AGENTS OF CORPORATE IDENTITY: PATTERNS AND VARIABILITY OF EFFIGY MOUND SOCIAL ORGANIZATION AND RITUALISM

By

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ABSTRACT

AGENTS OF CORPORATE IDENTITY: PATTERNS AND VARIABILITY OF EFFIGY MOUND SOCIAL ORGANIZATION AND RITUALISM

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This dissertation uses a contextual approach for elucidating the social organization of Effigy Mound peoples of southern Wisconsin during the Late Woodland period (AD 600 – AD 1150). Specifically, mound form, internal mound features, biological status, and biological distance analyses are used to inform the structure of Effigy Mound societies. Other studies of effigy mound form have suggested that individual mound groups were built and maintained by lineal corporate groups (Mallam 1976; Goldstein 1995; Rosebrough 2010).

Relying on both biological and ritual paraphernalia, the results of this study confirm that the mound groups were maintained by specific corporate groups and these corporate groups were likely lineage based. The evidence for a lineal form of social organization was marked by a combination of differential burial dispositions, internal structuring of mound features, inclusion of age classes, and phenotypic structuring among mound groups. Further, the ritual landscapes, represented by the mound groups, likely symbolized and asserted the lineage's control and access to critical resources in the area. This study also argues that the mound groups primarily functioned as formal cemeteries, evidenced by a majority of mounds containing burials and other features in the mounds tended to co-vary with burials. It is reasoned that the burial and non-burial features may have functioned as surrogate bodies or memorials to individual identities, corporate identity, or ritual offices.

Patterned regularities were found across all mound groups including: the building and maintenance of mound groups that usually included geometric and effigy mound forms, the use of mounds for burial purposes, the use of fire in mound building rituals, the inclusion of earthen fireplaces and stone altars, and equal access to males and females. However, there were also several markers of variability among the mound groups including: differential mound construction methods, the inclusion of idiosyncratic internal mound features, variable modes of burial disposition, differential positioning of internal mound features, and differential inclusion of juveniles in geometric and effigy mound forms.

The results of the epigenetic analyses indicate variable levels of intra and inter-regional interactions. These interactions are consistent with other biological and cultural patterns presented in this research. Biological distance generally correlated with geographic distance; however there was internal homogeneity within the western groups and among the central and eastern mound groups of Wisconsin.

Agency/Practice Theory was used for interpreting variation in Effigy Mound ritualism. Although, there was likely an overarching ritual system that was shared among all Effigy Mound peoples, ritual practitioners may have been interpreting and reinterpreting ritual customs locally.

This study illustrates how a combination of skeletal data and archived archaeological data may provide valuable insight into the nature and social organization of communities participating in one of the lesser understood mound building episodes in the Eastern Woodlands.

To Dr. Teri Hall, for inspiring me on my career path, for championing me as a graduate student at ISU, for encouraging me as a graduate student at Michigan State University, and for continuing to guide me with the memory of her support and inspiration. You will always be missed Teri.

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Chapter 1: Introduction

1.1 Introduction

The purpose of the research presented in this dissertation is threefold including: 1) elucidate intra-mound group and regional variation in the ritual and burial program among the Effigy Mound peoples of Wisconsin through an analysis of mound features and skeletal data within a bioarchaeological contextual framework, 2) demonstrate that the presence and positions of certain mound features and skeletal biological variables will systematically co-vary between mound groups and among physiographic regions as a product of specific lineage based ritual and mortuary programs, and 3) utilize epigenetic traits of the cranial and postcranial skeleton to investigate whether the ritual materials in mounds, among mound groups and physiographic regions were maintained through a lineal based form of social organization.

Findings from this study indicate that social organization(s) in Late Woodland southern Wisconsin was variable, with at least two levels of social organization. On one level, this research demonstrates that there existed a broadly distributed mortuary pattern which shared a few basic ritual links including the construction of effigy and geometric mound forms in groups and the inclusion of ritual features, including burials, within the mounds. On another level individual mound groups were quite variable in terms of the frequency, type and spatial structuring of the mound features. In addition, biological factors were found to be quite variable among mound groups. As will be shown in subsequent chapters, this research found that, although there was a loosely bound social organization that linked effigy mound groups, sometimes over great distances, individual mound groups were likely built and maintained by individual corporate lineal groups with a land tenure form of social organization.

The dissertation does not assume this Late Woodland phenomenon represents a cohesive cultural social system. Therefore, this phenomenon will be referred to as Effigy Mound manifestation (Mallam 1976) and the people participating in the Effigy Mound manifestation will be referred to as Effigy Mound peoples. These terms simply refer to groups of individuals in the Late Woodland period that built and maintained mounds and mound groups. While the Effigy Mound manifestation, as a whole, shares basic overarching principles of social organization and ritual cohesiveness, it is likely that individual lineages demarcated their corporate identity through the types of mounds they erected on the landscape, the ritual features they incorporated into the mounds or, conversely, the absence of such features, and how these features were oriented in space (both vertically and horizontally). The biological and mortuary framework, developed in this dissertation research, will contribute to our understanding of the social structure of the Effigy Mound manifestation.

Buikstra (1976) demonstrated that any interpretation of biological phenomenon should be done with a firm understanding of the cultural context of burial. To understand Effigy Mound intra-and inter-regional continuity, this dissertation research examines skeletal biological and cultural variables that elucidate a) whether, and to what degree, there are regularities or significant differences among the social structures (as observed through ritual and mortuary practices) of the peoples who constructed effigy mounds; and b) whether these specific corporate affiliations can be identified.

1.2 What is the Effigy Mound Manifestation?

Goldstein (1995) presents a description of the Wisconsin Effigy Mound manifestation. The Late Woodland Effigy Mound phenomenon geographically encompassed southern Wisconsin, northern Illinois, eastern Iowa, and southeastern Minnesota. The northern extent of this manifestation extended to Green Bay, Wisconsin on the eastern side and to La Crosse, Wisconsin on the western side of the state. This roughly west to east sloped northern border is commonly known as the tension zone. The tension zone demarcates the change in forest composition with eastern deciduous woodlands to the south and mixed hardwoods and conifers to the north (Figure 1.1). The area of the Effigy Mound manifestation includes the southern hardwood forests, prairies, oak savannas of southern Wisconsin, northern Illinois, eastern Iowa, and southeastern Minnesota (Birmingham and Eisenberg 2000). Effigy sites, particularly mound groups, tend to be clustered near resource rich aquatic resources within this region (Birmingham and Eisenberg 2000; Goldstein 1995; Mallam 1976).

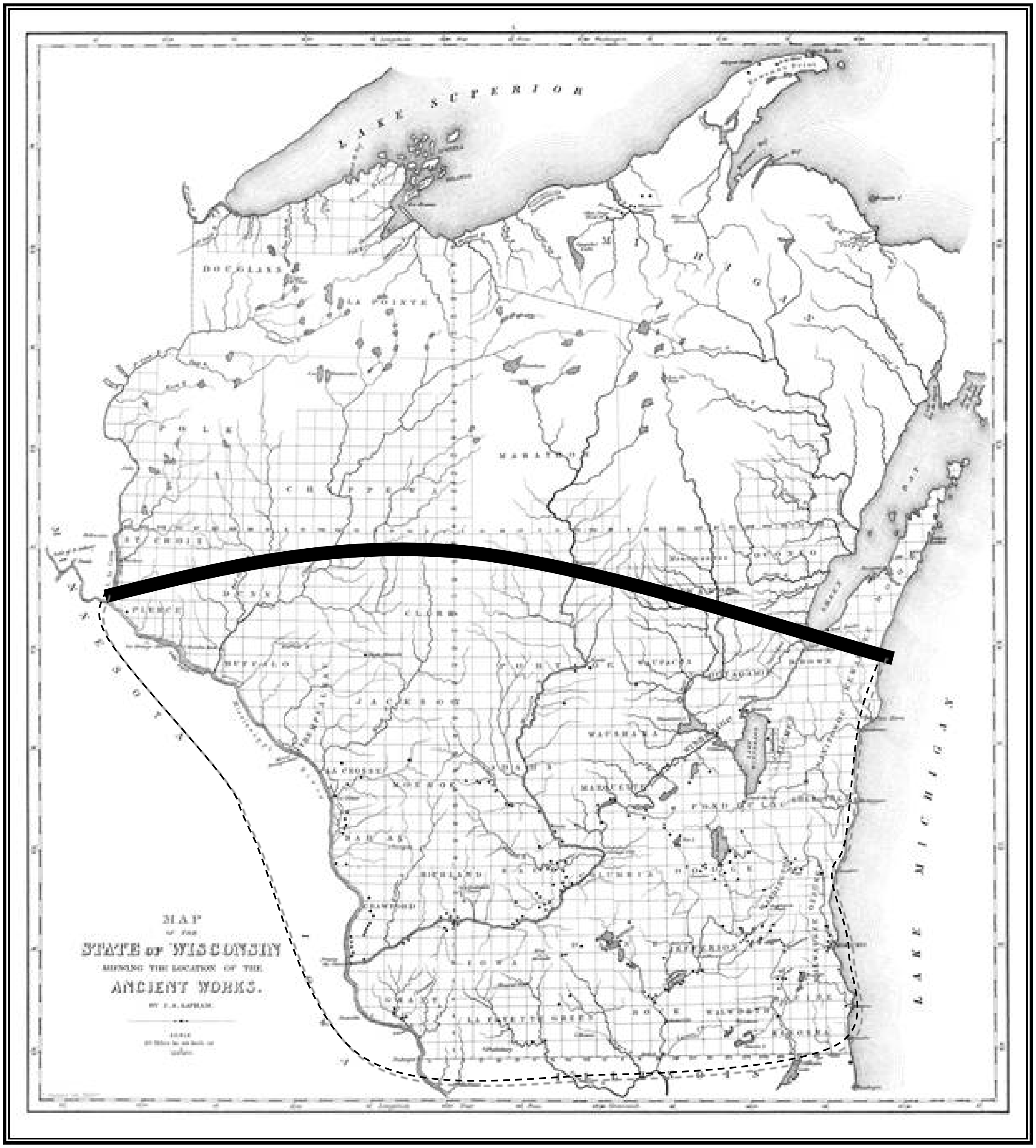

Figure 1.1 Effigy Mound regional distribution adapted from Lapham, Increase (1855) *The Antiquities of Wisconsin.* Smithsonian Institution, Washington. Dashed line indicates eastern, southern, and western extent and solid black line indicates the northern extent of Effigy Mound peoples.

It is generally agreed among most researchers that the subsistence and settlement patterns of the Effigy Mound peoples is one of seasonal mobility with hunting/gathering/fishing in resource rich areas (Birmingham and Eisenberg 2000; Goldstein 1995; Mallam 1976). In general, the Effigy Mound manifestation emerges as a phenomenon not unlike other areas of the Midwest during the Late Woodland. Most agree that the general Late Woodland trend involves a transition from a more sedentary settlement pattern associated with major tributaries in the warmer months to dispersal into secondary tributaries and the uplands in colder months (Birmingham and Eisenberg 2000; Milner 2004; Storck 1974). Not surprisingly, the Effigy Mound groups are found in warm-season resource rich areas (Birmingham and Eisenberg 2000; Goldstein 1995; Mallam 1976).

