G84 Gravesoil Microbial Community Structure During Carcass Decomposition

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After attending this presentation, attendees will understand that there is potential for the use of fatty acids to characterize gravesoil microbial community with the ultimate goal of estimating postmortem interval (PMI).

This presentation will impact the forensic science community by the development of an additional method to determine extended PMI. This additional method can be used in conjunction with other methods to estimate PMI, such as forensic entomology.

Estimating PMI is important for every death investigation. It allows for the acceptance or rejection of alibis as well as helping to identify victims. At present forensic entomology is arguably the most reliable means to accurately estimate PMI at outdoor death scenes. However, active blowfly larvae, which are critical to insect based estimates of PMI, can leave a body as early as ten days postmortem. When active blowfly larvae are not present at a death scene, forensic science is often ill equipped to estimate PMI accurately.

A controlled laboratory experiment was conducted to determine if soil microbial ecology has the potential to be used as an estimator of PMI. To do this incubation units were constructed that comprised petri dishes (150 mm x 25 mm) filled with 360 grams (g) of washed sand inoculated with 40 g of Pawnee clay loam soil. Soil was collected from Nine Mile Prairie, a natural tall-grass prairie ecosystem, which is located approximately nine miles northwest of Lincoln, Nebraska. Soil of the Pawnee series is a fine, montmorillonitic, mesic Aquic Argiudoll (Mollisol). These incubation units were calibrated to a water holding capacity of 55% and left to equilibrate for seven days in plastic containers (20 cm x 34 cm x 11 cm) that contained methanol washed pea gravel and distilled water (100 ml) to regulate humidity.

After seven days, a mouse carcass (killed with carbon dioxide) was placed on its left side on the inoculated sand within 30 minutes of death. Nylon mesh (0.1 mm x 0.1 mm) was then used to cover the plastic container to prevent insect colonization. The temperature was kept at approximately 20˚C during the experimental period and the water

content of the inoculated sand was maintained at 55% every 3-4 days by adding distilled water. Carcass decomposition was monitored every 24 hours for 35 days using a decomposition scoring system. In addition, carcass mass loss was measured at 7, 14, 21, 28, and 35 days postmortem. A destructive harvest design was used to avoid the influence of carcass disturbance on the rate of decomposition. Following carcass harvest, inoculated sand was collected and analyzed for lipid phosphorus, fatty acid methyl esters, pH, total nitrogen, and total carbon. This experiment was replicated four times and controls (inoculated sand with no carcass) were used. Results and discussion will be presented to demonstrate the effectiveness of soil microbial ecology to act as an estimator of PMI.

Forensic Taphonomy, Extended Postmortem Interval, Ecology

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