H4 Escaping Tennessee: Regions for Taphonomy Research Beyond Eastern Tennessee

Tracey A. Tichnell, BS, Michigan State University, Department of Anthropology, East Lansing, MI 48824*

After attending this presentation, attendees will understand where taphonomically relevant regions are located in the continental United States and the possibilities for furthering the work begun at the Anthropology Research Facility in Tennessee.

By providing locations of taphonomically relevant regions, researchers can investigate climatic variables affecting the rate of decomposition further than is possible in eastern Tennessee, allowing for more accurate time since death estimates.

Since 1981, groundbreaking research on the processes, the results, and the factors affecting decomposition has come out of the Anthropology Research Facility at the University of Tennessee. The results of this research have revealed several factors affecting the speed of decomposition and thus the time-since-death estimate. These factors can be lumped into two groups: intrinsic variables specific to the body, like clothing and trauma, and extrinsic variables, such as climate and environment. Though extrinsic variables are known to affect intrinsic variables, the magnitude of that effect is unknown. Many researchers examining any of these variables express the need for further work to be done, in different climates and environments. Even the investigators at the ARF, however inventive, are constrained by climate. Though they recognize their findings may be applicable only to one specific region, what defines different taphonomically-relevant climate zones is not known. By using variables known to have a large affect on decomposition rates, regions can be mapped defining where these variables differ.

Several things need to be thought out when undertaking this kind of mapping. The distribution of cases, what variables, and the length of time they are being studied all need to be taken into consideration. The cases should cover the whole area being mapped and should be as evenly spaced as possible. When mapping, it is important to keep in mind three very influential climatic variables which can divide a region into taphonomically-relevant climates: temperature, humidity, and precipitation. Beyond the regions created by these factors, microclimates can further subdivide regions to account for the unique features of a particular area. As all the climate factors that affect taphonomy are unknown and the full effects of the known ones are uncertain, these microclimates hold a great deal of potential. Analyzing any of these variables for only a month or a season is unlikely to provide an accurate assessment of a region's climatic variability. A year's worth of data is required to account for the differences between seasons; more than one year is better to allow for anomalous weather conditions. By considering time, variation, and distribution, accurate regions can be mapped displaying the differences in climate.

In this study, 129 cities across the United States were used. For each of these cities, data for three variables were downloaded from the National Climatic Data Center's website run by the National Oceanic and Atmospheric Administration. For average temperature, daily data were downloaded for five years (1999-2003). Daily precipitation data only for 2003 were downloaded. Only one year was used due to extensive missing data for the previous four years and only those cases with 95% of the data available were used to map regions. All daily data were converted to monthly averages for more efficient analysis. The available humidity data came as monthly averages. All the data were analyzed by variable using a hierarchical analysis in SPSS 12.0. The resulting groups were plotted on a map of the U.S. and regions drawn. Each of the three variables was mapped independently, producing three maps. The maps were then overlaid on top of each other and composite regions drawn, creating a fourth map of overall climatic differences.

Temperature divided the country into five regions. Most of the country split into rows becoming progressively warmer with lower latitudes. Along the west coast is a band of a more moderate climate without the large difference between highs and lows seen in the rest of the country.

Humidity creates five regions as well. The most humidity is seen in the northwest corner with a thin band of humidity down the west coast. The remainder of the country splits into a checkerboard. First, a line through the central plains divides the rest of the country into an arid region in the west and a humid one in the east. These are further subdivided into a northern more humid area and a southern more arid one.

Similar to humidity, precipitation splits the majority of the U.S. into two regions with a line down the central plains. To the west of this line are three drier regions with two wet regions to the east. The exception to this pattern is a small area of extremely wet weather along Oregon's pacific coast. The southern regions tend to have higher precipitation levels than the northern ones.

Using temperature, humidity, and precipitation maps, a composite map was drawn showing 11 regions. These regions do not follow state lines, though most states fit decidedly in one region. The North

 ** Presenting Author*

East is characterized as cold, humid, and wet and involves Maine, New Hampshire, Vermont, Massachusetts, New York, Michigan, and Wisconsin. Just to the south is the Central East, a temperate, humid, and wet section including Rhode Island, Connecticut, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Kentucky, eastern Tennessee, Ohio, Indiana, Illinois, Missouri, and Iowa. The hot, humid, and wet zone of the South East contains North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, and western Tennessee. The North Central is characterized as cold, humid, and dry includes Minnesota, North Dakota, and South Dakota. The temperate, humid, and dry region of the Central Plains contains Nebraska and Kansas. To the south is the South Central area, a hot, humid, and dry area involving most of Oklahoma and Texas. The cold, arid, and dry territory of the North West contains Montana, Wyoming, and Colorado. The Central West is characterized as temperate, arid, and dry and involves Idaho, eastern Oregon, Utah, and Nevada. To the south is the South West region of New Mexico and Arizona characterized as hot, arid, and dry. The west coast is divided into two regions with Washington and western Oregon in the moderate, humid, and wet north area and California in the moderate, humid, and dry south.

In a country that goes from the Atlantic to the Pacific and encompasses nearly every possible climate from the Arctic Circle to the Tropics, the potential for extensive and groundbreaking forensic taphonomic research is astounding. By using the three known influential climate variables, eleven regions in the U.S. were created. Each differs from its neighbor by temperature, humidity, or precipitation. Climate is the result of the interaction between these factors. In order to study how this interaction affects decomposition rates, at least one facility should be created in each region with the same goals as the ARF at UT. Though ideal, this is not likely to be feasible. However, each region is home to at least one forensic science program. Studies done through these programs could offer the same necessary information required to validate and fine-tune existing theories and methods and discover new ones that could not be found in the temperate, wet region of eastern Tennessee. Dr. Bill Bass and the faculty and staff at the Anthropology Research Facility have taken the first steps with sporadic efforts across the country to take the next ones. There is justification for further studies and facilities outside of Tennessee, both climatic and environmental. New facilities need to be created to contend with all the possibilities offered by the many different climates available in the U.S.

Taphonomy, Decomposition, Body Farm

 ** Presenting Author*