



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alexander L. Bishop</b>	<b>Project Number</b> <b>J0703</b>
<b>Project Title</b> <b>The Effect of Temperature on Battery Life</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My project was to determine at what temperature Alkaline and Lithium batteries last the longest and provide the highest voltage output. I predicted that batteries running in high temperatures will perform the best because the heat will charge the electrons. <b>Methods/Materials</b> I placed two new AA Energizer lithium and two new AA Duracell alkaline batteries in a AA battery holder. I then connected two sets of wires from the battery holder to two sets of two load resistors. The first test was performed at room temperature or 65 degrees Fahrenheit. I had the batteries run off the load resistors for three hours. I connected a volt meter to each set of resistors every ten minutes during the three hours and recorded the data. I repeated the test putting the battery holder in the freezer at 5 degrees Fahrenheit and again in the toaster oven at 120 degrees Fahrenheit <b>Results</b> The voltage output for both the lithium and alkaline batteries was the lowest for the batteries running in the coldest temperature tested. As the temperature became warmer the batteries provided greater voltage output and lasted longer. They performed the best at the 120 degree Fahrenheit temperature. The lithium batteries lasted a lot longer than alkaline. The alkaline reached their cut off point prior to the end of the three hour time period while the lithium did not. <b>Conclusions/Discussion</b> My results confirm my hypothesis that batteries will provide a higher voltage output as the temperature rises. The alkaline batteries lasted longer as well. The lithium batteries did not reach their voltage cut off point before the three hour time frame so I could not make a conclusion about how long they lasted.	
<b>Summary Statement</b> This project was to determine the effect of various temperatures on the voltage output and life of lithium and alkaline batteries and it was determined that batteries work better as the temperature rises.	
<b>Help Received</b> My father taught me how to use a soldering iron to attach the wires and helped me purchase the proper materials. My mother helped me to insert the digital pictures into my report.	