



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> Akalpiti A. Shukla	<b>Project Number</b> <b>J0621</b>
<b>Project Title</b> <b>Is There Life on Mars? Can You Imagine Boiling a Liquid without Heating?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The question that is trying to be answered is if there is life on Mars. The purpose of this project is to find evidence that life might have existed before on Mars. The main goal of this work is that if the pressure is decreased to that of Mars, then water (any liquid) will evaporate faster without heating resulting in lowering of temperature of the remaining liquid.</p> <p><b>Methods/Materials</b> The materials for the first experiment was a vacuum jar, supporting plate, vacuum pump, a thermometer, a pressure gauge, a rubber pipe, and a cup filled halfway with water. The general procedure for this experiment is to place the water in the vacuum chamber and record the times at which the first bubble, frequent boiling, and extreme boiling occurs. The 2nd experiment is to show that light exerts pressure and uses a Crookes Radiometer and a light source. The closer you bring the light source to the radiometer, the vanes/flags inside will start to spin.</p> <p><b>Results</b> The results of the first experiment showed that photons of light exert pressure on surface they hit. The pressure exerted by the light was determined by Crookes Radiometer (Light Mill). The second experiment showed that when Mars lost its atmosphere, the pressure was dropped dramatically to a very low level which caused water to evaporate without being heated, which resulted in the continuous lowering of the temperature of the remaining water that finally froze on Mars' surface. Mars' atmospheric pressure was mimicked by using a simple vacuum chamber, a vacuum pump, and the pressure was measured by a digital pressure gauge and the temperature of the remaining liquid was measured by using a thermometer.</p> <p><b>Conclusions/Discussion</b> This study provides evidence that water and life were possible on Mars, but later Mars lost its water to space. It is possible that microscopic life might have already migrated under the ground on Mars.</p>	
<b>Summary Statement</b> Boiling a liquid without heating at a low pressure helps answer the questions about life on Mars, and also health problems that effect climbers and ocean divers.	
<b>Help Received</b> Dr. Miguel Moreno, at Los Angeles Trade Technical College, Los Angeles	