The Effigy Mound manifestation, however, is chiefly characterized by the presence of mound groups that contain low earthen mounds of zoomorphic shapes such as bear, panther, turtle, buffalo, lizard, bird and some human forms. These effigy forms ranged from one to four feet in height and up to hundreds of feet long (see Figure 1.2). More numerous, but nonetheless associated with the effigy mounds, are geometric mound forms including: conical and flat topped conical mounds, oval, linear mounds and compound conical mounds. Effigy Mound groups ranged from three to over 100 mounds. There appears to be no systematic organization to mound placement on the landscape other than the mounds tend to be located on prominent landforms and blend into the natural landscape topography.

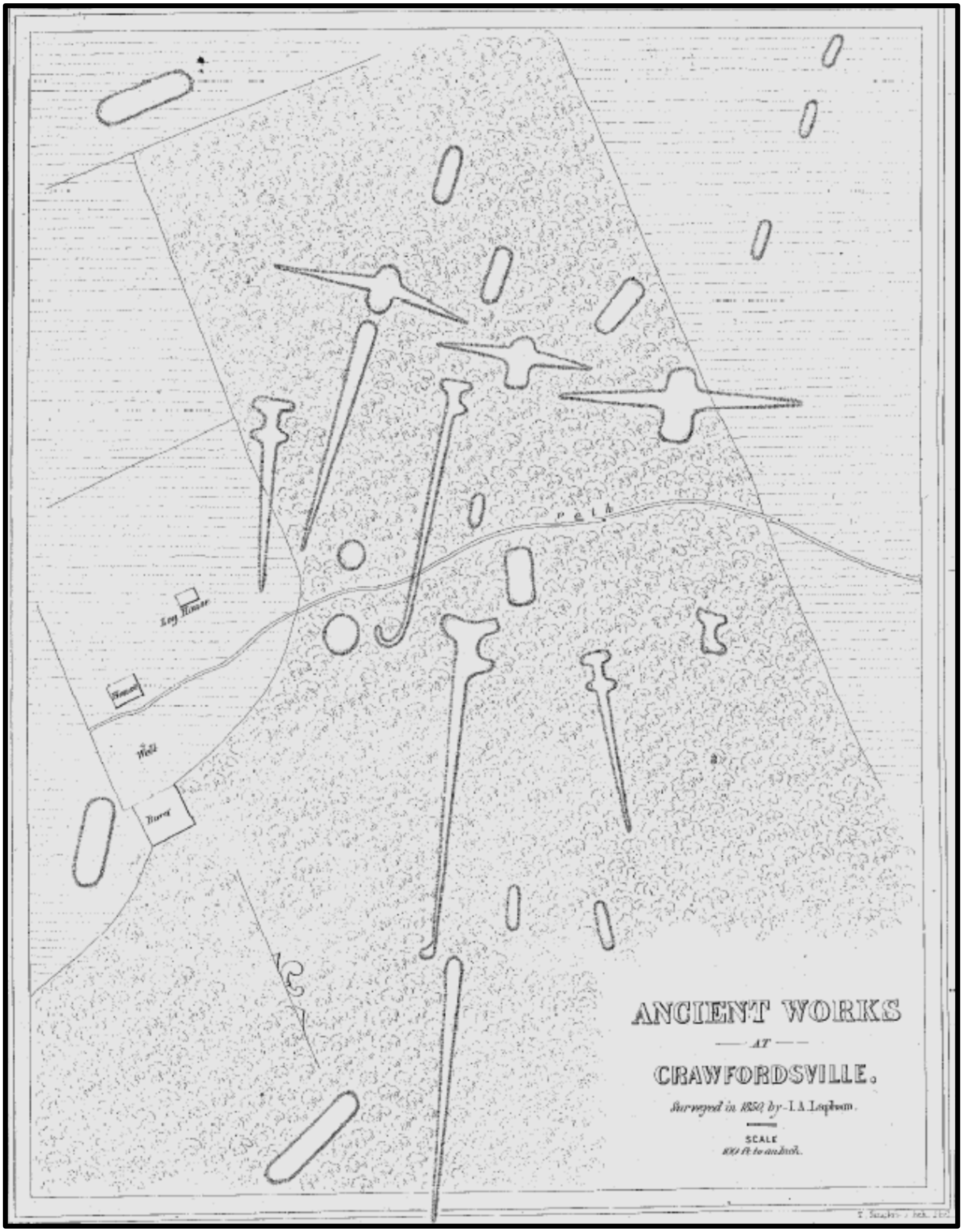

Figure 1.2 Crawfordsville Effigy Mound Group from Lapham, Increase (1855) *The Antiquities of Wisconsin.* Smithsonian Institution, Washington. This is an example of an effigy mound site showing variety and scale of mounds and the mound group.

1.3 Mounds and Mound Features

Goldstein (1995) outlined the variation in construction and contents of Effigy Mounds. While it is believed that most Effigy Mounds were constructed in one episode, three distinct methods were employed in their construction. In the first and most common method, the A-horizon (humus) was removed, creating the shape of the mound, followed by the erection of the mound above the ground surface. The second method involved construction directly on the ground surface. Occasionally, an intaglio was created followed by an excavation below A-horizon, soil was re-deposited in the empty space and the mound was erected. Finally, in other mound groups, like Kletzien and Kratz Creek, the A-horizon was removed followed by the deposition of one or more layers of sand and then completion of the mound form using soils (Goldstein 1995).

Not all mounds were used for burial purposes and even when burials are found in a mound this does not necessarily indicate that the sole purpose of the mound was for burial. When burials are found, they are generally located in the head or heart of effigy forms. In geometric mound forms (e.g. conical, oval, linear, compound conical) burials were predominantly placed in or near the center of the mounds. In Wisconsin, most burials were secondary bundle burials. However, there are many primary flexed burials, a few extended burials, a few cremations, and a mix of primary and secondary burials. Burials can occur on the mound floor, in subfloor pits below the mound floor, or within the mound fill. When all burials from mound groups are aggregated into a single sample; children, adults, males and females are generally represented in the mounds, and there were no differences in the frequency of males and females in the mounds (Birmingham and Eisenberg 2000; Ruth 1999). Artifacts directly associated with burials are rare, but when they occur, items are generally utilitarian objects; such as projectile points, ceramic vessels, or stone celts (Goldstein 1995). These objects are generally of local origin. Most often, instead of a burial (but sometimes co-occurring with burials), earthen fireplaces, stone altars, ceramic vessels, or clay and pebble cists were found in the head or heart region of effigy mound forms. These features also generally occurred in the center of geometric mounds.

Several interpretations have been proposed for the meaning or symbolism of the Effigy Mound groups. Stout (1911) was one of the first researchers to propose the idea that the mounds were possibly built as totems to symbolize the clan of the creators who built them. Mallam (1976) suggested mound groups functioned as multicomponent ceremonial centers that served several related families during times of increased resource abundance. The relative low number of habitation sites associated with the mound groups suggests these sites were not long term habitation sites but seasonal aggregation centers where mounds were constructed and other rituals were performed (Hurley 1976; Goldstein 1995; Mallam 1976; Benn 1979).

Some researchers believe the conical, linear, and compound conical mounds may also be Effigy Mounds (Rowe 1956; Hall 1993) but it is unclear what animal or other natural feature they could represent. Lackey-Cornelison (2012) suggests these geometric forms may represent a connection with earlier mound-building traditions. Others have attempted to ascribe meaning to the mounds and mound groups, primarily through Native American ethnography and historic documents (Benn 1979; Mallam 1976; Rowe 1956; Hall 1993). Mallam (1976) suggested the effigy mound forms represented three classes of natural phenomena; air, earth, and water and these three effigy classes were created to symbolize and balance the natural world. Hall (1993) argued effigy mound forms could be divided into an upperworld and lowerworld cosmology typical of the Midwestern Native American groups, such as the Winnebago and Menominee. Generally, bird effigy forms represented the upperworld and earth and water effigies, such as the water panther and bear, symbolized the lowerworld.

1.4 Framework for Current Study

This study relies on the guiding principle of mortuary archaeology that the social organization of the society at large will be reflected in the mortuary program (Binford 1971; Carr 1995; Goldstein 1981; Saxe 1970). More specifically, this research tests Mallam’s (1976) and Goldstein’s (1995) interpretation of Effigy Mound sites as multipurpose ceremonial or aggregation centers, the organization and appearance of which may have been influenced by corporate identity. According to Goldstein (1995), the mound groups also served as territorial markers that may have communicated to outsiders their control of limited resources.

Both Goldstein (1995) and Mallam (1976) suggest that: a) Effigy Mound groups were associated with seasonally resource rich areas which were most likely exploited by communities participating in Effigy Mound ceremonialism, b) the social structure of Effigy Mound peoples was segmented into subgroups which can be recognized by differences in the dominance of particular effigy mound forms, and c) Effigy Mounds communicated corporate rights to resources in a particular area. In other words, Effigy Mound communities used mound form, mound distribution, and mound group composition to make statements about resource allocation and social structure within and between regions.

This dissertation complements the work of Mallam and Goldstein by utilizing the combination of skeletal biological data, mound form, burial context, and other ritual features to further our understanding of variation in social structure of groups in this Late Woodland manifestation. Further, this dissertation demonstrates that these mound groups were likely maintained and used by specific lineages as part of a corporate-based land tenure sociocultural system.

1.5 Definitions

Since the descriptive language has been quite variable in the literature and published site reports, it is important to clarify the nomenclature used throughout this dissertation. It is noted that mound groups occupying sacred landscapes likely represented a fragment of the entire social system(s). This study accepts the premise that mounds and mound groups are ritual sites and therefore, use of these terms may imply ideology and ritual. Therefore, following is a list of the terms and their meanings as presented in this dissertation:.

- *"Effigy Mound manifestation"* refers to the widespread occurrence of Late Woodland effigy mound groups, constructed by groups of people who share certain features of a ritual system.
- *"Effigy Mound peoples"* and "Effigy Mound communities" refer to a collective of individuals who share a similar tradition of building and maintaining mound groups in the Late Woodland of southern Wisconsin.
- *"Geometric mound forms"* refer to the aggregate of conical, compound conical, oval, and linear mounds.

