

## Review Article



## Trigger Life on Mars

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## ABSTRACT

There have been several reports that some organisms suitable for Martian conditions exist in certain parts of the earth and we can expect similar life on the Red Planet. *Pseudomonas* sp. HerB is one of them. Analysing the behavior of the organisms and conditions on the planet we found that had there been any such organism on the planet it would have been continuously engaged in transforming the soil, atmosphere and temperature conditions on the planet to make it habitable for us. On the basis of behavior of *Pseudomonas* sp herb, we visualized and projected the sequence of events that it would initiate if we plant this organism just like a seed in the subsoil of mars, it will eventually lead to making the planet habitable. If successful in this experiment, by initiating life on it, we humans will be playing the role of GOD for the planet. Not only that we will create a neighbor, a huge reserve for resources, a place to escape in case of any unforeseen danger threatening the earth, besides this will open out many secrets of our origin and open many more venues in the universe to approach and develop.

**Keywords:** Transforming Mars, Extraterrestrial life, Life on Mars, Cultivate life on Mars, celestial neighbors.

## INTRODUCTION

Only commonsense, and no complicated science is required to understand the creation of the almighty. Man has been bestowed by the almighty with unlimited powers in the form of intelligence, if used correctly we can create wonders. Billions of dollars have been spent on missions looking for life on Mars, but nobody has yet thought over how if possible we can trigger life on Mars. We can plan a strategy by which we can not only trigger life on Mars but also gradually convert the Martian conditions and make them habitable by humans. Several factors like suitable temperature, atmospheric and soil conditions are required to support life. After a deep analysis of all the facts we reached to the conclusion that there are ways in which we can implant life on the barren planet and give evolution a chance to develop. In our paper titled 'THE THIRD CONSTANT' we have already given evidences that 'life' once planted on any planet will remain there forever. It may take several thousand or millions years to make the conditions favorable for us, but what is the hurry if we know that we are on the right track and have initiated the process. In this paper we have discussed the above facts, the strategy and the sequence of events that would be initiated if we implant life on Mars and trigger evolution.

## IMPLANT LIFE ON MARS AND TRIGGER EVOLUTION

Till now we have been looking for planets that can support life which even if available seem to be too far away to viably shift. Mars is at a viable distance where we can not only install life but effectively monitor the changes and development. We have been scanning Mars to find conditions which can support life but in this paper we analyzed the circumstances on the planet and developed a strategy so as to mould the conditions on the

planet to support life, following this strategy we shall be able to trigger evolution process and in due course we will see the red planet with eye catching greenery and scintillating beauty of life. To achieve this purpose we have to change the atmospheric, soil and temperature conditions. We have to look for workers who can live on Mars under the present conditions and work to change the conditions. There are reports which say that life may exist in the subsurface of Mars.<sup>1,2</sup> Life may or may not exist on Mars but there are fair chances that it will survive under these conditions and especially when we can provide at least some care and assistance. Stepwise we will analyse the conditions on the planet, the changes required, the strategy to plant life and the expected sequence of events after we plant life on it.

## CLIMATIC AND ATMOSPHERIC CONDITIONS ON MARS

**Comparison of dry atmosphere (Terraforming of Mars Wikipedia The Free Encyclopedia)**

|                                         | Mars   | Earth    |
|-----------------------------------------|--------|----------|
| <b>PRESSURE</b>                         | 0.6Kpa | 101.3kpa |
| <b>Carbon di oxide (CO<sub>2</sub>)</b> | 95.32% | 0.04%    |
| <b>Nitrogen (N<sub>2</sub>)</b>         | 2.7%   | 78.08%   |
| <b>Argon (Ar)</b>                       | 1.6%   | 0.93%    |
| <b>Oxygen (O<sub>2</sub>)</b>           | 0.13%  | 20.94%   |

- Strong ultraviolet radiations hit the surface of Mars in the absence of Ozone layer.

## SOIL CONDITIONS ON MARS

- Mars is covered with vast expanses of sand and dust and its surface is littered with rocks and boulders.
- Water contents of Martian regolith range from <2% by weight to more than 60%.



- The presence of olivine, which is an easily weatherable primary mineral, has been interpreted to mean that physical rather than chemical weathering processes currently dominate on Mars.
- In June, 2008, the Phoenix Lander returned data showing Martian soil to be slightly alkaline and containing vital nutrients such as magnesium, sodium, potassium and chloride, all of which are necessary for living organisms to grow.

### Olivine

When olivine is crushed, it weathers completely within a few years, depending on the grain size. All the CO<sub>2</sub> that is produced by burning 1 liter of oil can be sequestered by less than 1 liter of olivine. The reaction is exothermic but slow.

