H42 Decomposition Patterns in Indoor Environments: A Comparative Analysis of Rodriguez and Bass's Stages

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The objectives of this study are to explore the patterns and timing of the effects of decomposition and to identify factors that may or may not play a prominent role in the decay of bodies within enclosed environments, by comparing these data to the stages created by Bass (1997) and Rodriguez and Bass (1983).

This presentation will impact the forensic community by presenting data related to decay within an environment that has been largely unexplored. The patterns identified accentuate the need for generating comparative samples and engaging in collaborative research to create refined standards for estimating the postmortem interval within sheltered environments. This investigation retrospectively reviewed 69 cases to identify the presence and sequence of taphonomic effects of individuals who died within enclosed environments. The frequency of indoor decomposition and the patterns identified, such as the minimal role of necrophagy and sunlight on enclosed remains, underlines the need to generate comparative samples and generate context-specific standards for estimating the postmortem interval.

Where do people die alone when they remain undiscovered for extended periods of time? The forensic literature implies that most cases involving decomposed remains occur in outdoor contexts, yet a review of 2003-2008 Nebraskan autopsy records demonstrates that most people dying alone are within their homes. Of 87 forensic cases reviewed, 69 died within enclosed environments. For enclosed locations, men (n=49) and women (n=20) were represented (ranging in age from 2 months to 90 years). Unsurprisingly, police are most often the ones to discover the remains (20.3%). Estimation of the postmortem interval (PMI) is critical to reconstructing the events surrounding a person's demise and this is an area in which forensic anthropologists are increasingly playing a leading role.

Rates of decay are context-specific and little attention has been paid to decomposition patterns within enclosed environments. This research aims to achieve a better understanding of decay rates by exploring contributing factors and the applicability of Bass' stages to indoor decomposition cases.

There is a plethora of experimental research devoted to quantifying the rate of human decay for PMI estimation. Specifically, Bass (1997) and Rodriguez and Bass (1983) have created decomposition stages that are widely used within medicolegal investigations, but are based on decomposition in the outdoor environments. The value of retrospective studies in combination to experimental research is that the large number of variables that affect decompositional rates may be explored.

Rodriguez and Bass's work encapsulates the process of decomposition into four phases: fresh (first day), bloated (first week), decay (first month) and dry (first year), each of which is associated with specific taphonomic effects. In this study, investigators rated the stage of decay that best fits the description of the remains, resulting in 50.7% (n=35) fresh, 36.2% (n=25) bloated, and 13.0% (n=9) advanced. The dry phase was not represented in this sample. Preliminary results show that with the passage of time, the likelihood of remaining undiscovered within an enclosed environment decreases.

For fresh cases, the mean PMI was 1.4 days (range=1.0-7.5 days) and fell within the "first day" period 88.2% of the time. For bloated, the mean PMI was 5.0 days (range=1-17 days) and occurred within the first day to first week interval 73.9% of the time. For "advanced", the mean PMI was 16.6 days (range=2-66 days) and correctly transpired within the first week to first month range 55.6% of the time. This demonstrates the problematic increase in variability of decay rates with extended PMIs.

Investigators also documented the individual effects located on the remains and examined the frequency of necrophagy and climate on the rate of decay. Within the bloated stage, bloating of the abdomen was documented at a frequency of 91.7%; however, bloating was still present within 62.5% of the "advanced" cases, when putrefactive gases have supposedly been released. Skin slippage, a feature that is not expected to occur until the bloated phase, was also documented in 20% of the fresh cases. Partial mummification was identified in 17.4% of the bloated cases. Skeletonization was only found within one advanced case.

Bass' stages heavily emphasize the actions of insects in soft tissue removal, and there is debate within the field as to whether insects directly contribute to indoor decay. Only seven cases of fly colonization were documented in this sample: 11.1% within the bloated stage and 71.4% within the advanced stage. No cases of beetle colonization were identified in the indoor records, which is consistent with the literature for enclosed spaces. The only documented case of carnivorous activity was found within the first week and "bloated" range. It from the lack of necrophagous activity within enclosed settings.

As an approximation of climate, seasons of deposition were analyzed with an odds ratio, showing that a decedent is 1.5 times more likely to undergo decomposition before discovery in the spring and summer than in the fall and winter. This indicates that while the bodies were in artificial environments, temperature

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does factor into their rate of decay. The frequency of indoor decomposition and the minimal role of necrophagy on enclosed remains underline the need to generate comparative retrospective samples and context-specific standards for PMI estimation in indoor environments.

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