- *"Effigy mound forms"* refer to mounds that are typically in the shape of an animal, anthropomorphic shape, or representations of man-made objects (projectile point shape).
- "*Mound Groups*" refers to a loosely bounded area containing more than three mounds constructed during the Late Woodland.
- "*Physiographic region*" refers to three regions of southern Wisconsin; including the Western Uplands, Central Plains, and Eastern Ridges and Lowlands. These regions are specifically defined in Chapter 4.
- "*Burial*" refers to the purposeful deposition of human remains in a mound before or during construction of the mound.
- "*Primary Burial*" refers to a burial that was deposited close to the time of death, resulting in appropriate anatomic relationships among skeletal elements.
- "*Secondary Burial*" refers to burials containing one or more individuals that were exposed for a period of time, processed, or buried and later interred in a mound as a collection of skeletal elements or as a bundle burial.
- "*Earthen Fireplace*" refers to "a flat, circular area, blackened by charcoal, with elements of ash present" (McKern 1928:261).
- "Stone Altar" refers to a plat of two or more stones intentionally placed in the mound. These altars usually contain evidence of charcoal and ash but this is not a requirement.
- "*Clay and Pebble Cist*" refers to "a small bowl-shaped type of structure with more or less vertical walls of red, unbaked clay, reinforced to some extent with

pebbles, and with a slightly concave bottom lined with small stones” (McKern 1928:263).

- “*Ceramic Vessel*” refers to a vessel purposely placed in the mound. It does not include isolated ceramic fragments which were common in many mounds.

1.6 Conclusion

This dissertation research examines the degree of biological and cultural heterogeneity among mound groups and physiographic regions. This study tests current models of Effigy Mound peoples’ social structure utilizing skeletal and burial content and context data.

Benn (1979), Goldstein (1995), Mallam (1976), and Rowe (1956) demonstrated patterned variation of mound forms within and among mound groups. In addition, these spatial studies have confirmed that mound groups tend to be associated with seasonally rich resources, possibly representing markers of corporate identity and rights to resources on the landscape (Mallam 1976; Goldstein 1995). This study tests the degree of continuity among Effigy Mound communities and among physiographic regions through examination of the ritual features in the mounds. The question, however, is what can the biological and cultural variables tell us about a) whether, and to what degree, there is continuity in social structure among mound groups and among physiographic regions of Wisconsin; b) whether specific corporate affiliations can be identified; and; c) whether specific lineal groups can be identified.

First, documenting and examining patterned variation in who was buried, how individuals were buried, and in what mound forms individuals were buried help us understand interaction spheres in the Effigy Mound manifestation. Second, these same patterned variations provide valuable information about group membership and social structure, especially where marked biological and cultural variation among mound groups and physiographic regions are identified. An examination of biological distance between mound groups and physiographic regions furthers our understanding of gene flow (degree of social continuity), group membership (social structure), a membership of which may have a lineal based affinity.

1.7 Organization of the Dissertation

Chapter 2 surveys perspectives on bioarchaeological research, reviews pertinent mortuary archaeological theory and research, considers the contributions bioarchaeology has made to mortuary archaeology, and discusses the history of Effigy Mound research and interpretations. Chapter 3 lays out the specific research questions of this dissertation and discusses possible interpretations and their consequences for definitions of Effigy Mound social organization and variation of the social system. Chapter 4 reviews the methods for collection and analysis of the biological and archaeological data. Chapter 5 describes the mound groups and the contents of the mounds. Chapter 6 presents the results of the data analysis. Chapter 7 summarizes the findings of this dissertation, discusses the regularities and important differences among mound groups and physiographic regions, offers interpretations on the social organization of these Late Woodland communities, and discusses future directions for this research.

Chapter 2: Bioarchaeology and Contributions to Mortuary Archaeology

2.1 Introduction

This dissertation adopts the expectations and theoretical underpinnings of bioarchaeology as proposed by Buikstra (1976) and Buikstra et al. (2011), which maintain that the analysis of human remains should be contextually grounded, specifically in ethnographic, ethnohistoric, historic, and archaeological contexts. The research questions developed as part of this research were formulated in a manner that contextualizes Wisconsin Effigy Mound burials as they relate to other features within the mound and the potential variation across different mound groups. Additionally, this research aims to contextualize other ritual features and their co-variation within the mounds.

To provide a theoretical and methodological framework within which to interpret this dissertation research, the various schools of thought regarding bioarchaeology will be reviewed. Specifically, biocultural bioarchaeology, contextual archaeology, and the bioarchaeology of identity will be examined. Following this review, this chapter will examine mortuary theory with particular emphasis on both processual and postprocessual perspectives, and how each of these contribute to the interpretation of the results of this research. Next, bioarchaeological contributions to mortuary archaeology will be reviewed. Finally, a discussion of how bioarchaeology and mortuary archaeology can yield a more humanistic and socially grounded understanding of one of the previous “good gray cultures”, traditionally known as the “Effigy Mound Culture” is presented. Not unlike other more recent efforts to clarify the social organization (Clauter 2012; Rosebrough 2010) and mortuary behavior (Lackey-Cornelison 2012) of this Late Woodland Culture, this research incorporates biological analyses within an archaeological context that is firmly embedded in bioarchaeological and archaeological theory.

2.2 Bioarchaeological Approaches

There are several different interpretations of the meaning and practice of bioarchaeology pertinent to this research. Only those particularly relevant to the goals of this research are reviewed in this chapter.

2.2.1 Biocultural and Contextual Bioarchaeology

Buikstra et al. (2011) state that the major stumbling block in present-day bioarchaeology is an absence of collaboration between those engaged in increasingly specialized research and those engaged in more holistic generalized theories. According to the authors, the specialized methodologies should be combined and guided by overarching theories in the discipline.

In the introduction to their text, Buikstra et al. (2011) reviewed the history of bioarchaeology. The integration of archaeological and biological problems began in the early twentieth-century with Aleš Hrdlička and Earnest Hooton. While Hrdlička was accumulating large skeletal collections at the Smithsonian to preserve and document variation in the “American Indian” skeleton, Hooton was actively involved in field research with a more contextual motivation. Hooton’s protégé, Lawrence Angel, went on to develop what he termed “social biology”.

The mid twentieth-century saw the introduction of the “New Physical Anthropology” which attempted to break from a descriptive culture-historical science to one that emphasized hypothesis testing. This concept was heralded by Sherwood Washburn who was influenced by the processual paradigm of the time.

Within the “New Anthropology”, the processual archaeological perspective was heralded by Walter Taylor and Lewis Binford, who focused on site formation and function (Buikstra et. al 2011). As a consequence of site function, research sites were generally divided into either habitation or mortuary. This processual paradigm resulted in the emergence of processual mortuary archaeology.

The first proponents of processual mortuary archaeology were Arthur Saxe and Lewis Binford. Relying on cross-cultural ethnographic data, Binford (1971) and Saxe (1970) argued that the mortuary program was a reflection of the larger sociocultural system. Their findings supported the idea that the greater the elaboration of the dimensions of mortuary treatment, the greater the complexity of the society. The Binford-Saxe approach would ultimately influence a contextually based bioarchaeology.

The 1970s was a time of self-reflection in archaeology and bioarchaeology. Although there was still an emphasis on empirical hypothesis testing, two divergent paradigms emerged in anthropology, both claiming the term bioarchaeology. Jane Buikstra’s (1977) bioarchaeology emphasized a multidisciplinary approach that combined biological attributes of the skeleton within a cultural context. According to Buikstra (1976) and Buikstra et al. (2011) bioarchaeology is the inter-digitation of the archaeologist and physical anthropologist in all aspects of research design. This means the physical anthropologist is empowered to be an anthropologist instead of merely a skeletal biologist or population geneticist, examining human groups as organisms responding to their natural environment. Buikstra et al. (2011) contended that, although there is great value in the recent specialized research, the use of these specializations should be embedded within general theoretical constructs. Buikstra's bioarchaeology emphasizes social theory, history, archaeology, and ethnohistorical events that shape biology and how biology shapes cultural factors.

Larsen's (1997) volume "Bioarchaeology: Interpreting Behavior from the Human Skeleton" succinctly articulates his definition of bioarchaeology. To Larsen (2002) bioarchaeology is the application of osteological methods to interpret issues regarding health, diet, genetics, and sex and age status from human remains in an archaeological context. Here, instead of relying on context, the most direct means for understanding the biological history of individuals and populations is the data contained in the bones themselves. This bioarchaeology emphasizes biology over context and is seen as a tool that can be used by archaeologists for interpreting the social, political, and economic matters of a society. This is not to say that this biocultural bioarchaeology has any less value, it is simply a different conceptual perspective for studying human remains.

Zuckerman and Armelagos (2010) identify biocultural bioarchaeology as composed of three components including: a population approach, the recognition of culture as an adaptive mechanism that is linked to biological adaptation, and numerous methods can be used to test alternative hypotheses regarding the biological and cultural domains and view these as adaptive processes. In this paradigm, the theory guiding the research is largely evolutionary and focuses on large-scale social effects in cultural transitions; consequently there is less emphasis on the details of the mortuary and social context. Furthermore, these ecological/evolutionary empirical approaches are typically methodologically driven and not guided by social theory (Knudson and Stojanowski 2009).

Biocultural bioarchaeological questions differ in scale and scope compared to contextual bioarchaeology. As noted, the research interests are usually guided by culture ecology and evolutionary theory and consider the impact of culture change on biology and the impact of biology on culture change. This type of research is largely concerned with population level evolutionary forces including, for example, the social and health impact of the transition from hunting and gathering to the adoption of agriculture (Larsen 1997). Other studies conducted within the biocultural bioarchaeology tradition include: explorations of sexual division of labor, bio-behavioral studies focused on biomechanics and cross-sectional geometry, studies of migration, population replacement, postmarital residence, and population stability using specialized techniques with a genetic basis (Zuckerman and Armelagos 2011).

2.2.2 Bioarchaeology and Identity

Another bioarchaeological approach, which shares similar goals with contextual bioarchaeology, is the exploration of individual, corporate, and ethnic identity in archaeological research. According to Knudson and Stojanowski (2009:1) identity “refers to people’s perceptions of themselves and how they relate to larger social phenomena that characterize their existence”. Further, since the bioarchaeologist focuses on the individual in their analysis, they should be the ones involved in theoretically driven identity research (Goldstein 2006).

Individual and group identity encompasses many dimensions including: affiliations with the economic, political, religious, ethnic, nationalist, tribal, linguistic, sex, gender, and social and biological age (Knudson and Stojanowski 2009). Identity research has largely been influenced and guided by contextual bioarchaeology and practice theory. In an edited volume, Knudson and Stojanowski (2009) explore group or ethnic identity, the operationalization of individual identity within the social system. Whether analyzing the group or individual, identity research is focused on larger world system theory and a contextualized perspective, including the ethnohistoric, ethnographic, historic, and archaeological context.

