

TAPHONOMIC OBSERVATIONS IN THE POSTMORTEM INTERVAL

1.0 Principle, Spirit and Intent

The identification and correct interpretation of taphonomic alterations of human remains can assist with the reconstruction of postmortem events and the estimation of the postmortem interval (PMI; also known as time since death, TSD). A thorough and systematic examination of the evidence is essential for the identification of taphonomic features, recording their presence, and interpreting their significance.

2.0 Purpose and Scope

These guidelines recommend best practices for evaluating taphonomic influences on human remains relative to their environmental context. Taphonomic analysis often involves a multidisciplinary approach (including, for example, entomological or soil science analysis) for a more informed interpretation. Practitioners of forensic anthropology should implement these guidelines to the extent applicable, practical and appropriate. In the absence of specific guidelines or in the case of conflicting procedures, the principle, spirit and intent should be met.

3.0 General Principles

Taphonomy focuses on understanding and documenting the various postmortem processes associated with decomposition as well as those processes (both natural and cultural or intentional) that interact with hard tissue and associated evidence. Taphonomy is used to evaluate postmortem alteration to human remains and to estimate PMI. Forensic anthropologists can contribute to the PMI estimate at any stage during the decomposition process.

Thus, taphonomic observations can assist the forensic anthropologist by:

- Estimating PMI.
- Differentiating postmortem events from ante-mortem and peri-mortem events.
- Determining medico-legal significance.

4.0 Best Practices

4.1 Taphonomic alterations

Taphonomic processes have a wide range of observable effects on evidence, both soft and hard tissues. While the below list is not all inclusive, these represent areas that should be considered during an examination of both hard/bony and soft tissues:

- Abiotic agents and effects, such as
 - Weathering
 - Mechanical/physical
 - Colluvial/Fluvial/Eolian transport (rolling, etc.)
 - Freeze/thaw cycles
 - Sun-bleaching, etc.
 - Chemical
 - Pedogenic/subsurface
 - Surface chemical weathering
 - Harsh chemical damage related to erosion of cortical tissue (acids or bases)
 - Thermal events, such as
 - Soot or smoke-marking
 - Calcined bones or teeth
 - Melted or burned non-biological evidence.
- Biotic agents and events:
 - Decomposition processes, such as
 - Autolysis
 - Putrefaction
 - Rodent, carnivore, or other scavengers (i.e., gnawing, chewing, etc.)
 - Aquatic vertebrates/invertebrates/coral, etc.
 - Trampling
 - Insect/boring activity
 - Root etching and root destruction
- Anthropogenic effects, such as
 - Trophy skulls (e.g., painting, carvings, wax, etc.)
 - Anatomical specimens
 - Cremation
 - Religious practices (Santeria, Palo Mayombe, Moncado, etc.)
 - Purposeful mutilation
 - Accidental damage done during recovery excavation (excavation tool marks, mechanical excavation equipment, etc.)

4.2 Postmortem Interval Estimation

An accurate estimation of PMI may be critical to the death investigation and is often based on scene contexts as well as associated evidence collected during the recovery phase. A body is subject to a wide spectrum of complex biotic and abiotic taphonomic processes. The involvement of multiple specialists during the recovery phases is optimal; however, the anthropologist should be familiar with recommended collection and preservation strategies, so that if necessary, evidence may be submitted to other analysts at a later date.

A variety of descriptive decomposition systems have been developed by forensic anthropologists as well as researchers in other forensic disciplines. In general, these descriptive systems use a series of phases to describe the decomposition process; these systems and phases, while comparable, vary based on different environmental and decompositional context. For example, scoring systems have been devised to quantify decomposition. The forensic anthropologist should consider using these to describe the condition of a body, and reference to its stage of decomposition and/or its total body score. Additionally, for accurate PMI estimation, the anthropologist should select the most appropriate methods based on the most similar physical and depositional environments.

Transition from one phase to the next is heavily influenced by a number of different factors that may accelerate or impede the progression between stages. The observed factors that influence the rates of decomposition should be described in bench notes and the anthropology report.

To that end, the variables that influence decomposition should be documented and may include:

- Ecological and pedological characteristics, such as:
 - Outdoor terrestrial
 - Temperature and humidity
 - Burial substrate, burial depth, ecosystem (e.g., pasture, park, wooded), oxygen content, etc.
 - Soils: type, texture, moisture content, chemistry (i.e., C, N, P, pH, conductivity, etc.)
 - Shade, sun, elevation
 - Weather and seasonal observations (e.g., humidity; maximum/minimum daily temperature, rainfall, etc.);
 - Insect and scavenger activity
 - Indoor terrestrial
 - Location: (e.g. barn, house - carpeted or hard floor, car, etc.);
 - Temperature and humidity
 - Insect and scavenger activity
 - Aquatic (e.g. creek, marsh, swamp, river, lake, ocean, etc.)
 - water pH, temperature, depth;
 - potential decomposer population;

- Age, body size estimations
- Physical condition of the remains, including clothing and trauma;
- Cultural modifications can include:
 - Intentional mutilations
 - Unintentional damage, such as hand excavation methodology or heavy machinery used during recovery operations.

Human interaction as well as natural movement of a body can affect the depositional environment, such that remains may be moved from one type of environment to another. Given that the recovery and PMI estimations may be a multi-agency and multidisciplinary process, the anthropologist should be conscientious of other evidence that may be collected. In fact, the forensic anthropologist may have to coordinate efforts of these experts. The forensic anthropologist can obtain a more accurate PMI and understanding the taphonomic sequences by using this multidisciplinary approach. The anthropologist should be familiar with other disciplines' recommended collection and preservation strategies, so that appropriate evidence may be submitted to an appropriate analyst at a later date.

5.0 Unacceptable Practices

The follow practices are considered unacceptable and should be avoided:

- Making a PMI estimate without consideration of the taphonomic context/depositional environment.
- Interpreting taphonomic events as trauma.
- Using terms such as “trauma” and “injury” to describe traumatic events/defects.
- Reporting overly precise or insupportable PMI estimates.
- Making interpretive statements that are beyond the forensic expertise of the analyst.
- Application to remains should be more descriptive rather than interpretive in nature (e.g., suspected paint should be describe as color or pigment instead of suspected material; suspected gold application should be described as yellow-colored metal, etc.).
- Interpreting taphonomic signatures outside of one's area of forensic expertise.