D24 Novel Uses of Botanical Evidence for Forensic Investigations

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The goal of this presentation is to present unique examples of botanical evidence for use in crime scene investigations so that investigators can learn of the potential opportunities to utilize forensic botany.

This presentation will impact the forensic community and/or humanity by demonstrating additional ways to use botanical evidence in crime scene investigations and generally to make people aware of the unique contributions of forensic botany and its potential.

Awareness of the ways in which plants and plant parts can play in forensic investigations has increased greatly in recent years, and crime scene investigators are making more use of botanical expertise. However, it is important that more crime scene investigators become aware of the forensic potential of botanical materials. Bock and Norris began studies of plant cells in digestive contents and have demonstrated their usefulness in determining time of death (Bock et al. Identifying Plant Food Cells In Gastric Contents For Use In Forensic Investigations: A Laboratory Manual, U.S. Dept. of Justice; Bock and Norris 1997 "Forensic Botany: An Under-Utilized Resource," *Journal of Forensic Sciences* 42: 364-367). Later, the authors extended their observations to comparison of fresh fecal material associated with a rape-homicide victim and stains on the suspects clothing, again using the presence of specific plant cells associated with distinct food types (Norris and Bock 2000 "Use of Fecal Material to Associate a Suspect with a Crime Scene: Report of Two Cases" *Journal of Forensic Sciences* 45: 184-187; Norris and Bock 2001 "Method for Examination of Fecal Material from a Crime Scene Using Plant Fragments" *Journal of Forensic Investigation* 51: 367-377).

Reported here are some recent uses of forensic botany that extend to other applications. The first case involved plant taxonomy (identification of species by examination of unique features of the plant). Identification of an unusual strain of Bermuda grass (the Almond strain) from the Emerald Bay Golf course on Grand Bahama Island found on a suspect's clothing linked him to the golf course crime scene. Each golf course on the island is characterized by the use of different strains of grass. The second example is the use of diatoms (microscopic unicellular aquatic plants) to compare stomach contents of a drowning victim to different water sources. Each water source has unique diatoms present and typically differs from other nearby sources. The microscopic analysis linked the victim to a different source than where the body was found indicating the victim was partially drowned in the first source (a fountain) and then the child's body was thrown into the second water source where he ingested some additional water before dying. When the child's mother was presented with this evidence, she confessed that she was responsible. A third case is a 30-year-old cold case involving comparison of plant material in fecal material that has been desiccated for many years. Investigators had saved clothing from the victim and the major suspect. Although this case is still under investigation, the authors describe the detailed procedure necessary for preparing such samples for microscopy and comparison of the results.

In addition to these actual investigations, a new method under development based on microscopic analysis of isolated wood cells that may provide a way to identify tiny wood fragments associated with suspects and link them to crime scenes will be reported. Traditional wood identification requires relatively large pieces of intact wood to identify the species of tree from which it arose. However, the question has been asked on occasion if it is possible to identify the small fragments or splinters found in association with a suspect and determine if they might match a larger source found at a crime scene. It was previously assumed this was not possible. Wood largely consists of dead plant cells of several types (fibers, tracheids, vessels, parenchyma). Furthermore, one type of cell (e.g., fibers) may vary in appearance from species to species and in relative abundance. Analyses to date suggest that microscopic characterization of the cell types including careful physical measurements may be a promising approach for dealing with small wood fragments.

Forensic Botany, Microscopic Techniques, Homicide

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