In the same volume, Buikstra and Scott (2009) argue that identity research should be multidimensional, i.e. consider other dimensions of identity including, religion, social status, ethnicity, gender, and the life-course (age and sex). The authors illustrate that mortuary context is particularly important for religious identity and status distinction. In fact, the ritual or ceremonial realm is probably best represented materially in the mortuary sites, particularly in the processing of human remains, bodily disposition, and the manipulation and alteration of human remains. Social status may be analyzed by examination of the differential treatment of the remains, modification of the remains, and through dietary differences. Studies of ethnicity have focused on the material culture including: ceramic styles, lithic technologies, and dietary differences. Gender studies grew out of feminist theory, in reaction to the interpretation of objects using cultural definitions of male and female roles. Many of the new gender studies recognize gender and sexuality as cultural concepts and sex as biological. As a result of contextual bioarchaeology theoretical positions, gender issues have been explored both biologically and culturally. Life course studies, which by their nature subsumes sex and age, have resulted in studies that examine more closely the social roles individuals may have played within their cultural context.

According to Buikstra and Scott (2009), a unidimensional identity approach is inadequate for understanding identity. Since all of the dimensions are fluid and change during a person's lifetime, any change in one dimension can have dramatic social effects in other dimensions of identity. Specific examples of identity focused research are presented later in the epigenetic section of this chapter.

In conclusion, each of the bioarchaeological approaches contributes to the theoretical framework of this research. The biocultural methodological bioarchaeological approach is useful for understanding microevolutionary forces and how these may have been affected by culture change and the environment. The contextual approach is particularly useful for understanding cultural, environmental, and transformation of the living to all of the possible avenues for final disposal or retention of the dead. Identity research, specifically as it informs corporate identity, is particularly important in this research since one goal is to investigate site specific and regional indicators of group identity. To further emphasize the approach of this research, contextual bioarchaeology will be relied on for analysis and interpretation to understand the nuances of human decisions regarding disposal of the dead.

2.3 Mortuary Archaeology

Because this dissertation uses multiple lines of evidence to consider archaeological and burial context, the focus is primarily a bioarchaeological analysis of the mortuary ritual domain of the Late Woodland Southern Wisconsin effigy mound peoples. As such, it is important to consider the various theoretical positions of mortuary archaeology and how they may contribute to the tenets of this thesis. As stated above, the foundation of this research resides in the domain of a contextual archaeology, one that relies on an understanding that we are, for the most part, blind to a good proportion of the mortuary ritual. Given the inherent natural and cultural biases of mortuary samples, this section will outline how some of these biases can be reckoned through a firm understanding of mortuary archaeology theory.

Important to this section is the recognition that Effigy Mound sites can be viewed in three ways: (1) monumental cultural landscapes (re)creating social memories, (2) cemeteries articulating ancestral claim to territories and its resources, and (3) as sacred landscapes where ritual is performed. As such, the theoretical basis for evaluating the Effigy Mound sites as ritual spaces, monuments representing corporate affiliation, and the mortuary program will be considered in this review of the applications and contributions of mortuary archaeological theory.

2.3.1 Theoretical Framework

The theoretical positions of the "New Anthropology" relied on "strength in numbers" to legitimize the science as empirical and reproducible (Binford 1971). Mortuary studies in the 1980's and 1990's focused on the regional perspective; diachronically and synchronically. Some of those important contributions relevant to this research are reviewed and critiqued here.

This research is guided by two both processual and post-processual approaches. The processual perspective will guide the analysis of systematic variation across mound groups and physiographic regions but it will also isolate those dimensions of the mortuary program that are shared across most or all mound groups, possibly representing an overarching ritual system. Given the nature of systematic variation that will be demonstrated between mound groups and physiographic regions the post-processual theory of structuration agency will be used, where appropriate, as an interpretive tool for explaining the idiosyncratic nature of certain dimensions of the mortuary program.

Lewis Binford's (1962) approach signaled the beginning of an empirically based method and theoretical position in archaeology which would later influence physical anthropologists and mortuary archaeologists that were interested in social forces affecting the biological and cultural traces of mortuary behavior. Binford's approach of systematically partitioning societies into technomic, sociotechnic and idiotechnic dimensions provides an empirically based environment for examining the complexity and subsistence and settlement practices of societies. Later, Arthur Saxe (1970) and Binford (1971) proposed that the mortuary program was a reflection of the social organization of the larger community.

Saxe (1970) incorporated role theory, componential analysis, evolutionary political theory, information theory, and structural-functional theory to introduce a broad sociocultural theory for analyzing mortuary behavior. The main goals were to use mortuary data to understand how different sociocultural elements interacted with each other. First, he chose to analyze and explain the formal disposal categories in three social systems. Second, he wanted to demonstrate how the domain (constructed from categories) could illustrate the social organization that produced them. He derived eight hypotheses to test cross-culturally with data from three different societies. Important to this research is Hypothesis 8, which stated:

> To the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by means of lineal descent from the dead (i.e., lineal ties to ancestors), such groups will maintain formal disposal areas for the exclusive disposal of their dead, and conversely. (Saxe 1970: 119)

Saxe's first four hypotheses, which rely primarily on role theory, are concerned with the manner in which social personae are differentially represented in the disposal domain. For this he defined social identity relationships, and social persona. Social identity referred to the social status of an individual. Identity relationships referred to the interaction of two or more social identities. The social persona was a composite of all social identities. Saxe maintained that the social persona was the most important dimension celebrated in funerary behavior because, as predicted by role theory, the most significant social identity will be chosen and symbolized in death.

The second four hypotheses focused on the manner in which social structures were differentially represented among different disposal domains. Of these, Hypothesis 8 was supported by all three ethnographic groups, which would later influence Lynne Goldstein's (1980) approach.

Goldstein (1980) stated that the problem with Saxe's Hypothesis 8 is that it implied that all cultures respond in similar fashion given certain economic and environmental conditions. The hypothesis did not allow for variability. Goldstein noted, "One [not the only] means of ritualization is the maintenance of a permanent, specialized, bounded area for the exclusive disposal of their dead". Goldstein asserts that a corporate group may legitimize its claim to critical resources through reference to the ancestors, as represented by a corresponding bounded cemetery, but other societies may ritualize this in other areas of social life.

Using mortuary data from the Mississippian Spiro site, Brown (1971) adapted information theory to the mortuary program. Brown (1971) devised a dichotomous keying system (similar to Saxe's) whereby combinations of attributes could be evaluated to identify the degree of complexity of a society. In a perfect paradigm all attributes are independent and there can be a low degree of redundancy. A perfect tree would indicate high redundancy and all attributes are dependent on preceding dimensions. In Saxe's study he found a high degree of redundancy for all three societies, indicating the reliability of archaeological data.

Later, in her analysis of ethnographic data Goldstein (1981) modified Saxe's (1970) Hypothesis 8 into three parts as follows:

> A. To the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by lineal descent from the dead (i.e. lineal ties to ancestors), such groups will, by the popular religion and its ritualization, regularly reaffirm the lineal corporate group and its rights. One means of ritualization is the maintenance of a permanent, specialized, bounded area for the exclusive disposal of their dead.
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> B. If a permanent, specialized, bounded area for the exclusive disposal of a group's dead exists, then it is likely that this represents a corporate group that has rights over the use and/or control of crucial but restricted resources. This corporate control is most likely to be attained and/or legitimized by means of lineal descent from the dead, either in terms of an actual lineage or in the form of a strong, established tradition of the critical resource passing from parent to offspring.
>
> C. The more structured and formal the disposal area, the fewer alternative explanations of social organization apply, and conversely. (Goldstein 1981:61)

In his manuscript on the Saxe/Goldstein Hypothesis, Morris (1991) claims to resurrect a debate between the processual and postprocessual archaeologists. Morris contended that many postprocessual archaeologists tended to ignore Goldstein's results from the revised hypothesis 8 because the hypothesis seems to treat cultures mechanistically, and it does not allow for human agency.

Morris (1991) criticizes his postprocessual colleagues who wish to dispose of the hypothesis because of its presumed rigidity. He uses two examples from his research on Classical Greco and Roman mortuary practices. Morris demonstrated that, while the driving force behind the corporate group is not necessarily lineal in nature, it is formed by the burden of citizenry in these two societies.

Like Goldstein (1981), Joseph Tainter (1978) provided a methodological incorporation of the Saxe-Binford approach in specific dimensions of the mortuary program. In his chapter Tainter (1978) reviewed the theoretical basis of Binford and Saxe to provide a framework for mortuary analysis which could be employed to infer social structure. There are two assumptions that are made about the importance of mortuary data as a useful indicator for social modeling. First, the form and structure of the mortuary program conveys information about the form and complexity of society. Second, social identities of the living are portrayed in the treatment of the dead.

Tainter (1978) was critical of the use of evolutionary categories for pigeonholing societies. He suggested that archaeologists must use a system of classification that could measure the relative complexity of a society. Tainter argued that data must be selected to represent how social positions are symbolized in mortuary treatment. Referring to ethnographic data, Tainter claimed that grave goods are not an accurate indicator of social status. Instead, Tainter measured energy expenditure pertinent to complexity of body treatment, construction and placement of the internment facility, and extent and duration of the ritual as a measure of social status. Tainter concludes that this quantitative approach more accurately evaluates the degree of social complexity.

Specifically, Tainter proposed that in a ranked society there are two social positions held in life; a vertical and horizontal social position. Tainter's premise was that the number and kind of ranked positions in a society are an accurate reflection of the number of ranked positions of the living society. Tainter applied an energy expenditure analysis to 103 ethnographic samples and was unable to reject the hypothesis that individuals who differed in social importance also differed in the amount of energy expended on their burial. Tainter used three different procedures in his analysis. First, he did a cluster analysis of the burials, followed by a regrouping of the clusters based on equivalent levels of energy expenditure. Finally, he assessed four measures of the burial program complexity based on the regrouping of the clusters. These regrouped clusters were seen as differing ranked levels on the vertical dimension. In addition, Tainter evaluated the relative energy expenditure for the same grave goods differentially in different temporal phases.

Braun (1981) was critical of Tainter's model as it was applied to six Midwestern Woodland mortuary sites and argued that the methods and conclusions relied on flawed procedures and theoretical assumptions. Braun was not opposed to the idea that mortuary samples could inform the sociocultural context but that the inappropriate use of methods and theories could negate fruitful mortuary research. Braun further argued that Tainter did not evaluate how differences in energy expenditure would always reflect differences in social importance.

Braun (1981) was further critical of the statistical procedures Tainter used and the assumptions he made regarding the clustering of different groups of burials. Braun criticized Tainter's assignment of energy expenditure, especially as it was applied to misclassified local versus imported grave goods. Finally, Braun was critical of Tainter's assigned energy expenditure concerning burial treatment. Many of these dimensions in prehistoric society are invisible in the archaeological record because certain behaviors and mortuary treatments leave no archaeological trace.

Braun (1981) also took issue with Tainter's misuse of the monothetic-divisive statistical procedures. High redundancy of different burial attribute clustering should indicate different ranked levels. According to Braun, the primary problem was that this method would always produce clusters based on the presence or absence of discrete data. Here, the interpretation of clusters may have been an artifact of faulty assumptions of the statistical procedure and not necessarily an accurate representation of the social system.

