H16 Dirty Secrets: Identification of Older Crime Scenes in the Former Yugoslavia Through Blood Protein and Volatile Fatty Acid Soil Analysis

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The goals of this presentation are to present to the forensic community evidence validating the analysis of soil deposits by CIEP, GC, and MS in the identification of older crime scenes.

Those who commit murder regularly attempt to hide or destroy evidence to avoid prosecution. Murder scenes are cleaned up and bodies removed and concealed by the guilty party. After hiding the body, the murderer, rethinking his disposal plan, may even retrieve the body and attempt to hide it in a different, more secretive, location or destroy it in some manner, further confounding investigations. Identifying and documenting a crime scene, especially an older one, in the absence of a credible witness, a body, or other physical evidence is near impossible. However, the absence of observable evidence, while an obstacle, is not necessarily an end to the investigation. Despite removal, the body may have left behind microbiological evidence that can be collected and analyzed. Human blood proteins and volatile fatty acids (VFAs) deposited in soil at murder scenes and concealment/burial sites may remain stable over long periods of time; sophisticated soils analyses may be used to detect them.

The same detection methods used by archaeologists for ancient artifact examination and criminologists in recent murder cases were used in this study to examine older soil deposits sampled from three sites investigated by the International Criminal Tribunal for the Former Yugoslavia (ICTY): an execution site, four individual graves in a cemetery, and a mass grave.

An immunological test, crossover immunoelectrophoresis (CIEP), was used to identify blood proteins as independent evidence of an execution near Stutica, Kosovo. The passage of time between residue deposit and testing was an important element in this study. Forensic investigators rarely test soils for blood residue if the event in question is more than a few months old on the assumption that predatory microorganisms would degrade deposited residue beyond the ability to identify them. The Stutica blood proteins were deposited in soil approximately a year-and-a-half prior to analysis. In spite of the blood protein's lengthy exposure to the soil, from a total of 72 samples, 44 returned positive results for human blood proteins.

Similarly, VFAs in soils collected from cemetery graves in Duz, Kosovo and a mass grave in Knin, Croatia, were identified using a microFAST GC^2 (a field portable gas chromatograph) and a HP 5890 Series II GC with a 5971 mass selective detector Mass Spectrometer (MS). Six samples were removed from four graves in the Duz cemetery for testing. Prior to exhumation and soil sampling, bodies laid in the graves approximately one-and-a-half-years. GC results from the cemetery revealed the presence of iso-butyric and valeric water soluble VFAs in one sample. MS examination of the samples was inconclusive. From a sixyear-old mass grave in Knin, three soil samples were analyzed in the same manner. GC and MS analysis revealed the presence of iso-butyric and isovaleric water soluble VFAs in two of the three remaining samples. In addition, MS analysis revealed the following non-water soluble VFAs in all three samples: capric, lauric, myristic, palmitic, stearic, and oleic. Possible causes for inconsistent results between the cemetery graves and the mass grave may be attributed to the differences in burial styles, soil moisture, and clay content.

The positive findings of blood proteins and VFAs in the Kosovar and Croatian soils validate CIEP, GC, and MS analysis of older site soils. In the absence of bodies or other physical evidence, investigators are encouraged to use these methods of identifying and documenting sites to support their evaluation of suspected crime scenes. Demonstrating that murder scenes, execution sites, and individual and mass graves can never be completely cleaned—that evidence of past criminal activity can never be completely erased—may help to deter murder and human rights abuses in the future.

Soil Analysis, Blood Protein, Volatile Fatty Acids

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