Move over DNA: Here comes forensic pollen analysis

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By Colleen Murphy

Almost everyone has heard of DNA evidence that places the murderer at the scene of the crime. The investigators find a hair or blood on the victim that undergoes forensic analysis to help solve the crime. However, a relatively new technique in forensic analysis could aid investigators - it is known as palynology.

Palynology is the study of newly collected or fossilized pollen, spores and a type of plankton known as dinoflagellates. Palynology is an interdisciplinary science that combines geology and biology, particularly botany or plant science.

Palynology is useful in science in general, but it is starting to be employed in forensics as well.

Louisiana State University (LSU) doctoral candidate Shannon Ferguson studies palynology and recently interned with the Department of Homeland Security (DHS) in Houston. As an intern, Ferguson worked in Customs and Border Protection with Dr. Andrew Laurence, the head palynologist.

"Pollen has a wide utility, because it's everywhere," Ferguson said in an article published by the LSU College of Science, "What ever question you're trying to answer, it can help. It's not going to be

perfect, but it's going to get you close and definitely in the right direction."

During her internship at DHS, Ferguson worked closely with Dr. Laurence on the Baby Doe murder case. The Baby Doe murder case revolved around a two year old child that was found dead after her body washed ashore Deer Island, a peninsula in Boston, on June 25, 2015. The baby had no identity, and all that the investigators had was a computer-generated image of the little girl.

"When the samples arrived, we had a pair of her leggings, two blankets that she was wrapped in and a little piece of her hair," Ferguson said in an interview with LSU student newspaper *The Reveille.*

The analysis from the trace amounts of pollen found on the clothes and hair helped investigators determine what area the little girl was from. Ferguson has described the pollen analysis as tricky because scientists use tiny vacuum cleaners to suck up the pollen grain through a filter. Once the samples have been sucked up, individual pollen grains are isolated from chemical processing to be examined.

From the pollen analysis, it was concluded that the little girl was from the local northern area of Boston because of the spruce grain pollen identified. The little girl was identified as Bella Bond after further research.

In mid-September,Bella Bond's mother's boyfriend was arrested for her murder, as was the mother who is being charged as an accessory.

Being attached to the Baby Doe crime investigation was a first for Ferguson. The Baby Doe case made a huge impact on Ferguson's internship with the DNC, and she is looking forward to interning with the DHS again this summer.

I had the opportunity to ask Ferguson how she felt about the media attention. She was excited that palynology was in the forensic spotlight: "With the media coverage around this case, I'm happy that forensic palynology is getting the attention it deserves, and will hopefully help the science become routine in U.S. criminal cases as it is in many parts of Europe and Canada."

"The ability to determine the specific location of a crime is unique to forensic palynology, and we need U.S. law enforcement to embrace this tool as they have for decades overseas," Ferguson said.

Ferguson was able to land this internship because in 2013 the father of forensic palynology, Dr. Vaughn Bryant, invited her faculty advisor Sophie Warney to attend a DHS/FBI meeting in D.C. to speak about the use of pollen in forensics. After that meeting, the Nations Center for Biomedical Research and Training at LSU funded a forensic project and Ferguson was able to receive training in forensic palynology as well as make connections that helped her receive the internship at DHS.

Ferguson's interest in palynology began while she was getting her bachelor's degree in geology at Georgia Southern University. Her advisor at Georgia Southern University recommended that Ferguson enroll in the PhD program at LSU.

Ferguson is in her final year of postdoctoral studies at LSU. Her research at LSU has revolved around studying vegetation and sea-level changes for coastal Texas for the last 10,000 years through palynology analysis.

Whenever Ferguson has been asked by different media outlets about her plans for the future, she says that she is keeping an open mind to all possibilities. However, she does know that she will always be interested in pollen.

"I'm passionate about palynology no matter the topic, and have been lucky having the opportunity to study not only 'classical' palynology (climate/vegetational change) as well as forensics," Ferguson said.

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