Given the tremendous planning and labor it would have taken to construct the large effigy mounds on the landscape, it may be tempting to consider Tainter's approach as a legitimate method for analyzing social organization of Effigy Mound peoples. However, we have no way of knowing how many individuals were engaged in the activity, the amount of time that was spent constructing an effigy mound, and the distance the material was carried. Further, the structures were probably not constructed primarily as burial structures but were very likely community investment ventures that celebrated and reproduced group cohesion through ritual. Finally, systematic variation among peoples engaged in Effigy Mound ritualism, even the idiosyncratic nature of some of the groups, may have reflected a segmented sociocultural system in which groups were asserting their unique identity through very different ways (material and behavioral) of performing ritual.

The Saxe-Binford approach has been valuable to archaeology and mortuary archaeology for its capacity to articulate and test specific problems (Brown 1995). These approaches have been criticized for using rigid classification systems and for their disregard for bias and transformations in the archeological record. It is clear that the systematic variation and structuring of burial programs could not be investigated adequately without this empirical approach. This research uses a combined processual approach with some of the interpretations influenced by postprocessual treatments of ritual, community identity, and practice theory. As such, some of the approaches will be reviewed in the following section.

2.3.2 Postprocessual and Agency/Practice Theory

The postprocessual movement arose in response to the perceived inadequacies of the processual movement. First, the claim is that the processualist generally disregards the great variation in practice and symbolism. Second, there is unfounded focus on vertical and horizontal status, which disregards other potential social dimensions. Third, the use of ethnographic analogy is misused and the only proper use of ethnohistory and ethnography is within the specific cultural customs of the society of interest.

Rakita and Buikstra (2005) provide a concise summary of the postprocessual paradigm in archaeology. According to the authors, postprocessualism grew out of the scholarly work of the European structural-symbolic-interpretive paradigm and includes many theoretical perspectives. For the mortuary domain it is believed that "mortuary rituals frequently utilized by the living to negotiate, display, mask, or transform actual power or social relations" (Rakita and Buikstra 2005).

Ian Morris is one of the most influential mortuary postprocessual theorists. Morris (1992) argued that social structure is created through ritual. Although the extent of ritual cannot be completely inferred, social structure can be partially inferred based on burial, cultural, and regional context. Morris defined social structure as societal norms, power relationships, and social obligations. In his view, social structure is a constantly renegotiated concept on the individual level. Ritual is regulated by who can do what and when. To Morris, ritual should be examined in four different ways including: direct observation, textually, through artistic representation, and material remains analysis. The most preferable means for reconstructing ritual is through material remains as this allows examination of the physical symbols and their variability. In this context the symbolic meanings do not have to be inferred. The inherent shortcoming is that only the tangible and preservable traces of ritual can be examined.

Morris (1992) presented two methods for interpreting symbolism, including the 'direct' and 'linguistic' approach. The 'direct' method implies that one can interpret the exact meaning of a particular symbol, even out of context. The second approach, 'linguistic', requires a more comprehensive understanding of a symbol within a larger body of evidence and context. Here the same symbol could mean a different thing in different contexts, times and places. Alternately, different symbols could mean the same thing in different contexts, times and places.

This is an important concept since this research examines variation in the selection of ritual features in the mounds and the dispositions of those features. This is important on two levels. First, different groups may be symbolizing something different from those around them through the incorporation and position of various features in the mounds. Second, it may be that the mounds and mound groups themselves represented a “sacred landscape” (Rakita and Buikstra 2005) and a ritual system that was not primarily funerary. We see evidence that the mounds may not have functioned solely as funerary since many of the mounds that contained no burials contained other stone, fire, or pottery features that may have communicated to the rest of the community the same symbolism as a burial.

Morris (1992) asserted that some archaeologists have failed to recognize that social structure is created through ritual and that grave goods are produced and deposited through ritual. Ignoring the complexities of ritual and the profound lack of ritual evidence makes for uncomplicated functionalist interpretations. Important elements for reconstructing ritual and tracking transitions in ritual include developing typology, investigating change through time, and analyzing both local and regional contexts, examining spatial relationships and developing demography.

Dornan (2002) reviews the history of Agency Theory and its important role in archaeology. Largely in response to the structural deterministic approaches in anthropology, this theory was originally put forward by Pierre Bourdieu (1977) and Anthony Giddens (1979).

To Bourdieu, social change operated through agency in which the agent could potentially alter the structure through practice. The practice is seen to be embedded in the structure or the social setting and conditions that result from the relationship between individuals. The *habitus* is an internalized disposition that determines perception and appropriate conduct. Therefore, the structure is seen to structure behavior and in turn be structured by behavior. Any given societal change was brought about by accidental changes in *habitus* in varying social conditions.

In Giddens' Structuration Agency theory (1979), agency both constrains and enables social structure. Giddens' agency allows the agent to be malleable, creative and innovative. Here the *habitus* allows conscious reflection on context and meaning of actions. Societal change takes place because the structures are reproduced with varying interests and motivations of the actors.

The basic premise of agency theory, as presented by Bourdieu and Giddens, is that the agents or actors reproduce societal structures to (re)create social reality. Agency/Practice theory has been viewed as a theory that focuses on the individual actors and also as a societal phenomenon that, on some level, whatever the dimension, must be negotiated with others in the community for the practice to be reproduced. The approach used here maintains agency manifests as the creativity or free will of individuals operating within the confines of the existing social structure.

Structure in the context of this study includes the rules determined by an overarching ritual movement during the Late Woodland. The structure of this society is equivalent to the corporate identity reflected in the systematically reproduced rituals consistent with the overarching social system. The agency model, as applied here, is composed of two possibilities. First, it is possible that Effigy Mound ritualism allowed for slight to extreme derivations from the societal structure. Alternately, existing structures allowed for, or possibly encouraged, derivation from the social system. If, as we know occurs ethnographically (Pollock 2012), there was the existence of a secret society of funerary ritual leaders, these leaders could have ritually set themselves apart from others through creative symbolizing in the ritual context. In addition, due to the possible infrequency of the secret rites in some societies, it is quite possible that the ritual agents forgot or adapted certain rites spontaneously. Important in all this is an understanding that, while individuals play a role in reproducing and participating in structures, it is likely structures accommodate and have an embedded agency at the group level.

Interestingly, in the literature on Agency there is no discussion of the possibility that different structures of society may be differentially malleable and more receptive to modification and reinterpretation. For example, the technological aspects of a society may more likely be modified and open to new ideas since actors see the immediate benefits of improved technology, making it more likely to be adopted. Here it may be that individual agents have a greater effect on social change. Alternatively, if we look at the sociopolitical structures of society, agency may be possible, but it is conceivable that any change would have to be negotiated by the larger community.

There could be multiple scenarios occurring in ritual and religious structures of society that could result in diachronic and synchronic variability. The result of variable rituals practiced differently could be due to secret societies surrounding rites, specialized knowledge to perform the rites, and/or the infrequency of ritual performance (Pollock 2012). Also, ritual specialists may improvise and deliberately augment their practices as a way to reinforce and/or elevate their own authority (Pollock 2012). Any one of the above conditions could result in great variation in the ritual and mortuary program. Although there may be great variability in the allowance for creativity agency on the individual or group level, it is likely that there is differential encouragement or abstinence for certain practices within a given structure.

Since the Effigy Mound sites are viewed as sacred monuments within a sacred landscape it is important to draw on Bradley's (1993) work which focused on monumental symbolism. Bradley attempted to define the fundamental properties of prehistoric monuments in Britain and continental Europe as follows. Much like contemporary archaeology, monuments have continually been interpreted and reinterpreted. The symbolism may not have been totally clear, even to the builders. Monuments may have served several purposes including: invoking memory, ritualized communication, passive reflections of something outside religion, burial exchange, food storage, and warfare. An important feature of all monuments is their intended permanence, meaning that monuments were meant to endure long periods of time. The erection of monuments served to affect human consciousness by creating a renewed sense of place, enhancing the meaning of significant locations, and the meaning and symbolism of the monuments may have changed through time without the change of form.

Bradley (1993) took issue with the notion that monuments served as a corporate group's attempt to communicate a claim to scarce resources that was legitimized through reference to the ancestors. In Europe, Bradley identified this as a problem since many of the Neolithic monuments were erected prior to an agricultural economy.

Bradley referred to two different areas of the world (Australia and Eastern North America Adena and Hopewell Traditions) where monuments had been constructed in the absence of an agricultural economy. He further argued that a sense of place was important prior to the construction of monuments. Most of the monuments were constructed to mimic or were situated in relation to natural topographic features. The conception of space and time for agriculturalists and hunter/gatherers would have been different and this would affect the way that places were perceived and given meaning. In fact, as Bradley argued, societies may have adopted an agricultural economy as a result of a new sense of place created by the monuments.

Bradley claimed that monuments functioned as a representation of basic beliefs, to constrain and affect behavior and movement, a permanent staging of ritual, and they could have played an active role in social change. It is also important to recognize that monuments were erected in relation to natural landmarks and in relation to each other; therefore he recommends a regional approach for interpretation of the meaning of monuments.

The meaning of the monument was not only intended for future participants as a mechanism for linking an identity with the past, but the construction alone, accounted for group identity in the present (Bradley 1993). Monuments were meant to be experienced in a particular order or manner, therefore the monument areas themselves should be analyzed as they relate to the surrounding landscapes and other monuments, both relics and contemporaneous.

Bradley (1998) drew further attention to monuments and the possibility that man-made monuments may not be conceptually different than natural monuments. He noted that many of the monuments in Europe were built next to natural monuments or the monuments were built to mimic natural monuments. This may indicate that prehistoric peoples did not have a worldview that distinguished between natural land forms and cultural forms and that the meaning archaeologists assign to monuments did not necessarily carry the same symbolism. It may be that the mimicking of the natural landforms provided special powers, and by extension, power for the groups that controlled them.

The ideas presented by Bradley are particularly valuable for this study and other monumental research in the Eastern Woodlands. In southern Wisconsin we see the same monumental sites used through time and we may even see transitional mounds that may not fit the definitions of a time period. Bradley's (1993) discussion is particularly relevant to Effigy Mound patterns of variability since it is has been documented that each group seemed to signify a unique symbolism to themselves and to outsiders. Also, it is well documented that many of the mounds were added to or changed in later generations (Barrett and Hawkes 1919), possibly resulting from changing meaning, or the need to connect with the ancestors in a symbolic physical manner, or as a mechanism for subverting the symbolism of past groups. The presence of Hopewell mounds alongside Effigy Mounds at the Trowbridge site (Trempeleau County) and Effigy Mounds associated with Aztalan (Jefferson County) are a testament to the potential adoption or reinterpretation of these mounds and the symbols associated with them (Birmingham and Eisenberg 2000; Lackey-Cornelison 2012).

