

A74 Decomposition in the Sonoran Desert During the Summer

Kaitlyn J. Fulp, BA*, Texas Tech University, Lubbock, TX 79409; Meghan M. Gast, School of Mathematics and Natural Sciences, Glendale, AZ 85306; Jacob A. Harris, PhD, Institute of Human Origins, School of Human Evolution and Social Change, Tempe, AZ 85287; Katelyn L. Bolhofner, PhD, Arizona State University, Glendale, AZ 85306

Learning Overview: The major goal of this presentation is to offer a timeline of decomposition for use in estimating postmortem interval in the southwestern United States, particularly during the summer months when decomposition is rapid.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a model for estimating postmortem interval during the summer months in the Sonoran Desert. The extreme heat and aridity of this location directly affect the mortality of exposed populations and the subsequent decomposition timing and stages. Patterns of decompositional change gleaned from other environments are not applicable to postmortem interval estimation in this extreme environment. This study is the first in a series to document the stages of decomposition in the Sonoran Desert throughout the year.

The extreme climate of the Sonoran Desert of the southwestern United States presents a unique challenge for estimating postmortem intervals through stages of decomposition. In a single summer month, temperatures were recorded ranging between 58°F and 124°F, with relative humidity as low as 7%. In the Arizonan portion of this desert, the city of Phoenix in Maricopa County has been described as a “heat island” with temperatures up to 21°F hotter than rural areas.¹

Maricopa County is part of the Tucson Sector of the United States-Mexico border, where more than 200 sets of remains known to belong to undocumented border crossers have been recovered in recent years.² In addition, Phoenix also has a crisis of homelessness. Maricopa County reported a total of 25,832 homeless individuals in 2015.³ Exposure during the summer is a common cause of death among these groups.⁴ Further compounding this unique vulnerability to environmental factors is the shared likelihood for a potentially increased interval between death and the point at which a deceased individual may be recovered. As an accurate estimate of postmortem interval is a critical component of the identification of the deceased in these cases, an improved understanding of the rates and stages of decomposition in this environment is crucial.

The goals of this study were to: (1) document the process of decomposition and the effects of this extreme environment, and (2) estimate the timing and stages of decomposition during the summer in the Sonoran Desert of Maricopa County. To achieve these goals, two intact adult pig carcasses were placed in cages in an area of native desert in mid-June. Both were approximately the size of a human adult (~200lbs) and were clothed to better represent the state of individuals who perish in the desert. One carcass was placed in direct sunlight and the other was placed in the shade of a Palo Verde tree. Cameras were set to capture photos at 30-minute intervals. Additionally, weather stations were set up near each cage to collect temperature and humidity readings every ten minutes. Further photographs and documentation were collected throughout the experiment.

The results of this study demonstrate both the impact of extreme heat and aridity on the decomposition process overall, as well as the nuanced differences in the timing and stages of decomposition produced by differential ultraviolet radiation.⁵ The carcass placed directly in the sun experienced abdominal wall rupture within 12 hours. Flies were present in large quantities within 24 hours, and maggot activity peaked after five days. Insect activity occurred predominantly at night on the underside of the body and under clothing. This carcass maintained a wet appearance, and skeletal exposure was only seen on the facial region. The carcass placed in the shade did not experience abdominal wall rupture, and the soft tissue began to mummify around regions of skeletal exposure after seven days. More extensive maggot activity was noted, as was insect activity during both day and night. Maggot activity peaked after six days. Throughout the experiment, rodent and bird activity was noted during early morning, late evening, and nighttime hours. Within one week, the carcass in the shade exhibited skeletal exposure in the face and around the vertebral elements. No such exposure was observed in the other carcass. In the subsequent weeks, no further changes were visible in either set of remains following two weeks, and complete skeletonization was not observed when the experiment was concluded after 26 days.

Reference(s):

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