



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b>  <b>Sai Rithvik Kotla</b>	<b>Project Number</b>  <b>J1512</b>
<b>Project Title</b>  <b>The Hardest of the Hardy: Assessing the Endurance Limit of Some Extremotolerant Microbial Life Forms</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Several organisms exhibit survival and adaptation to a harsh environment. Selection of candidates that has the potential to withstand and adapt to a diverse set of harsh conditions is a key requirement for an interstellar space mission. I discovered certain microbial life forms that co-exist in the domestic environment also adapt and grow in a diverse set of harsh conditions acidic, alkaline, oxidizer, detergents, temperature, UV exposure, etc. This result will prompt the research community to relook for microbial life forms as alternatives to tardigrades for exploring the possibility of life in the interstellar space.</p> <p><b>Methods</b> Established molecular biology approaches were used for growing microbes on agar plates. These microbes were treated with various chemical (detergents, acetic acid, hydrogen peroxide, brine) and physical agents (high temperature, UV radiation) to determine their ability to endure harsh conditions. The viability of the microbes under various treated conditions was assessed by morphological examination using optical imaging methods.</p> <p><b>Results</b> A small population of microbes survived in all treated conditions - Acetic acid, Hydrogen Peroxide, and brine solution. A gradation in survival population proportionately varying with the treatment variables was observed. Repeated trials were run to determine if the microbes survive harsh conditions.</p> <p><b>Conclusions</b> Preliminary experiments support that a small percentage of microbes in the domestic environment sustain harsh conditions. This finding forms the basis for the candidate species selection for interstellar space mission.</p>	
<b>Summary Statement</b>  Certain microbial life forms have potential to withstand harsh conditions and can be an excellent model system for studying the mechanisms underpinning the extremotolerent conditions and their underlying molecular basis.	
<b>Help Received</b>  I conducted and analyzed all my experiments myself. Mr.Prasanna Srinivasan from University of California Santa Barbara advised me on analyzing data. Experiment requiring UV source were performed at UCSB by experienced personnel for safety reasons.	