H113 An Analysis of the Effect of Necrophagous Entomofauna on Fabric Modifications During a Summer Season in Western Australia

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Learning Overview: After attending this presentation, attendees will understand the effect of carrion insects on fabrics during the postmortem period. In particular, attendees will understand those variables (e.g., the nature of the fabric [natural, synthetic, blended], the fabric's elastic content [% in elastane], the type of initial damage [tear/penetration] that will most impact on how the fabric modifies during a decomposition event).

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a new body of information that will enhance the investigative role of clothing associated with decomposed and skeletonized remains.

Fatal stabbing incidents are the leading cause of homicides predominantly in countries with restricted access to firearms, such as Australia. During a stabbing assault, the distinctive characteristics of an implement deposit specific features, typically assessed during wound examination by a pathologist and/or during a fabric damage assessment by a forensic scientist. When the decomposition process impedes the identification and evaluation of the type and extent of a stabbing wound, fabric damage analysis on the victim's clothing may provide information about the implement or the actions that caused the injuries. However, studies have suggested that insect activity can modify the original cut (e.g., exacerbating the fraying of a fabric's cut, especially the edges of the cut). Furthermore, insect activity and the progression of decomposition such as bloating have also been reported to produce changes to clothing that in some cases may mimic indicators of sexual homicides. At present, there is a paucity of research focused on the effect of insect activity on different fabrics and the modifications they cause throughout the process of decomposition.

The aim of this study is to analyze the effects of the activity of the necrophagous entomofauna during a summer season in Western Australia on different types of fabric (natural, synthetic, blended—with different amount of elastin), type of damage (tear/penetration), and time since death/insect colonization.

For this study, 117 piglets (*Sus scrofa* L.) were used. Four different fabrics were selected based on their type (natural/synthetic) and their percentage in elastin (0%, 50%, 100%): (1) cotton 100%; (2) polyester 100%; (3) cotton-elastane 50%–50%; and (4) spandex 100%. All fabrics were woven. Of the 117 piglets, 112 were wrapped from the neck down with one layer of each fabric type and in the same weave orientation. Five piglets were not clothed and were used as controls. Twenty-four wrapped piglets were stabbed twice, consecutively and at identical anatomical positions with a Philips-head screwdriver (pointed edge) and 24 with a kitchen knife (sharp edge) by utilizing a stabbing apparatus (for consistency and to maintain a similar amount of pressure when thrusting). The fabric of 24 wrapped piglets was torn twice at the same positions as the penetrated piglets. Twenty-four wrapped piglets were left undamaged and 17 wrapped piglets were excluded from insect activity to serve as controls. Also, 112 samples of fabrics that were not wrapped on piglets were placed at the field site along with the samples. The experiment took place in a eucalypt woodland on sandy soil in southwestern Australia. The environmental conditions were also documented.

Data collection was comprehensive of piglets, fabrics sample (a total of 20 replicants every three days from the beginning of the experiment), and insect specimens (via direct collection and adhesive traps). At each sampling period, photos and videos were recorded. Analyses performed covered both taphonomic aspects (degree of piglets' decomposition), entomological (insect species and instar), and physical evidence (fabric damage via stereomicroscope and Scanning Electron Microscopy [SEM]). The statistical analysis considered the different variables (e.g., time since death, insect activity, type of fabric, type of damage) and assisted in the generation of likelihood ratios for the interpretation of damage on the fabrics.

This presentation will discuss the results of this experiment and its impact on postmortem interval assessments, as well as implications on fabric damage analysis.

Textile Damage, Decomposition, Forensic Entomology