H43 A Test of the Megyesi Equation on Scavenged Human Remains

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After attending this presentation, attendees will be better able to conceptualize the importance of temperature in the decomposition process and to understand the limited role small scavengers may play.

This presentation will impact the forensic science community by contributing to an understanding of human decomposition so that the accuracy of postmortem interval estimates can be improved.

The purpose of this research is to address the contribution of small vertebrate scavengers to human decomposition and to discuss how such scavenging may affect estimates of postmortem interval calculated using the regression equation proposed by Megyesi *et al*.[1] Megyesi's equation uses a scoring scheme to produce a numerical representation of the state of decomposition and can be used to predict the number of accumulated degree days that have elapsed since death. Weather data can then be used to relate accumulated degree days to chronological time since death. Postmortem interval estimates derived from Megyesi's equation assume that the cadaver is that of a complete adult human that has not suffered any trauma and has been allowed to decompose on the surface. Megyesi et al.call for future studies to address whether the equation accurately predicts postmortem interval in the event that the remains deviate from these specifications. Scavenging is one such deviation and is addressed in this project.

The scoring scheme described by Megyesi *et al*., the total body score, was used to document decomposition over a period of months for six donated human cadavers placed at an outdoor human decomposition research facility in western North Carolina. Motion sensitive cameras were used to gather evidence of scavenging. All six donated cadavers were scavenged by small mammalian and avian species.

Actual accumulated degree days were calculated for each donor and plotted against total body score as reported by observers. The resulting pattern for the entire data set was curvilinear, with an R-squared value of 0.395. Accumulated degree day values were transformed using a base-10 logarithm, and the resulting plot for the entire data set was more linear with an R-squared value of 0.75, suggesting that, when transformed, accumulated degree days are a strong predictor of variation in total body score.

When the regression equation of Megyesi et al. is applied to this data set, the equation worked reasonably well to predict the actual accumulated degree days when the suggested error range of +/-776.32 accumulated degree days was applied. However, a paired sample T-test of the actual accumulated degree days against the predicted accumulated degree days showed that the differences in the means were significant at $p<0.001$. Autocorrelation may be a factor because scores are from sequential observations of the same individuals. These results indicate that Megyesi's findings of the strong correlation between thermal energy, as measured by accumulated degree days, and level of decomposition hold true even in the presence of scavenging and in the western North Carolina region. However, future research in this biome may provide a refined regression equation for similar environments and may serve to quantify the contribution of scavenging to the percentage of total body score that is not explained by accumulated degree days.

Reference:

1. Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. J Forensic Sci 2005;(50)3: 618-26.

Decomposition, Postmortem Interval, Scavenging

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