2.4 Contributions of Bioarchaeology to Mortuary Archaeology

As stated earlier, a contextual bioarchaeology can greatly contribute to our understanding of the mortuary program and archaeology, which is the goal of this dissertation; a thesis that unites both contextual and archaeological data to uncover patterns, or possibly the nonexistence of patterns in the archaeological record. It has been observed that variability, even idiosyncrasies in the burial ritual program, may in fact represent a pattern (Pollock 2011).

Goldstein (2006) argued that the original goals of bioarchaeology, as envisioned by Buikstra have not been fulfilled. In her chapter, Goldstein reviewed 30 years of publications in physical anthropology and was unable to find many bioarchaeological applications. While it is true that many traditional physical anthropology publications do not typically publish contextual bioarchaeology papers, it is the case that there has been research published that is in line with the goals of contextual bioarchaeology. For example, Blakey (2001) has emerged as a prominent figure as a bioarchaeologist working on the African Diaspora. He has been critical of physical anthropologists who take a strictly “forensic” approach to their analyses of burials. Although he examined differential health in slave and freed slave cemeteries, Blakey argued that the historic context is important for understanding the health of past individuals.

Charles and Buikstra (1983) employed Goldstein’s (1981) postulates of mortuary behavior to devise a regional interpretive model for resource competition by focusing on the spatial distribution of Archaic mortuary sites. The manuscript contributed greatly to our understanding of burial programs and settlement patterning and how this information can aid in the reconstruction of population structure. Also important is that, during the Illinois Valley terminal Archaic, the mortuary program tended to be bimodal where a minority of the community, those deemed productive in the subsistence economy, were buried in the bluff-top cemeteries, and the infirmed tended to be buried in the middens associated with the village (Buikstra 1981).

In another study, Charles and Buikstra (2002), in their diachronic assessment of social change from the Archaic through the Mississippian periods in the Illinois River Valley, found that as mobility decreased and sedentism increased, there was an associative increase in the display of visible burial tumuli on bluff tops. They interpreted the visible cemeteries as a link to the land by reference to the ancestors. Further, through time there was an increased reuse of the same mortuary sites. Charles and Buikstra (2002) concluded that the space and place of death are vital for understanding the long-term changes in the mortuary program. Further, it was observed that changes in the mortuary program reflected social, economic, political, and demographic conditions. Finally, the mortuary program was one way that groups negotiated political and social power in a region.

Another notable example is presented by Margerison and Kneusal (2002) who analyzed two historic cemeteries in London, including one that contained interred plague victims. The structure of the cemetery was composed of mass burials up to five bodies thick with an unusual representation of individuals between the ages of 25 and 35 years. Also unusual, was an unexpected frequency of individuals between the ages of 20 and 25 years. The authors contend that this is the age in which most people working in London were migrants and did not have families in the vicinity. Therefore, these individuals disappeared into the countryside due to the threat of death. This study has the advantage of relying on historic documentation as an avenue to reconstruct the cemetery structuring.

This train of thought could be extended to North American prehistoric bioarchaeology where the physical anthropologist primarily relies on context and the mortuary program to make interpretations about the past. Rather than, relatively simplistic regimented ecological studies concerning differential access to resources, status differences, and division of labor, it might be more fruitful to understand these processes in the historic and agency driven contexts in which behavior occurred. Put simply, there may be other stressors that were culturally driven, rather than simply as a consequence of dietary stress.

Other than solely identifying the dimensions of burial, that is the cultural treatments and final disposition of the dead, this research also explores the use of and disposition of other features in the mounds as potentially meaningful symbols of the overarching ritual system. These non-biological features within the mounds may carry the same symbolic meaning as the bodies themselves. This idea is not proposed in the absence of evidence. For example, it has been noted that other features such as intentional ceramic depositions, stone altars, earthen fireplaces, and clay and pebble cists are found in the same positions in mounds where bodies are found (Goldstein 1995). They may symbolize the group, an individual, the ancestors, the community, or some combination of the above; the same way a human body could be represented.

2.4.1 Sampling bias

Before performing any analysis of mortuary behavior, the sample characteristics, particularly potential biases, must be investigated. The bioarchaeologist *must* assume that every mortuary sample is biased, subject to natural and cultural factors that introduce bias. Without understanding site formation and transformation processes, we cannot assume a sample is representative of the biological population. Another issue concerns the cultural determination for who gets buried, how they get buried, where they get buried, the postmortem treatment, and what skeletal elements were selected for burial. There should be some attempt to understand the source of bias, whether natural or cultural.

Along with understanding the sociocultural systems that were involved with the disposal of the dead, it is clear that a contextual bioarchaeology is important for understanding that very rarely do physical anthropologists have access to a representative sample of the population. Instead, they commonly encounter a collection of individuals that a) happened to be encountered archaeologically, b) were chosen by the living to be buried within a certain context (e.g. a cemetery or under residence), c) were culturally selected for specific postmortem treatment, d) were recovered and recorded by the archaeologist, e) underwent differential taphonomic processes, f) may have included the selection of certain skeletal elements to be included in burial. For this study, probably the most important bias is found in the archaeological methods that were employed. First, not all of the mounds were sampled and it is unclear how the individual mounds were chosen for sampling. Second, the mounds were not completely excavated but were typically “trenched” in areas where features had been found in the past. Both of these issues could, and likely have, created important confounders in this study.

It was a focus on paleodemography and paleopathology in the late 1980's and early 1990's that promulgated a concern with sampling of the burial series and an overall concern with a representative demographic profile of the biological population as opposed to a biased segment of the biological population. In physical anthropology this spawned what was to be termed the "osteological paradox" as articulated by Wood et al. (1992). The original concern for sampling bias grew out of studies on paleopathology but can be translated to any biological dimension of the sample. Wood et al. (1992) identified several problems with paleodemographers and paleopathologists inferring disease prevalence and patterns in archaeological skeletal samples. Specifically, the problems inherent in demographical research were "demographic nonstationarity, selective mortality, and unmeasured, individual-level heterogeneity in the risks of disease and health" (Wood et al. 1992:343)." Demographic nonstationarity is defined as a departure of the population from the stationary state in which there is a change in the population structure through migration and fertility and mortality rates. Selective mortality refers to the observation that the sample is composed of the individuals who died from a disease or stressor but does not account for all the individuals at risk for disease or mortality. This could result in an overestimation of pathological conditions or other biological features to be analyzed. Finally, hidden heterogeneity refers to varied prevalence in frailty or susceptibility to morbidity and death which could be caused by socioeconomic status, genetics, and temporal differences in health. Hidden heterogeneity refers to the inherent bias of having a burial sample from an unknown mix of individuals.

In her study of two Archaic sites in Illinois, Buikstra (1981) presented clear evidence for how sampling bias could be extreme if archaeologists and physical anthropologists do not account for the entire burial program. In this study Buikstra demonstrated that there was a duel mortuary program in which part of the community was interred on the bluff top and part of the community was interred on the valley bottom. Only through a contextual analysis of human remains can we begin to discern some of the inherent biases in this type of research.

Historical and ethnographic studies can help to understand the potential sources of bias. Mary Jackes (2011) gives an historical example of the changing mortuary pattern in St. John's Church, Ashfield, Sydney, Australia. In the early period the church was the center of the community but as the community expanded other cemeteries and churches were established. The church cemetery had been in use from the mid 1800's to the mid 1900's. She demonstrated that changing social conditions had an effect on the demographic profile of the cemetery. The period encompassing 1840-1890 reflected a U-shaped curve, wherein the very young and old were represented in higher frequencies. This is a pattern an expected for most communities. In the later period there was a shift to a general bell curve skewed to the older age categories; when life expectancy increased. When the historic information was considered the following observations were made to explain the biased sample. First, many young adult males died and were buried elsewhere during World War I. Second, during the early 1900's many of the individuals of reproductive age migrated to industrial centers, thereby reducing children and young adults in the community. Third, preference for burial in the original church cemetery changed in the later period. Other churches and secular cemeteries became preferred locations for burial of middle and upper class individuals after 1900.

Both of these studies reveal that without context, or at least an attempt at understanding social processes of the community, one cannot understand the demographic profile of the sample.

Another source of bias resides in the osteological methods. Although Wood et al. (1992) claimed that estimation of age was no longer a problem in anthropological studies, many have pointed out that estimations of age are population dependent (Konigsberg et al. 2008; Jackes 2011). Bayesian formulae have been designed to smooth the data and take into account the age structure of the study population.

More specifically, if we look at the effects of taphonomy and the differential preservation of bones between sites, we realize that not all methods may be applicable for determining age and sex (Jackes 2011). In other words, assessment of the demographic profile is not equal across the sample. This is most evident in the Effigy Mound sample, where there is differential preservation and the real possibility that not all skeletal elements were selected for burial, which could introduce additional bias into the sample. Nevertheless, in this situation, the investigator is faced with the fact that, although all potential age indicators are used for assessment, not all indicators are equally reliable. The difficulty with this is that any assessment of age or sex is population dependent, and in fact, it is the sample itself that determines the parameter (demographic profile) of the age categories and the assessment of sex. Most skeletal biologists agree that it is best to use a multifactorial approach when assessing biological indicators of age and sex (Konigsberg 2008).

In her chapter “The Formation of Mortuary Deposits: Implications for Understanding Mortuary Behavior of Past Populations”, Weiss-Krejci (2011) described the potential inherent biases in various mortuary programs. First, many cultures define what is a good death and a bad death. Therefore, circumstance of death may determine the death rituals and some individuals may not be included in the mortuary context if the circumstances of death were not appropriate. Second, the funerary cycle can introduce bias in that the funerary rules for final disposition are temporally variable. In some cultures rituals may precede death, come at the time of physical death, or when the descendants have declared the death; sometimes well after death occurred. The funeral may include the immediate separation or transformation of the individual’s identity or it may include the reintegration of the individual into the community through various secondary treatments. In addition, bodies may not be represented at all, but other objects may be used to symbolize the transition of the living into the dead. Third, the treatment of the body after death introduces bias due to bodily manipulation after death. Sometimes remains are stored indefinitely by the descendants and sometimes the remains may be stored, buried, or cremated after death and later buried in another funerary context. Another important point here is that certain skeletal elements may be selected for burial. Further, different elements from the same body may undergo different types of treatment ranging from immediate burial of some elements to cremation of selected elements and burial of others. Finally, the context of burial is important in providing clarity for why some bodies or elements are included but the context of burial may convey specific meaning in a given burial program pertaining to individual or collective identity.

In the context of Effigy Mound mortuary behavior it is important to consider all possibilities of bias. It is generally agreed that that not all individuals were chosen for burial in the Effigy Mound sites (Birmingham and Eisenberg 2000; Goldstein 1995; Lackey-Cornelison 2012). Considering the biased nature of the Effigy Mound mortuary program it is important to understand the various natural and cultural processes that influence what the archaeologist actually has to analyze. For example, Lackey-Cornelison (2012) found a low frequency of individuals exhibiting debilitating pathology and healed trauma from Effigy Mound sites. In addition, no individuals with healed trauma were included in the zoomorphic mounds. This may provide valuable insight into whom or what bones might be excluded from burial in this mortuary program.

