CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
S1901

Project Title
The Effects of Photosynthesis on Martian Atmospheric Composition in a Closed System

Abstract

Objectives/Goals
Martian habitability is a problem for NASA and other space agencies that will need to be solved before we can send people to Mars. This project consists of attempting to transform current Martian atmospheric composition into a composition in which humans could potentially inhabit within an enclosed environment. This could potentially solve the problem of the inhospitable Martian atmosphere.

Methods/Materials
Two airtight boxes were constructed using plexiglass and a strong adhesive, and Lepidium sativum (Garden Cress) was planted in regular potting soil in one box and planted in Martian soil simulant in the other. The container was flushed with 100% carbon dioxide and sealed, and the plants were allowed to grow for approximately 20 days. The resulting atmospheric composition was monitored over all of these days using carbon dioxide and oxygen gas sensors and recorded to a LabQuest device.

Results
The results of the experiment show that after 20 days, the oxygen and carbon dioxide levels returned to very near that of Earth. The experiment is affected, however, by the fact that the chambers could have been leaking, and other life might have been present in each box. Because of this, it cannot be concretely determined that the results were directly the result of the plant growth.

Conclusions/Discussion
Overall, the experiment worked considering the gas concentrations over the 20 days. If this is done on a larger scale, the same effect could be achieved on Mars. The results could have been skewed by leaking of the chambers of carbon dioxide, however. Another trial with re-secured chambers will be conducted within the time between the submitting of this application and state science fair.

Summary Statement
This project attempts to prove the viability of a certain system of oxygen production that could be used on Mars.

Help Received
Dr. Malhotra, my advisor, helped me to develop my methods, as well as Mr. Jeffery Lewis, He also helped me with making sure the chambers were airtight and flushing them with carbon dioxide, My dad also helped me with construction of the chambers.