



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Marc Bielas	Project Number S0492
Project Title Alcohol Dependence in C. elegans: A Behavioral Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The National Institute on Drug Abuse reports that substance abuse and addiction cost American society \$559 billion dollars a year in increased health care costs, crime, and lost productivity; however, little is known of the factors that induce addiction. Addiction, specifically alcohol dependence, can be observed in the nematode <i>C. elegans</i>. These studies seek to pair dependence on ethyl alcohol with stress (by way of starvation), and observe the effects of various combinations of these factors on <i>C. elegans</i>.</p> <p>Methods/Materials A chemotaxis assay was developed to assess the nematodes ability to choose between alcohol and <i>E. coli</i> (food). Alcohol was injected into agar at locations equidistant to the lawn of <i>E. coli</i>, whereupon a chunk of agar containing <i>C. elegans</i> was placed in the middle and <i>C. elegans</i> were allowed to choose between alcohol or food. The test groups were: 1) worms acutely pre-exposed to alcohol and stressed, 2) worms stressed but not acutely pre-exposed to alcohol, 3) worms acutely pre-exposed to alcohol but not stressed and the control, worms that were neither acutely pre-exposed to alcohol nor stressed. <i>C. elegans</i> were observed at different time periods up to 120 hours. Alcohol was re-injected into the agar at 72 hours to rechallenge the worms. Worms stressed were exposed to three consecutive days of treatment.</p> <p>Results Patterns of statistical significance were observed in the one and three day test groups, showing that stressed worms had a higher tendency to migrate to the alcohol. A subsequent analysis was done for a pool of the 120-hour data where the variable of alcohol pre-exposure was minimized, allowing stress to be examined individually. This analysis further illustrated the patterns seen in day one and day three showing a higher tendency to seek alcohol in stressed worms in three out of four comparisons.</p> <p>Conclusions/Discussion The unique behavioral assay developed for this study allowed stress to be identified as a major factor in the initiation and maintenance of alcohol seeking behaviors. The results of this study could be applied to a clinical setting whereby stress-inducing factors would be identified and eliminated from the environment of those susceptible to alcohol dependence.</p>	
Summary Statement The central focus of this project is to evaluate the effect of stress and malnutrition on alcohol seeking tendencies in <i>C. elegans</i> , an animal model for human addiction.	
Help Received Used lab equipment (chemicals, glassware etc.) from school under the supervision of Dr. Willoughby as required by school policy.	