



# CALIFORNIA STATE SCIENCE FAIR

## 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Gabriela N. Goldberg</b>	<b>Project Number</b> <b>S1008</b>
<b>Project Title</b> <b>Fecal Matters: Generating Electricity in a Microbial Fuel Cell</b>	
<div><div><b>Objectives/Goals</b><p>The purpose of this project was to learn how using different types of wastewater in a microbial fuel cell affects the output voltage. My hypothesis was that if I use confluent wastewater, primary treatment wastewater, and secondary treatment wastewater in a microbial fuel cell, then the confluent wastewater fuel cell will have the highest output voltage, because confluent wastewater has the highest concentration of anaerobic bacteria.</p></div><div><b>Abstract</b><p></p></div><div><b>Methods/Materials</b><p>I used the following materials when building (and using) the microbial fuel cell:</p><p>Confluent wastewater, primary treatment wastewater, secondary treatment wastewater, pure filtered water, Ziploc containers, PVC pipe, agar, sodium chloride, copper wire, carbon felt, resistors, air pump, airline tubing, Wye adapters, epoxy putty</p></div><div><b>Results</b><p>To investigate my hypothesis, I built four devices (per trial). I poured my independent variable (type of wastewater) into the container. One device held confluent wastewater, one held primary treatment wastewater, one held secondary treatment wastewater, and the last held filtered water. I tested each device for two weeks. After completing my testing, I found that my hypothesis was incorrect. The average output voltage of devices containing primary treatment wastewater was over 100 millivolts more than the output voltage of devices containing confluent wastewater!</p></div><div><b>Conclusions/Discussion</b><p>This experiment is extremely important regarding real-life applications. As stated by Hong Liu, a professor at Oregon State University, "If this technology works on a commercial scale the way we believe it will, the treatment of wastewater could be a huge energy producer, not a huge energy cost. This could have an impact around the world, save a great deal of money, provide better water treatment and promote energy sustainability" (Liu). This experiment proves that microbial fuel cells have the potential to be both cheap and efficient.</p></div></div>	
<b>Summary Statement</b> <p>I built a microbial fuel cell using cheap and accessible materials, and I tested which type of wastewater used in the fuel cell would generate the highest output voltage.</p>	
<b>Help Received</b> <p>I used lab equipment and created prototypes for my project under the supervision of Jenny Du, PhD.</p>	