



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Peter Joseph M. Edpao; Parth R. Shah</b>   | <b>Project Number</b><br><b>S0405</b> |
| <b>Project Title</b><br><b>pH Correlation to ATP Production Rate of Mitochondria</b>  |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>The objective of this project is to develop a new protocol to track ATP production in mitochondrion cells and use it to determine which pH level, acid-4, base-10, or neutral, will increase the ATP production rate of mitochondria most positively.</p> <p><b>Methods/Materials</b><br/>Celery mitochondria were exposed to pH conditions: acid-4, base-10 and neutral. The mitochondria were stained with Janus Green B, and a sucrose solution was added. ATP production rate of mitochondria was tracked by developing a new protocol of using a spectrometer (a device that measures and the light wavelength of Janus Green B to track mitochondrion activity).</p> <p><b>Results</b><br/>The acidic celery cells continually rose in absorbency level, reaching up to 0.042 Absorbency (A). The neutral celery cells remained stable throughout at 0.002 A. The basic celery cells had an initial jump to 0.012 A, but then eventually dropped to 0.005 A.</p> <p><b>Conclusions/Discussion</b><br/>Janus Green stains active mitochondrion cells, which allows a spectrometer to detect ATP production activity. When the spectrometer measures absorbency, it also measures the amount of activity. This means that the greater the absorbency, the greater the amount of activity of the mitochondrion. The greater amount of activity of the mitochondrion signifies that it produces more ATP. The results support the conclusion that an acidic 4 solution most positively impacts the rate of ATP production in mitochondria. The hypothesis was correct. These data suggests possible applications for low energy individuals and plant growth under acidic conditions. The results of the experiment expand our knowledge of ATP production rates of mitochondrion by demonstrating that mitochondrion are more effective in an acidic environment and a largely basic environment can eventually hinder ATP production.</p> |                                       |
| <b>Summary Statement</b><br>The project is about developing a new protocol of tracking ATP production and determining which pH level will increase the ATP production rate of mitochondria.   |                                       |
| <b>Help Received</b><br>Received biological stain from La Sierra University; Mr. Newton provided validation for theory behind project design; Used lab equipment at Centennial High School.   |                                       |