H97 Using Algae to Estimate Postmortem Submersion Interval in a Louisiana Bayou

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After attending this presentation, attendees will recognize the utility of algae in the estimation of postmortem submersion interval (PMSI).

This presentation will impact the forensic science community by highlighting an often overlooked resource for the prediction of time since death, promoting collaboration between forensic anthropologists and algologists for the estimation of PMSI.

When a body is found in a terrestrial setting, the forensic anthropologist has a wide array of taphonomic information available to assist in the estimation of postmortem interval (PMI). Yet, decomposition in water is far less understood, with the estimation of PMSI more difficult to determine. While insects are a principal contributor to the data on terrestrial decomposition, few truly sarcophagous aquatic insects have been documented (Wallace et al. 2008).[1] Water is a highly variable habitat, being affected by numerous factors such as sunlight, temperature, wind, pollution, and geographic location. The position of a body in water is also highly variable, with some bodies floating or sinking naturally, while others are trapped or deliberately weighted to sink to the water floor. Depth, salinty, pH content, current, and micro and macro organisms all affect how quickly a body will decompose, and disarticulation coupled with fluvial transport make submerged cases particularly challenging. However, researchers have identified stages of underwater decomposition, such as the six-stage system suggested by Payne and King (1972).[2]

The current study used fetal pigs as models for humans to assist in evaluating the potential for using algae growth as an indicator of PMSI, examining three questions: (1) will a decomposing pig have different algae growth than a non-decomposing object; (2) does a clothed substrate have different algae growth than an unclothed substrate; and,(3) is algae growth different in spring and fall? Pigs were placed in a Louisiana bayou in spring and fall, some clothed in cotton and others unclothed. Each season, one clothed pig and one unclothed pig were sampled for algae accumulation daily for ten days, then once weekly until no flesh remained. In addition, submerged clothed and unclothed slate tiles were sampled for algae during the same time period, acting as comparative, non-decomposing objects. In laboratory, the algae samples were quantified through chlorophyll *a* concentration, while microscopic analysis qualified diatoms as the primary algae in both seasons. Additionally, each season a neighboring clothed pig and an unclothed pig were not sampled but rather visually assessed for stages of decomposition. These unsampled pigs provided a control for observation into the effects of algae sampling on the rate of decomposition.

Statistical analyses were conducted to examine the effects of clothing and season on chlorophyll *a* on the pigs and tiles. Positive, linear relationships existed between the amount of time submerged and the accumulation of chlorophyll *a* l substrates in both seasons, meaning that chlorophyll *a* potentially can indicate time since submersion. Results also demonstrate that the presence of clothing has a greater impact on algae growth rate than the presence of decomposing matter, with the clothed pigs and clothed tiles having more growth than the unclothed pigs and tiles, especially in spring. Season was also found to highly impact algae growth, with the light rainfall and warm temperatures of spring creating ideal growing conditions compared to the heavy rainfall and cool temperatures of fall. Finally, the act of experimental algae sampling did not influence the process of decomposition.

In summary, this study shows that algae growth, measured through chlorophyll *a*, has tremendous potential for the estimation of PMSI. **References:**

1. Wallace JR, Merritt RW, Kimbirauskas R, Benbow ME, McIntosh M. Caddisflies assist with homicide case: determining apostmortem submersion interval using aquatic insects. Journal of Forensic Sciences 2008;53(1):609-614.
2. Payne JA, King EW. Insect succession and decomposition of pig carcasses in water. Journal of the Georgia EntomologicalSociety 1972;7:153-162.

Postmortem Interval, Algae, Taphonomy

 ** Presenting Author*