H33 The Role of Textiles in Determination of Postmortem Interval

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The goal of this presentation is to assess the deterioration of a decedent's clothing to assist in determining postmortem interval (PMI) of a forensic case. Preliminary results have provided 88% accuracy in PMI estimation.

One of the most critical problems to be solved in the medicolegal field of forensic science is time since death, or postmortem interval (PMI). Determination of PMI typically falls upon the forensic pathologist, but in advanced cases of decomposition, a forensic anthropologist is often consulted. Accurate assessment of PMI is important because investigators can narrow the time frame of events for a case, a crucial step for law enforcement in forensic analysis. However, as PMI increases, the accuracy of determination of PMI often decreases. Rarely in a forensic case can PMI be determined based on one taphonomic variable. Yet, an investigator can aspire to having a basic understanding of the various effects that each variable may bring to the deterioration rate of a body to form a more comprehensive evaluation of PMI. This study offers forensic investigators another reliable method of determining PMI by analyzing the deterioration rates of various fabric types associated with actual forensic cases.

An analysis was completed based on a comparative evaluation of clothing curated by the Louisiana State University Forensic Anthropology and Computer Enhancement Services (FACES) Lab. A total of 17 forensic cases were examined. The clothing from each case is stored separately from the associated skeletal remains; therefore, assessments of PMI were based solely on a visual evaluation of the fabric and not on skeletal evidence. Also, the estimations were made without any previous knowledge of the history of the case, including the environment in which the decedent was found.

Only items of cotton, polyester/cotton blend, or polyester were examined. Shoes, belts, and leather goods were not considered. On some items, the tag on the clothing could still be read and the exact fabric composition was recorded. In cases where no tag was present, estimation was made as to the composition of the clothing based on its appearance, weave pattern, and texture. As the items were examined, a number of recurring characteristics presented themselves. Items with extensive insect activity, series of small (1-2) mm holes as well as the presence of larva cases, were generally assessed to be associated with a longer PMI than items with little or no evidence of insect activity. Overall insect activity was judged on the percentage of the item's surface area that featured evidence of such activity. Fading of the materials, as well as relative stiffness or fragility, was attributed to cases with longer perceived exposure to the elements. Polyester/cotton blends exhibited vertically aligned runs in the fabric and transparency, both becoming more prevalent with increased deterioration. The presence of adipocere was also considered in forming an estimation of PMI.

Once all of the clothing was evaluated in this blind test and a PMI estimation was made for each case, the official case files were then examined to determine the accuracy of the estimations. In 15 of the 17 cases considered, the PMI estimation either fell into the range previously assessed by the forensic anthropologist or hit exactly on the actual PMI of the case, providing 88% accuracy. Overall, an accuracy of 88% shows promise in the evaluation of the deterioration of clothing in relation to determining PMI of a forensic case. In addition, coupled with the analysis of the human remains, a more accurate assessment of PMI will be made.

Postmortem Interval, Fabrics, Forensic Anthropology

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