G99 Comparison of Methods for Measuring Decomposition of Submerged Carrion in Fresh Water

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The goal of this presentation is to determine a method for measuring submerged decomposition experimentally that limits contamination to the carrion.

This presentation will impact the forensic science community by discussing how, currently, there is no standard for measuring submerged decomposition *in situ*. This study compared current proposed methods for experimentally measuring the amount of decomposition undertaken by carrion underwater, and hopefully, the results may guide future underwater decomposition research, using more standardized techniques that limit contamination of the decomposition process.

Continuous monitoring of decomposition and calculations of the postmortem submersion interval (PMSI) of carrion at depth can be problematic for forensic investigators due to risk contamination of the carrion caused by the extraction from the experimental environment and weighing processes. Underwater photography and evaluation utilizing the Heaton et al. total aquatic decomposition (TAD) score at depth was compared to weighing the carrion before and after submersion, as well as full forensic necropsies. The actual time of submersion was known for each carrion. Perinatal piglets were used as human analogues for experimental purposes. This study suggests that weighing the piglets after they have been submerged in fresh (stagnant) water yields inconsistent results due to the unpredictability of algae growth in water ecosystems with high algal contamination. In addition, while underwater photography does reveal some evidence of decomposition *in situ*, usefulness is limited by required training, expensive equipment, and further algal growth issues which can obscure the visual data. The results of this study indicate that in order to objectively measure decomposition over time, the carrion should be examined either at depth using the TAD scoring system, or a set of piglets should be submerged with one piglet harvested from the experimental environment over set periods. This piglet should then undergo a pathological examination (with histological sampling and TAD scoring, as was done in this study), rather than relying on underwater photography. This allows for normalization between piglets and excludes weight and algal growth issues, thereby showing the amount of decomposition over time. The acquired TAD score can then be used with the calculated Accumulated Degree-Days (ADD) to determine an approximate PMSI. These results may not be generalizable to other submersion conditions in water ecosystems with different salinity, temperature, degree of algae growth, and amount of other animal activity.

Underwater Decomposition, Postmortem Submersion Interval, Visual Scoring System

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