



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Jeffrey L. Jensen	Project Number S0408
Project Title Isolation by Distance: Quantifying Genetic Similarity in Relation to Geographic Distance	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals</p> <ol style="list-style-type: none">1) Create an online web service for statistically calculating the impact of geographic distance on genetic distance (http://phage.sdsu.edu/~jensen/).2) Get allelic data for multiple populations of the Jeffrey Pine Beetle and the Ponderosa Pine Beetle.3) Analyze the allelic data and determine which species has more genetic variance. <p>Methods/Materials</p> <p>To obtain the allelic data of the beetles, the following methods are used:</p> <ol style="list-style-type: none">1) Collect samples of Ponderosa Pine and Jeffrey Pine Beetles.2) Isolate the DNA from the samples.3) Do Polymerase Chain Reaction (PCR) gradients to determine the optimal amounts of added magnesium chloride, annealing temperature, and DNA concentration for each primer being used (810, 811, and 825).4) Use PCR to replicate the DNA from the samples using the optimal configurations, determined in step 3, 3 separate times (each time using a different primer).5) Run the PCR product on a high resolution gel.6) Read the bands using a combination of computer software and gel analysis hardware to generate allelic data. <p>Results</p> <p>Isolation by Distance Web Service has become a popular internet application used by biologists across the country. It stands as a unique application of statistics, genetics, and computational power to produce valuable conclusions regarding geographic distance's impact on genetic variance. The service is hosted 24/7 at http://phage.sdsu.edu/~jensen/ by the Rohwer Lab at San Diego State University.</p> <p>Conclusions/Discussion</p> <p>The methods used in IBDWS, including the mantel test, reduced major axis regression, and Slatkin and Rousset's measures of genetic distance combine flawlessly as a complete solution for analyzing geographic distance's impact on genetic variance.</p> <p>In addition to the success of IBDWS, an article has been published detailing its operation by the scientific journal "Biomedical Central - Genetics."</p> <p>At the time of this writing, the allelic data is not yet ready for analysis but it is merely supplemental to this project and may or may not be ready by the time of the fair.</p>	
Summary Statement Isolation By Distance Web Service statistically analyzes geographic distance's impact on genetic variance.	
Help Received Dr. Bohonak and Dr. Kelley of San Diego State University Life Sciences have both played crucial roles in the creation and publication of IBDWS.	