



CALIFORNIA STATE SCIENCE FAIR 2003 PROJECT SUMMARY

Name(s) Benjamin N. Kletzer	Project Number J0406
Project Title Extracting DNA at Home: Can I Do It?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if I can extract DNA from animal and plant specimens at home using common household materials, and to show that my sample extractions contained DNA.</p> <p>Methods/Materials Extractions were conducted using three plant specimens (russet, red and sweet potatoes) and one animal specimen (calf thymus). A sequential process of combining minced potato, meat tenderizer, detergent, heat, blending, and filtering was used to produce the plant filtrate samples. For the thymus extraction, the process involved combining minced thymus, sucrose solution, blending, detergent, salt, and filtering to produce a filtrate sample. The final extraction step for both plant and animal samples involved pouring cold ethanol into the filtrate to precipitate out the DNA. A spectrophotometer was used to measure the quantities of DNA in the samples.</p> <p>Results Of all the specimens, the spectrophotometer readings for the thymus extract showed the greatest quantities of DNA. At each higher temperature, the thymus sample absorbed more light, indicating the presence of more DNA due to the unraveling of the double helix with heat.</p> <p>The samples of all three potatoes all absorbed UV light in the spectrophotometer. The readings did not rise as the specimens of russet potato and sweet potato were heated. Only the red potato sample absorbed more UV light as the temperature increased.</p> <p>Conclusions/Discussion The rise in UV light absorption with rising temperature confirmed the presence of DNA in the thymus and red potato samples. The thymus extraction was the most successful as it produced visible strings of DNA in the test tube and the sample absorbed the most UV light at any temperature. None of the potato extractions produced visible strings of DNA.</p> <p>I think that the potato DNA experiments were less successful because plant cells have cell walls composed of carbohydrates that dissolve with the DNA. Animal cells do not have cell walls, but can contain lots of protein molecules which could dissolve with the DNA. I do not know why the red potato experiment was more successful. Maybe there are some chemical differences between the starches in the different types of potatoes. I conclude that thymus cells are a good choice for DNA extraction because I was able to separate the DNA from the protein molecules easily.</p>	
Summary Statement My project is an attempt to extract DNA from animal and plant specimens at home using common household materials, and to show that my sample extractions contained DNA.	
Help Received Dr. Michael Dalbey of the University of California, Santa Cruz Biology Department offered to help me use the spectrophotometer in his lab. He gave me some reading to do first, taught me how to use the spectrophotometer and centrifuge and helped me measure the absorption of UV light by my samples.	