It is only through a contextual bioarchaeology that we can begin to understand the natural and cultural biases in the mortuary program. We must remember that, although there may be rules guiding ritual and mortuary ritual, individual groups and spiritual leaders are making decisions about the details of the ritual. The selection and maintenance of the ritual cycle for an individual or group of interred individuals can be understood through the recognition that, from the beginning of the investigation, the sample is biased. It is the bioarchaeologist who can assist in elucidating some of the sources of bias.

2.4.2 Effective Use of Indicators of Biological Distance

An important line of inquiry in this study is to determine whether Effigy Mound groups were constructed, maintained, and occupied by a corporate group which asserted its rights to critical resources in the area, specifically a corporate group composed of a single or related lineal group with a lland tenure oriented social organization. Some studies have suggested this form of social organization utilizing mound form (Mallam 1976; Goldstein 1995; Rosebrough 2010) and others have relied on ceramics (Hurley 1976; Rosebrough 2010) to suggest a lineal based corporate group social organization for Effigy Mound peoples. This study uses multiple lines of evidence to investigate whether the mound groups' social organization was structured in this manner. This study analyzes the pattern of burial and disposition of other ritual features in the mound to examine whether the mound groups were built and maintained by lineal groups. As an independent test to determine whether there was a heritable component to Effigy Mound social organization, this study will conduct epigenetic biodistance analyses on the skeletal remains. This section outlines the benefits, limitations, and contributions of the biodistance analysis to social organization of the Effigy Mound peoples.

Epigenetic traits, ancient DNA, and isotopic analyses are methods used to investigate patterns of population genetic stability, migration, and gene flow. The methods may also be used to understand cultural proximate causes of epigenetic patterning within and across populations. Metric and epigenetic analyses have the same goal essentially, to infer biological distance and explain or interpret cultural processes or environmental processes that occurred to explain the observed biological distance. This study focuses on the use of cranial and infracranial nonmetric skeletal traits as one way to understand the relative cohesiveness of these Late Woodland groups, as represented by the Effigy Mound groups.

A basic assumption of epigenetic analyses is that the traits under study are under genetic control, and therefore, can be used to infer genetic relationships on several different population levels (Jantz 1994). Given this basic assumption, the scope of various types of analyses include: measurement of worldwide genetic relationships for questions of origin, synchronic regional and intra-population biological distances and diachronic models of genetic change within and across regions. This research uses epigenetic data to examine whether mound groups were maintained by lineal groups.

Epigenetic analyses must begin with an investigation of the potential sources of biological variation. The primary sources of variation include age and sex. The epigenetic analyst generally attempts to identify those traits that differ significantly between sexes. These traits are generally eliminated from the analysis. Many of the studies make some assumptions about the raw data, in terms of the degree in which genes, the environment and culture effect morphology. Some authors (Fulginiti 1993; Rothhammer and Silva 1990) go to some length to filter out the potential environmental and cultural influences on the expression of traits. This is particularly important because, in these studies, biological distance is presumed to be a proxy for genetic relatedness. Most studies attempt to filter out or attempt to control for traits that may be effected by sex, age, or the environment (e.g. Saunders 1976; Buikstra 1972; Hanihara and Ishida 2001; Stojanowski and Schillaci 2006; Narayana et al 2007).

As stated earlier, a skeletal sample does not necessarily reflect or indicate a breeding population. The samples are typically accumulated over long periods and may not represent an accurate demographic profile of a population at any point in time. Ideally, good temporal control is important for understanding whether the biological structure of the population is contextualized diachronically and synchronically.

Many studies (Sciulli 1990; Connor 1990; Owsley 1981; Sutter and Verano 2007) focus on intra-regional, inter-site, and intra-site differences. What is measured is the biological distance of groups separated geographically and/or temporally. Typically, the hypotheses are derived from archaeological interpretations of social interaction and migration. In some instances archaeological interpretations are disputed if the biological/phenotypic data contradict them. A sampling of a few of these studies will provide a backdrop for understanding this approach, its use, and some of the problems implicit and explicit in this type of research.

Through epigenetic and craniometric analyses Sciulli (1990) compared the Ohio Duff Cemetery to eight other skeletal samples from Ohio. He concluded that the more geographically disparate sites are from each other the more heterogeneous they become. In a more detailed epigenetic analysis Conner (1990) examined several Early to Late Woodland skeletal samples throughout southern Illinois. The important point was that the diachronic and synchronic pattern of biological distance was more important than the specific observation of biological distance. Employing a biological distance matrix analysis he found greater heterogeneity between Early and Late Woodland sites. The samples became more homogeneous between the Middle and Late Woodland. He inferred that the homogenizing effect was due to increasing population sizes and social interactions at that time. His thesis stressed the need for physical anthropologists to coordinate with archaeology in order to fully understand the processes of change in skeletal samples.

In an interesting demonstration of the utility of biological distance studies Owsley (1981) attempted to identify the origin of a sample from the Mobridge site to a specific part of the site. Owsley argued that if biological distance studies are to have utility, physical anthropologists should be able to situate non-provenienced samples with a sample of known provenience. In the 1920's WH Over excavated a burial area at the Mobridge site. He reported that the area he was working in was north of the village site. Only three burial areas were known at the site, one east of the village, one west of the village, and one north of the village. Owsley compared the Over sample to these three known samples and found that it did not cluster with any of them. Since all three burial areas represent unique morphologies, Owsley suggests that Over's sample most likely came from a different burial area within the site.

More recently, epigenetic data has been used in identity bioarchaeological research. Not unlike this research, others are using multiple lines of evidence to investigate ethnicity using a combination of epigenetic data, isotopic analysis, ethnohistorical texts, historical texts, and the archaeological contextual data (Knudson and Stojanowski 2009; Stojanowski 2009; Nystrom 2009; Sutter 2009).

Identity research in bioarchaeology considers individual, community, and ethnic identity as exemplified by Knudson and Stojanowski's (2009) volume, which is divided into two parts: studies focused on community and studies of individual identity. The chapters by Stojanowski (2009), Nystrom (2009) and Sutter (2009) apply biological distance analysis along with archaeological, ethnographic, ethnohistoric, and settlement data to examine ethnogenesis in three different societies.

Using dental epigenetic data Stojanowski (2009) examined the remains from late precontact, early mission, and late mission periods in Spanish La Florida (14^{th} -18^{th}

Century). He found there was greater genetic variability before contact and during the Early Mission periods. In the Late Period he found a decrease in variation. Using historic, archaeological, ethnographic, and settlement data, he concluded that during the early to contact periods earlier ethnic distinctions loosened. During the late contact period new alliances and connections developed and then stabilized resulting in decreased genetic variability. Out of this a new identity developed for these groups, suggesting a pan-Spanish Indian identity which resulted in the contemporary Seminole.

Nystrom (2009) investigated ethnicity and the impact of biological and cultural dimensions of ethnicity for the ethnogenesis of the Chachapaya of Peru before, during, and after the Inka conquest using cranial epigenetic data. Ethnohistoric and archaeological evidence suggested that the preconquest Chachapaya were a heterogeneous group, composed of at least 22 ethnicities and with restricted gene flow in a north-south direction. Before and after Inkan conquest, the genetic structuring of the groups correlated with geographic distance, with the most northern groups greatly differentiated from the most southern groups. Although the Chachapaya adopted Inkan architecture and political economy, there was very little change in their population structure. The incorporation of the Chachapaya with the Inka, through selective enculturation, allowed the Chachapaya community to coexist without affecting the genetic structuring. There is clear evidence that the Chachapaya adopted Inkan architecture and textile and ceramic motifs, but no evidence that this affected gene flow in all three regions. Therefore, for the Chachapaya ethnogenesis proceeded with the selective adoption of Inkan cultural traits.

These chapters did not focus on heritability alone, allowing the investigators to infer causes for the way social units and social form changed in an environment of ethnogenesis (Knudson and Stojanowski 2009). Also important is that a diachronic approach was preferred because it allowed for understanding evolutionary change within a social and historic context. Both of the above studies examined biological change as a result of expanding imperialism and the resultant ethnogenesis. This study uses epigenetic traits in the same manner, by using them as a tool for understanding societal organization, specifically whether the mound groups were built and maintained by closely related lineal groups.

In this area, just as other areas of bioarchaeology, bioarchaeologists should consider biological and cultural influences. It is only through careful examination of demography, population structure and cultural interaction that we can examine not just biological distance, but the social processes and patterns effecting biological distance.

Relevant to this study is that ethnic identity is complex, historically embedded and subjectively dependent on the level of inquiry (i.e. local, regional, etc.). Epigenetic data and biodistance analysis is used as one tool to examine group identity and cohesiveness. As the above studies demonstrate one cannot proceed with a meaningful analysis of the genetic structuring of a population without considering the cultural causes and consequences.

2.4.3 Contextualizing Late Woodland Effigy Mound Peoples

Before discussing how bioarchaeology and mortuary archaeology can contribute to our understanding of the social organization of Effigy Mound peoples, it is important to briefly review environmental and social conditions from the Middle Woodland to the Late Woodland in the Midwest in general.

The Late Woodland period in the Eastern Woodlands is a period of dramatic change and extreme variation. Milner (2004) characterized the Late Woodland as a period of increasing territoriality, the emergence of segmented societies, the dispersal of settlement patterns from primary river valleys to uplands and secondary tributaries, the emergence of villages, and a general increase in the reliance of domesticates. According to McElrath et al. (2000), unlike other formally recognized periods, the Late Woodland can be characterized as a period of cultural variability, a tendency towards regionalization, shifting centers and peripheries, and population fluctuations. Settlement systems varied from fixed agricultural settlements to semi-sedentary hunter-gatherers to fortified villages. Mortuary programs ranged from the highly visible communal facilities to the archaeologically invisible.

For the Southeast, Nassaney and Cobb (1991) support the claim that there was great variability in the subsistence, settlement, exchange patterns, and demographic patterns in the Late Woodland. They argued that the Late Woodland Southeast did not represent a collapse of earlier Middle Woodland social organization, but a stabilization of an earlier egalitarian period that relied more heavily on interregional alliances. The same holds true for the upper Midwest, where there seemed to be communication and exchange of ideas that, although loosely articulated, there was interregional coordination of ritual and economy (Rosebrough 2010). Further, in her analysis of ceramic materials and style, Clauter (2012) found that there were different levels of interaction within and between regions of southern Wisconsin.

