G70 The Biochemical Alteration of Soil by Decomposition Products

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After attending this presentation, attendees will understand the importance of soil analysis in cases involving decomposed remains, and the correlation of soil composition changes with the decomposition period.

This presentation will impact the forensic community by serving as a potential tool for estimating the postmortem period and may have implications for both forensic and human rights investigations.

Decomposition chemistry refers to the chemical degradation processes which occur in soft tissue as decomposition proceeds. These processes involve the breakdown of the body's main constituents including proteins, carbohydrates and lipids. Lipids represent an important biomarker of decomposition as they are not easily degraded and can be retained in the soil environment for extended periods. Currently, there are few techniques which can provide an accurate estimation of the postmortem period. When a body decomposes in a soil environment the currently available techniques become even less accurate.

The aim of this study was to investigate the relationship between the release of decomposition fluids into a soil environment and their potential correlation with the decomposition period. The study was conducted in the southern region of Ontario, Canada during the summer months of July and August. Pig carcasses were used as acceptable models for human decomposition and were allowed to decompose on the surface of the soil until skeletonization occurred after approximately 100 days. Soil samples were collected from the region directly beneath the carcass at varying decomposition intervals. The total microbial biomass was determined by measuring the extractable lipid phosphate and the fatty acid content. Samples were analyzed by chromatography and spectroscopy techniques. The soils were characterized using particle size analysis and variations in total carbon, nitrogen, phosphorous, pH and moisture content were also investigated.

The study identified a significant increase in the amount of total nitrogen and soil extractable phosphorous released into the soil. However, the total available carbon did not increase significantly with time. Lipid- phosphate and fatty acid concentrations also increased with time confirming that there was a flux in the microbial biomass present in the soil. The pilot study was able to highlight the forensic potential of these techniques for estimating the postmortem period and promoted ongoing studies in this area. The results have the potential to be used in a forensic investigation involving remains which have decomposed for an extended period in a soil environment.

Decomposition, Soil, Postmortem Period

 ** Presenting Author*