled creatures beneath the seafloor are clues of life on Mars.[3] They are such clues which would provide enough information on the existence and continuity of life on Mars[4] and that very existence of life helping the life on earth and also its resources.[5] The bacteria discovered in these tiny cracks of the former volcanic rocks are living proof of survival in the most extreme of extreme environments.[6] The cracks present in the rocks are the homes of a large community of bacteria. Such a large amount of bacteria is present in the community as much as 10 billion bacterial cells per cubic centimeter.[7] Researchers estimate that since these rocks are the home to such a large number of bacteria, it is as dense as the human gut[8] which is approximately 10 billion bacteria per 0.06 cubic inches. Such a large number of microorganisms in such a small space with such extreme conditions is quite baffling.[9] Hence as the possibility and exceptional facts are way beyond what was considered possible, research is very important and required to hook up for life on mars to that on earth.[10] Because all of the above had seemed to be only a mere possibility earlier, and now as it seems possible, search for life on Mars has become one of the top priorities of the current leading nations. It has been entered on the list of important and prioritised research in most developing countries[11] because in case it turns out to be successful, then the resources from Mars can be traded in for that on earth which can hence help in rejuvenation of the resources of earth.[12] Hence it's very much required to draw a connection between the planet Mars and Earth.[13]

Single-celled microorganisms

These newly discovered microorganisms are those single celled creatures which live deep beneath the seafloor where the environment is at such extreme conditions[14] where life wouldn't have been considered possible. The microorganisms seem to have great tolerance to extreme levels hence the microorganisms which live deep beneath the seabed help provide clues about life on Mars.[15,16] To find the correlation between the life on Mars samples from both of the areas are required. To obtain the colonies of bacteria so that it's characteristics can be studied under the microscope, research had to perfect a new method of cutting the rocks into ultra thin slices.[17,18]

Techniques to find correlation

Firstly certain techniques had to be developed to find a correlation between the life on earth and that of Mars. For such interplanet connections, the availability of resources to create such a connection and thus finding proof was difficult.[19] The entire procedure of establishing the correlation seemed quite as close to impossible. Even if proof from the Martian surface had been obtained, the correlation had to be created and hence proof from earth also was required.[20] To help with findings from earth, scientists had to find proof of life which would support the atmosphere of Mars.[21,22] Certain microorganisms, to be more precise certain bacteria were discovered to be living within clay filled solid rocks.[23] To be within such rocks is practically considered a wonder and awe since such rocks have been formed from mostly the lava from volcanoes.[24] These microorganisms should have extremely good resistance to the odds of the exigency of bad environment and temperature. If it is able to withstand such extremities,[25] it also might have the possibility of being able to withstand the temperature of that of Mars.[26]

Proof from both planets

Cutting the rocks into ultra thin slices is very much required to obtain better results and cutting of rocks is very difficult when compared to other specimens.[27] When studied under the microscope, it showed that these microorganisms were very much alive in the tiny cracks preset inside the volcanic rocks.[28] Once these rocks were cut open, to be analyzed under the microscope, it was found that these cracks had aerobic bacteria present within them which underwent processes similar to that of human cells.[29] The microorganisms had processes which were similar to the energy making processes of human beings. This shows that these microorganisms also relied on oxygen and other organic nutrients for making energy to sustain life and the future generations.[30]

Rocks which were assumed to have had microorganisms buried within it were chosen from the seabed and even rocks were collected[31] from the Martian surface using space rovers. These rocks were examined, analysed and also checked for any link between each other so that the study could be confirmed to be worthy to continue. When a connection was tried to be drawn out between the samples (of Mars and Earth's seabed), the condition of the rocks beneath the seabed were found to be similar to that of the Martian rock.

Once the interlink was formed between the rocks on Mars and that beneath the seabed on earth,[32] it had been confirmed that this research is meant to continue as it has great potential and also life on Mars could be checked. After the connection had been formed in this research, the need for its continuation was considered very crucial and important as it could be a breakthrough in science.[33] Hence all of the powerful nations have considered it as their top priority to do further research on. The check for similarity between the rocks would have a great possibility in how the research would help in future rejuvenation of the[34,35] resources of earth.

Requirement of efficient research

Like mentioned earlier hardcore research is required to come up with solid proof of a link between the pattern of life within the two planets.[36,37] If the hypothesis of correlation between the Martian rocks and those of earth prove to be a success, it could help bring earth back to its former glory.[38–40] There can be obstruction to the study such as lack of proper evidence from the surface of Mars, limited access to the depths of the seabeds, vitality of microorganisms.[41] But there is a scope in future for the relation between life on Earth and Mars.[42,43]

Conclusion

Life on a planet other than Earth was believed to be practically impossible earlier. But slowly the level of confidence on the fact of occurrence of any correlation between the planets (Mars and Earth) increased[44] which sparked up the interest of many more institutions and countries to come together and work. In case the hypothesis put forward proves to be right, the phase of life on earth would change. There are remarkable similarities and major variations between the two planets. We might characterize Mars as having a poor relationship with the Earth. We just scratched a couple of sites on its surface though. The man remains unaware of most of its secrets.

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Conflict of Interest: Nil

Ethical Clearance: As it is a review article so it is not required.

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