Mar 6th, 12:00 AM

09. Forensic Science

Southwestern Oklahoma State University

Enzymatic Digestion of Pseudogenes for Species Identification

Billi Bobala & Kaitlyn Hickey

Abstract

It is important for wildlife forensics scientists to genetically identify animal species when analyzing a poached artifact to preserve endangered animals and prevent poaching. This genetic identification yields solid evidence when apprehending criminals. A common problem when performing DNA analysis on wildlife is that mtDNA used for identification is often found as pseudogenes in the nuclear DNA. These numts can make it difficult to correctly identify species involved in wildlife crimes. It is currently commonplace to dilute a sample to only sequence mtDNA. Due to the amount of mtDNA in every cell, this should theoretically eliminate some numt contamination. However, with a sample containing a low quantity of DNA, there's a risk of over dilution and loss of sample. Exonuclease V is an enzyme that will digest linear DNA and leave only circular DNA. Mitochondrial primers were designed to amplify Panthera cyt b. Nuclear primers for the β;-fibrinogen intron 7 gene were used to identify linear DNA and confirm its digestion. Exonuclease V digested the numt, leaving only the uncontaminated mtDNA. Exonuclease V's effectiveness was confirmed by running gel electrophoresis with the mitochondrial primers and nuclear primers to show the absence of amplified nuclear DNA and presence of amplified mtDNA. This was further supported by the absence of nucleotide variations within the sequenced mtDNA.

An Analysis of the STEM Career Builder Program and STEM Interests Among High School Girls

Joselina Cheng & Kathleen Brown

Abstract

This program was developed to increase STEM awareness among high school girls - specifically those who have limited access to STEM education. As a part of this initiative, students are specifically recruited from the Oklahoma Promise Zone. We were awarded a grant by the National Science Foundation to allow the modification of our current summer STEM academy to focus exclusively on females and computer forensics. The grant also allowed a new initiative to be formed: recruiting high school STEM teachers to facilitate our summer academy. For our program, we use a variety of techniques including e-learning, hands-on experience, virtual reality, computer simulations, subject-matter experts, internships, fellowships, and more to provide girls with an overview of computer forensics and career possibilities. Students have the opportunity to tour law enforcement facilities and work a mock case to get a glimpse of the possibilities in forensic science. Our study looked at five research questions to measure the lasting benefits of the program. Pre- and post- surveys were given to students and teachers to measure program efficacy. As a result of the 2019 summer academy, both teachers and students reported increases in STEM career awareness, and students reported an increased interest in pursuing a four-year STEM degree. Moving forward, the academy will be modified slightly for maximum effectiveness, and former attendees will be selected for STEM internships and fellowships.