D10 Molecular Palynology Study in Central East Texas: A New Approach to Linking Crime Scenes

Jamie L. Jouett, BS, Sam Houston State University, 13 FM 1696 E, Huntsville, TX 77320*

After attending this presentation, attendees will see how molecular palynology in combination with a Geographical Information Systems (GIS)-based analysis may help to link pollen samples collected at a crime scene to or from a suspect with a particular geographic area and the associated vegetation.

This presentation will impact the forensic community by demonstrating a correlation between STR (Short Tandem Repeat) analysis of pollen/plant DNA and geographical location to potentially link pollen evidence to a crime scene.

Forensic palynology is gradually becoming a more recognized scientific field as the analytical technology has developed to the point that trace evidence, such as pollen collected from a crime scene or suspect, can be characterized efficiently. Pollen evidence has been successfully used in the past to solve criminal cases; however, no initiative has been taken to merge hi-tech analytical techniques and mapping programs such as GIS with DNA analysis. Similar to humans, plants and pollen are comprised of DNA. STR analysis of plant and pollen evidence could provide the missing link, which allows differentiation among pollen evidence, in turn, narrowing the window of searching to either include or exclude geographical areas from the scope of a criminal investigation.

The objective of this study is to demonstrate how pollen collected at a crime scene or from a suspect can be linked to a geographical location by STR analysis and sequencing samples of pollen DNA. A wide range of pollen samples were collected from the northern, southern, eastern, western, and central areas of Huntsville, TX. This presentation illustrates geographical profiling by mapping the Huntsville area and associated vegetation using GIS software. In addition, a new molecular approach involving STR analysis of DNA was performed on each collected pollen sample. These were compared to reference samples to identify a species and subsequently link the pollen sample back to a plant source. The steps in this method involve DNA extraction, amplification by PCR, and detection by STR analysis. In doing so, specific pollen from a native plant species is characterized by establishing a unique DNA profile.

The ultimate goal of this study is to increase the availability of pollen data and stress the significance of pollen collection at crime scenes. Thus, by broadening the knowledge of forensic scientists, further opportunities, initiatives, and new methodologies and advancements in the forensic palynology field will be realized. Most importantly, the study and ideas presented here provide a basis for STR analysis of pollen DNA and will subsequently benefit forensic scientists in criminal investigations involving pollen/plant evidence. Moreover, the application and software described above will set the benchmark for generating a database combining pollen DNA profiles with geographical locations.

Palynology, Short Tandem Repeat (STR), Geographical Information

 ** Presenting Author*