



Pathology & Biology Section – 2005

G50 Which Field Method is Best? A Comparative Study of Four Entomological Methods for Sampling Forensically Important Arthropods on Human and Porcine Remains at the Anthropology Research Facility in Knoxville, Tennessee

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The goal of this presentation is to present to the forensic sciences community the latest findings from the Anthropology Research Facility (ARF) in Knoxville, Tennessee, on the topic of which field sampling methods, when used singly and in combination, yield the largest fraction of forensically-important insect species from human and porcine remains.

This presentation will impact the forensic community and/or humanity by providing recommendations on which field methods forensic entomologists and crime scene investigators should use when sampling forensically-important arthropods from human remains in medicolegal death investigations.

The obvious constraints imposed on the scientific study of human corpses speak to the urgency for forensic entomologists to have comparative field data on human and surrogate (non-primate) remains to insure that the recommendations offered for one are valid for the other. In 1989, the on-campus Anthropology Research Facility (ARF) at the University of Tennessee, Knoxville, became the site of the first comparative field test of four arthropod sampling methods used by forensic entomologists.

Over a 35-day period in summer, aerial sweep nets, pitfall traps, sticky traps, and hand collections were taken from one unembalmed, unautopsied human cadaver and two freshly-euthanized 50-lb pigs. (Due to limitations in procurement, replicate human corpses were unavailable in this study.) A third pig, also placed at the site, was not sampled in order to monitor possible sampling effects on rates of decay and arthropod succession. Depending on carcass age, the daily sampling schedule included up to four collections (early morning, noon, afternoon, early evening), for a total of 96 sampling periods and 1,370 individual samples; by season's end, the corpses at this site became the most intensively sampled remains of any previous study. Where arthropod life stages and taxonomic keys permitted, specimens were identified to the lowest possible taxon (family, genus or species). From the arthropod counts, the fraction of forensically-important arthropods captured by each method and combination of methods was calculated. Forensically-important taxa include members of the sarcosaprophagous fauna (e.g., blow flies, flesh flies, hide beetles) and certain predators (e.g., rove beetles, clown beetles, ham beetles), both of which have been used as forensic indicators in medicolegal death investigations.

Based on analysis of 16 days of samples, different sampling methods captured between 35 and 100% of the forensically-important taxa and between 30 and 100% of the sampled individuals. Hand collection, when performed by an experienced forensic entomologist, was found to be the single best method for sampling forensically important insects at a crime scene, followed by aerial netting, pitfall traps, and sticky traps. Hand collection and aerial net sampling were found to offer the best combination of methods for sampling forensically-important insects. This ranking held regardless of whether the remains sampled were human or pig. Human-pig comparisons revealed a high degree of similarity in catch statistics, regardless of method, leading researchers to conclude that enough elements of the forensically-relevant fauna were found on pig carcasses in southeastern Tennessee to reflect what crime scene investigators are likely to find there on human remains in future death scene investigations.

The authors gratefully acknowledge the logistical and field assistance of the Anthropology Department of the University of Tennessee, Knoxville, and financial support of the National Institute of Justice (Grant #94-IJ-CX0039).

As forensic entomologists they hope to see future field-tests and eventual adoption of these recommendations by crime scene investigators and other members of the forensic sciences community.

Forensic Entomology, Anthropology Research Facility (ARF), Field Sampling