

Effect of Tissue Preservation Chemicals on Decomposition in Different Soil Types

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Abstract : Introduction: Forensic taphonomy is a multifaceted area that incorporates decomposition, chemical and biological cadaver exposure in post-mortem event chronology and reconstruction to predict the Post Mortem Interval (PMI). The aim of this study was to evaluate the integrity of DNA extracted from the remains of embalmed decomposed *Sus domesticus* tissues buried in different soil types. Method: A total of 12 limbs of *Sus domesticus* weighing between 0.7-1.4 kg were used. Each of the samples across the groups was treated with 10% formaldehyde, absolute methanol and 50% Pine oil for 24 hours before burial except the control samples, which were buried immediately. All samples were buried in shallow simulated Clay, Sandy and Loamy soil graves for 12 months. The DNA for each sample was extracted and quantified with Nanodrop Spectrophotometer (6305 JENWAY spectrometers). The rate of decomposition was examined through the modified qualitative decomposition analysis. Extracted DNA was amplified through PCR and bands visualized via gel electrophoresis. A biochemical enzyme assay was done for each burial grave soil. Result: The limbs in all burial groups had lost weight over the burial period. There was a significant increase in the soil urease level in the samples preserved in formaldehyde across the 3 soil type groups ($p \leq 0.01$). Also, the control grave soils recorded significantly higher alkaline phosphatase, dehydrogenase and calcium carbonate values compared to experimental grave soils ($p \leq 0.01$). The experimental samples showed a significant decrease in DNA concentration and purity when compared to the control groups ($p \leq 0.01$). Obtained findings of the soil biochemical analysis showed the embalming treatment altered the relationship between organic matter decomposition and soil biochemical properties as observed in the fluctuations that were recorded in the soil biochemical parameters. The PCR amplified DNA showed no bands on the gel electrophoresis plates. Conclusion: In criminal investigations, factors such as burial grave soil, grave soil biochemical properties, antemortem exposure to embalming chemicals should be considered in post-mortem interval (PMI) determination.

Keywords : forensic taphonomy, post-mortem interval (PMI), embalment, decomposition, grave soil

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