A66 Phase II Spatial Patterning of Vulture-Scavenged Human Remains

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Learning Overview: After attending this presentation, attendees will better understand vulture-scavenging patterns of human remains at Texas State University's Forensic Anthropology Research Facility (FARF).

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that vultures' scavenging activities can affect Postmortem Interval (PMI) estimation as well as provide longitudinal data that contributes to the development of vulture-modified decomposition sequences.

This project is Phase II of a longitudinal study.[1] Phase II continues to systematically assess the timing and sequence, rate of skeletonization, disarticulation, and dispersal of human remains by vulture-scavenging activity. Additionally, it investigates whether microenvironment (e.g., placement of the bodies in proximity to vegetation or other human remains) affect vulture-scavenging activity. While some studies have examined scavenger guild behavior, none have modeled the ways microenvironmental factors might influence vulture scavenging of human remains.[2]

Data and Methods: Five donated human bodies from the Willed Body Donation Program at Texas State University were placed at the University's FARF in various contexts. For example, placements were chosen to reflect an individual in heat distress seeking shade or multiple individuals perishing in close proximity to each other. The FARF is a closed, 16-acre site (reinforced chain-linked fence), which allows for exclusive observation of avian scavengers. The first donated body (Body 1) was placed at FARF on September 3, 2013, in a grassy area surrounded by trees. Body 2 was placed on September 24, 2013, in open grassland. Body 3 was placed on November 21, 2013, adjacent to a wooded area approximately 66ft west of Body 1. Body 4 was placed approximately 364ft west from all the other bodies in open grassland on December 11, 2013. Last, Body 5 was placed on May 2, 2014, in open grassland, adjacent to a tree cluster, approximately 66ft north of Body 2.

Accumulated Degree Days (ADD) (i.e., the energy available to drive biological processes) was calculated to characterize the geographic region and explain the level of observed decomposition before complete skeletonization by vultures.[3] Animal activity was captured with motion-sensing infrared game cameras (Moultrie Game Spy®) and high-accuracy Global Positioning System (GPS) (GeoExplorer XT®) was used to systematically record successive disarticulation and scattering. GPS data were input into a Geographic Information Systems (GIS) to calculate elevation, Mean Center (MC), Standard Distance (SD), and Directional Distribution (DD) changes to analyze and visualize vulture-scavenging activity patterns.

Results and Conclusions: Phase II results align the findings from the Phase I.[1] Specifically, all remains—with the exception of Body 4—were moved from higher to lower elevations, vultures were observed continuing to disperse body parts after skeletonization, and vultures can completely skeletonize a set of human remains within 72 hours once scavenging begins. Notably, vultures began to scavenge at variable times after placement (anywhere from 4 to 77 days). Further, the data collected inform general considerations regarding the effect of microenvironment, such as the difference in Time-to-Scavenging (TtS).

TtS may be related to temperature, not tree cover or proximity. Vultures appeared to wait for shorter amounts of time to begin scavenging when the bodies were placed in the autumn (Body 1 and Body 2) or summer (Body 5) compared to winter (Body 3 and Body 4). It is possible that in Central Texas the initiation of scavenging by vultures is shorter in the warm to hot months. Temperature may also affect the number of vultures that will scavenge at a given time. Larger numbers of vultures may scavenge together in cooler months (Body 2 and Body 3), while smaller groups may scavenge together more frequently in hotter months (Body 5).

Taken together, Phases I and II demonstrate that vulture-scavenging activity can impact the estimation of PMI, in this case increasing the estimate, and introduce additional challenges to recovering remains by authorities.

Reference(s):

1. Spradley, M.K. et al. (2012). Spatial patterning of vulture scavenged human remains, *Forensic Sci. Int*. 219(1-3): 57-63.
2. Olson, Z.H. et al. (2016). Carcass type affects local scavenger guilds more than habitat connectivity, *PLoS One* 11(2): e0147798.
3. Megyesi, M.S. et al. (2005). Using accumulated degree-days to estimate the postmortem interval from decomposed human remains, *J. Forensic Sci*. 50(3): 1-9.

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