## H46 Decomposition Scoring as a Method for Estimating the Postmortem Submersion Interval of Human Remains Recovered From United Kingdom Rivers - A Comparative Study

*Abigail C. Lagden, BSc*, and Tal Simmons, PhD, Department of Forensic and, Investigative Sciences, University of Central Lancashire, Preston, Lancashire PR1 2HE, UNITED KINGDOM*

This presentation will make attendees aware of how a scoring system that reflects decomposition can be used reliably to estimate the postmortem submersion interval when human remains are recovered from an aquatic environment. They will also be provided with evidence that indicates how a single scoring system may be applicable across different aquatic environ- ments.

This presentation will impact on the forensic community by providing a better understanding of the variables that affect decomposition in aquatic environments and showing how this knowledge has been used to produce a reliable method for estimating postmortem submersion interval, that could be applicable across different aquatic environments.

When human remains have been submerged in water for any length of time, estimation of the postmortem interval becomes difficult. This is due to the limited amount of research that has been carried out into the changes that occur when a body undergoes decomposition in an aquatic environment and what variables influence these changes. It is accepted that these decompo- sitional changes, and the rates at which they occur, are different to those observed in terrestrial environments, but it is unclear how they differ and whether they also vary from one aquatic environment to another. This study aims to provide an understanding of how the decomposition of human remains progresses in the River Mersey, UK and whether it differs from decomposition as observed in other UK rivers.

A fifteen year retrospective study was carried out of forty nine cases where human remains were recovered from the River Mersey, UK. Infor- mation was obtained by reviewing coroner's case files, containing records of the individual's demographics, police reports and postmortem examination reports. For a number of cases it was also possible to view postmortem and scene photographs.

For each case, the body was divided into three areas; the head and neck; the torso; and the limbs. Information was then recorded for each area, detailing the characteristics of decomposition observed in the postmortem photographs, and those described in the pathologist's report. Using this infor- mation, a scoring system was produced for each area to reflect the sequential stages of decomposition observed in the study sample. Each case in the sample was then scored using this system, and the three resulting scores summed to provide a Total Aquatic Decomposition Score (TADS).

Multiple regression was carried out to establish which independent variables (sex, BMI, age, salinity, level of clothing, season of entry, post- mortem submersion interval {PMSI} and accumulated degree days {ADD}) had an effect on the assigned decomposition score. Only PMSI and ADD showed a significant correlation with TADS, and separate regression models were produced to estimate each of these variables from TADS.

Similar models had previously been produced for cases recovered from the River Thames, UK and the River Clyde, Scotland, UK, and comparisons were made among the three sets of results. An analysis of covariance (ANCOVA) was used to compare the regression models (TADS vs. ADD) for each of the three rivers. This revealed no significant difference between the models derived for the Mersey and the Clyde. The Thames model, however, was shown to have a significantly different intercept from the other two rivers, although there was no significant difference between the gradients. It is thought that this may be explained by inter-observer differences, as the scoring system produced for the Thames study was difficult to apply to the Mersey cases, resulting in similar scores for cases with very different decomposition characteristics.

A further 21 cases were reviewed of human remains recovered from canals throughout Merseyside and Cheshire. Each case was scored using the system developed above and a regression model was applied to show the relationship between TADS and PMSI. When ANCOVA was used to compare this study sample with those from the three rivers, there was no significant difference between the canal, Mersey or Clyde models. The Thames model, however, was again shown to be significantly different to the other models.

These results indicate that the stages of decomposition and the rate of decomposition in relation to ADD are consistent across the UK rivers studied. It also suggests that a single model for estimating PMSI may be applicable to other aquatic environments.

**Decomposition, Aquatic, Postmortem Interval**

Copyright 2008 by the AAFS. Unless stated otherwise, noncommercial *photocopying* of editorial published in this periodical is permitted by AAFS. Permission to reprint, publish, or otherwise reproduce such material in any form other than photocopying must be obtained by AAFS. ** Presenting Author*