### CHANGES REQUIRED

- Increase the atmospheric pressure.
- Increase the temperature.
- Increase the O<sub>2</sub> content in the atmosphere.
- Release the sequestered CO<sub>2</sub> from the soil.
- Produce an Ozone layer to prevent the ultra violet radiation from reaching the surface.

To achieve the required changes instead of thinking on the line of sending machinery and equipment which will be too costly and less efficient, we decided to think on the line of sending some species that may prove to be less costly and more effective. There are organisms on earth that can live in Mars like circumstances<sup>3</sup>, looking at the features of *Pseudomonas sp. HerB* we zeroed in on it. These cultured organisms, which are the first known to oxidize iron from olivine at neutral pH, may be a major component of the subsurface biosphere, may affect global chemical cycles of elements in basalt, and could potentially, live in the Martian subsurface<sup>4</sup>.

Under the low pressure & temperature conditions and strong UV radiation on the surface, survival of the organism was the issue to be handled. We studied the features of the organism and reached to the conclusion that if it is placed a few inches below the surface in the soil just like we sow a seed to plant a tree, the organism will survive and start its function of transforming the planet and will grow in the process resulting in speeding up the process. It will initiate a sequence of events that will lead to conversion of the soil and atmospheric conditions and forming of the Ozone layer. The entire process will continue as below:

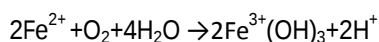
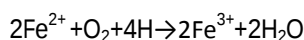
### CONDITIONS FAVOURING *Pseudomonas sp. HerB*

- Presence of Olivine in sufficient quantity.
- Subsoil temperatures close to the freezing point.

### CONDITIONS AGAINST *Pseudomonas sp. HerB*

- Present day temperature of surface of Mars is mostly below freezing point of water<sup>3</sup>.
- Low pressure<sup>5,6</sup>
- Ultraviolet radiations<sup>5,6</sup>

Planting the organism a few inches below the surface will protect it from the ultra violet radiation and nullify the affect of low pressure. *Pseudomonas sp. HerB* can use ferrous iron Fe(II) from the igneous mineral olivine as an electron donor and O<sub>2</sub> as an electron acceptor under low O<sub>2</sub> conditions<sup>3</sup>. When the organism is sown like a seed in the Olivine rich soil of Mars it will immediately start oxidizing Fe<sup>++</sup> content in the Olivine. The reaction to which is as below:



In the subsurface of the soil where the temperatures may be close to freezing point, these exothermic reactions, will help to maintain warmer surroundings. Thus the reaction and growth of the organism will augment each other till the subsurface temperature rises up to 20°C.

There is presently enough carbon dioxide (CO<sub>2</sub>) as ice in the Martian south pole and absorbed by regolith (soil) around the planet that, if sublimated to gas by a climate warming of only a few degrees, would increase the atmospheric pressure to 300 millibars<sup>5</sup>. With the increase in temperature of the subsoil the sequestered CO<sub>2</sub> will be released adding some green house effect further complimenting the rise in temperature. This microorganism is a heterotroph and facultative autotroph with the capacity to use CO<sub>2</sub> as a sole source of carbon<sup>3</sup>. *The organism will utilize the available CO<sub>2</sub>*, the byproduct O<sub>2</sub> will escape into the atmosphere and will initiate the formation of Ozone layer under the impact of the strong ultra violet radiation. Regarding the source of energy, it is an organotroph and facultative chemolithotroph, capable of neutrophilic iron oxidation with Fe(II) from olivine as the sole electron donor and O<sub>2</sub> as the electron acceptor. H<sub>2</sub>O produced during the above oxidation reaction and CO<sub>2</sub> will form carbonic acid which in turn will react with the metal oxides to form bicarbonates which is a facultative source of carbon for *Pseudomonas sp. HerB*<sup>3</sup>. Bicarbonates will be the main source of carbon till enough CO<sub>2</sub> is released into the atmosphere by increasing temperature of the soil.

Planet wide continued reaction of oxidation of Fe<sup>++</sup> content in the Olivine will produce enough water to form an ocean under which first Cyanobacteria may develop which will release O<sub>2</sub>.

Gradually enough O<sub>2</sub> will be released and the Ozone layer will be formed. The Olivine reserves will begin to deplete increasing the competition, thus the resultant mutations to adapt to the new circumstances will trigger the evolution process, under water and surface autotrophs

may come into existence. This entire process may take a few thousand or million years but has the potential to show greenery on the planet in the future. Let us go ahead with fingers crossed and initiate life on Mars, if we achieve success in this endeavor it will open the book of evolution of life on earth and understand our origin and also pave the way for us humans to act 'GOD' for other planets.

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