



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Elizabeth Howe; Ashley Louderback</b>	<b>Project Number</b> <b>S1311</b>
<b>Project Title</b> <b>The Effect of Environmental Stress on Gene Expression in Saccharomyces cerevisiae</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Our objective was to find out if gene expression in <i>Saccharomyces cerevisiae</i> was altered by the addition of an environmental stress of a heat shock of 39.9 C for one hour. We believed that gene activity rate would alter in the yeast based on the idea that living organisms must adjust their internal mechanisms which are regulated by proteins and therefore genes in order to survive in a changed environment. <b>Methods/Materials</b> Yeast samples were harvested and split into a control group kept at 27 C and a heat shocked group at 39.9 C for one hour. The RNeasy Maxi Kit for Isolation of Total RNA using an enzymatic lysis protocol was used to extract RNA from both samples. Then, the processes of linear amplification and dye-incorporation were coupled, producing tagged strands of linearly amplified DNA. The unknown fragments of tagged DNA were washed over fragments of known DNA on a microarray slide allowing for hybridization to occur. The slide was run through a scanner in order to analyze the fluorescence levels of the genes of the yeast. <b>Results</b> Our results confirmed that the gene activity rate did change with the addition of a one-hour 39.9 C heat shock based on the results produced by the scanner. <b>Conclusions/Discussion</b> We found that many genes activity rates were increased or decreased due to the heat shock. We selected twenty-five genes to focus upon. Based on these genes we found two trends. First, many genes associated with cellular respiration were down-regulated. Second, genes involved with substance transportation across the yeast were up-regulated. For further analysis, we compared our data to that of Pat Brown's of Stanford who had performed a similar experiment previously. We found many similar alterations in the expression of the same genes.	
<b>Summary Statement</b> We tested the effect of heat shock on gene expression in yeast samples and used a microarray for analysis.	
<b>Help Received</b> Mr. Kucer was our teacher advisor; Mr. Willy McAllister was our mentor and contact at Agilent; Agilent allowed us to use their labs and supplied us with equipment	