The northern extremities (Michigan, Wisconsin, Ohio, and Minnesota) of the Eastern Woodland were quite variable during the Middle to Late Woodland periods. One of the most prominent features of the Late Woodland was the abundance of earthworks in Wisconsin and northern Iowa. Birmingham and Eisenberg (2000) summarize the distribution, forms, proposed meanings, cultural significance and function of the effigy mounds.

This dissertation builds upon the early descriptive works of Taylor (1838), Squire and Davis (1848), Lapham (1855), Locke (1840), Thomas (1894), Mckern and Ritzenthaler (1949), as well as later works by Hurley (1975) Rowe (1956), Goldstein (1995), Mallam (1976), Rosebrough (2012), Clauter (2012) and Lackey-Cornelison (2012).

Early Effigy Mound research began 150 years ago with an antiquarian interest to determine whether Indians built the mounds and to document and survey the mounds before they were destroyed by the agricultural industry (Hurley 1975). Hurley (1975) divided the history of Effigy Mound research into three broad categories; 1836-1919, 1919-1956, and 1956-1972. The initial period (1836-1919) is characterized as the acknowledgement and description of the mounds. Although Taylor (1838) was the first to survey and publish descriptions of mounds from Dane County, Wisconsin, Increase Lapham's (1855) treatise was the first systematic survey and documentation of the effigy mounds of Wisconsin and remains a valuable resource today. Since that time, Lapham published his survey of the mounds, most of the mounds and mound groups had been destroyed, primarily due to agriculture and infrastructure projects. John Locke (1840) also surveyed and crudely measured several mound groups. The goal of both

Lapham and Locke was to survey and document the mounds before they were destroyed by agriculture. Relying on previous surveys, Squire and Davis' (1848) objective was to present evidence for the mound builder myth. It was their belief that Native Americans were not responsible for the mounds, but some other extinct race. In reaction to this, the Bureau of Ethnology, Smithsonian Institution, arranged for Cyrus Thomas to head an expedition to determine who the mound builders were. Thomas (1894) completed a thorough survey and description of the mounds, described the construction process of the mounds, and documented the geographic range of the different types of effigy mounds. Thomas supported the idea that Native Americans constructed the mounds and that the mounds were not of great antiquity.

A second period (1919-1956) of research into effigy mounds consisted of survey, excavation and search for habitation sites. W. C. Mckern, of the Milwaukee Public Museum, conducted a state-wide survey of the effigy mounds of Wisconsin that involved test excavations of mound groups along an east-west transect across southern Wisconsin (Hurley 1975). This resulted in the publication of effigy mound trait lists including; stone tool types, ceramics, burial practices, and subsistence patterns (McKern and Ritzenthaler 1949).

A third period (1956-1972) is characterized by research questions pertaining to dating of the Effigy Mound sites, subsistence and settlement patterns, belief systems, and social organization (Hurley1975). Rowe (1956) attempted to describe subsistence and settlement patterns, belief systems, and developed trait lists for the Effigy Mound peoples. Hurley (1970) focused on research conducted over the previous 100 years on two sites in Wisconsin to analyze and draw inferences about the material culture of the

Effigy Mound peoples. He primarily focused on habitation, burial patterns, and settlement patterns. Mallam (1976) was the first scholar to systematically study mound groups in Iowa with the goal of making interpretations about the function and interpretation of the Effigy Mound phenomenon. He proposed that the mound groups functioned as multipurpose seasonal aggregation centers where groups coalesced during resource rich times of the year.

Some believe that there were at least two Late Woodland cultures, each with its own settlement pattern, in this region (Salkin 1987), and described two separate Late Woodland phases in the region at this time. According to Salkin (1987), the Effigy Mound manifestation is represented by the Horicon Phase in Dodge County from AD 650 to AD 1200. It is characterized by short-term seasonal camps, little evidence of house structures, shallow cooking pits, a hunting-gathering-fishing subsistence pattern, the construction of effigy earthworks, secondary burials as the dominant burial form, and Madison ceramics. The second tradition, the Kekoskee Phase arose around AD 800 and lasted until AD 1300. This phase was characterized by semi-permanent villages, evidence of keyhole habitation structures, large storage pits, and a hunting-gathering-fishing subsistence pattern supplemented by the use of some domesticates, non-mound flexed burials, and collared Madison ceramics (Salkin 1987). However, according to Rosebrough (2010) there is no evidence that both of these groups were not participating in Effigy Mound ritualism. When she investigated the ceramic evidence, although some regions were dominated by a particular ceramic form and style, not one site or region could be definitively assigned to the traditional notions of an "Effigy Mound Tradition" if Madison ware alone were used to define a site. In fact, Salkin presents no clear evidence that links either site to the builders of the effigy mounds.

What is unclear about the Effigy Mound peoples is what the dispersal pattern was during those times of the year that would not permit a large group to inhabit Effigy Mound sites (Birmingham and Eisenberg 2000). Although occasionally associated with Effigy Mound groups, few habitation sites have been located (Birmingham and Eisenberg 2000). Related to this, it is unclear what the seasonal cycle was and how people settled onto the landscape during the fall and winter months. Rosebrough (2010) proposed that certain segments of the community stayed near the Effigy Mound sites, while others dispersed across the landscape in the winter months.

Mallam (1976) tested several hypotheses driven by the cultural ecology paradigm and found that the earthworks could be regionally analyzed to infer the social organization of the Effigy Mound peoples. First, Mallam (1976) and later Benn (1979) suggested that the mound groups may have been associated with different lineages within a larger society. Although most of the mound groups shared the same effigy forms with other groups, certain forms tended to be more prevalent at each site. Hurley (1975) also found that there was systematic variation between the Effigy Mound groups when one looked at mound features and artifacts. Second, Mallam (1976) found that the Effigy Mound complexes were associated with areas that would have served as seasonally rich resource areas. Mallam (1976) and Benn (1979) speculated that the Mound complexes probably served as corporate ceremonial centers for gathering, resource exploitation, and burial of the dead. The visibility of the mounds probably served as territorial markers, asserted through reference to ancestors buried in the mounds.

Similarly, in her analysis of the Effigy Mound manifestation of southeastern Wisconsin Goldstein (1995) asserted that intersite and intrasite spatial and structural relationships within a region can provide insight into territoriality and the corporate group. She further stated that the mounds themselves (i.e. the sites) should be treated as artifacts within a larger site or region. In her analysis of the Effigy Mound groups of southeastern Wisconsin Goldstein found that the type of effigy that dominated a mound group tended to correlate with the dominant natural resources in a given area. Based on her analysis, she concluded that the mound groups may have served as resource maps.

Three recent studies have investigated the social organization of the Effigy Mound peoples. One important contribution by Rosebrough (2010) is that each subregion in southern Wisconsin could be divided up by dominant ceramic styles and effigy mound forms. Her dissertation established for the first time that the Effigy Mound peoples shared only one common denominator; the construction of effigy mounds in groups. According to her, there are no other features that can be seen as a universal Effigy Mound trait. Thus we see the emergence of several ethnic or local identities in this Late Woodland phenomenon that has been traditionally united under one cultural umbrella.

Individual and community identity is a complex issue that Rosebrough has methodically and theoretically demonstrated (through ceramic analysis) in her dissertation. Salkin's and Hurley's work has essentially contributed to the notion of two synchronically different groups, one that could be attributed to a single Effigy Mound culture and one that was not. According to Rosebrough, there was no empirical reason for doing so. In her study she finds variation within Late Woodland habitation sites and links this variation to the Effigy Mound sites proper. In other words, the variation that is observed is localized and can be correlated with the frequencies of styles within a given area. Therefore, what others have observed as ethnic differences were likely local differences in style within a broader overarching ritual system.

Using ceramic manufacture and style from Effigy Mound sites, Clauter used a territorial model that included a monolithic system, a Low-level Territorial model, and High Level Territorial model. Clauter (2012) found, based on ceramic manufacture and style, that there was differential interaction throughout southern Wisconsin in the Late Woodland. Clauter found that the western groups were generally distinct from the central and eastern Effigy Mound groups, with less variation in south-central and southeastern Wisconsin. In her territorial analysis, Clauter identified the Effigy Mound peoples at as Low-level Territorial which is a territorial model that does not strictly prohibit participants from ranging and interacting with others in other territories. She also found that there was great variability in interaction among Effigy Mound peoples.

Lackey-Cornelison's (2012) dissertation represents one of the few accounts of an Effigy Mound contextual bioarchaeological approach. In her regional study of seven Effigy Mound sites, Lackey-Cornelison considered both biological and ritual traits in Effigy Mound ceremonialism. The skeletal data included determination of age and sex, determination of minimum number of individuals per mound, and severe debilitating pathology. Contextual data included mound form (effigy vs. geometric forms), burial disposition (primary vs. secondary postmortem treatment), and other ritual paraphernalia in the mounds.

In considering whether there were age and sex demographic differences between effigy and geometric forms, Lackey-Cornelison found no significant differences, concluding that these life statuses did not preclude an individual from being interred in either mound type. Analysis of whether there were significant differences for MNI between effigy and geometric mound forms, Lackey-Cornelison found that geometric forms held more individuals than effigy forms. Examination of whether there was a significant difference between effigy and geometric mound forms for the disposition of burial, Lackey-Cornelison found that geometric forms held many more secondary burials. The former two findings led her to conclude that the geometric forms likely represented the corporate group. By contrast, the increased number of primary burials in effigy forms suggested that individuals interred in effigy mounds may have represented a masked hierarchy, in which these were individuals of special status in the community, likely shamans or ritual leaders.

This research is important because, much like this research, it considers the burials and the biology represented in those burials as material artifacts that are part of an overarching ritual program in which: not everyone was included; inclusion was likely limited by circumstances of life and death; there was a divided burial program which partitioned the community along secular and ritual statuses; burial disposition carries with it a symbolism that can only be interpreted within a larger cultural context; and that a regional level of analysis is a preferred form of inquiry to investigate whether there is potential bias and variation within a community that is socially embedded within a larger religious movement.

2.5 Conclusion

The Effigy Mound groups, burials, and cultural features provide an opportunity to apply Goldstein's Hypothesis 8 (1981) because it is unclear what specific form of sociocultural system existed for these people. Effigy Mound peoples may have been structured by a clan or moiety social system. The archaeologically observable features of the Effigy Mound mortuary program included mounds as one means of disposing of the dead, yet not all Effigy Mounds contained burials or any other features. This suggests three possibilities including, (1) the mound groups themselves could represent a bounded cemetery, (2) each mound could be viewed as a bounded cemetery, and (3) the mound groups do not represent a bounded cemetery at all, but rather reflect a mortuary program that is incorporated into an overarching ritual system that sometimes uses human remains as a symbolic representation of the corporate group. In other words, we are only observing part of a larger ritual that gets played out behaviorally and materialistically (Morris 1992).

This dissertation asks whether the people who built effigy mounds were part of a sociocultural system that was governed by lineal descent and whether it is the descent groups that were maintaining the mound groups. These mound groups were demonstrably as different within regions as they are across regions. Goldstein (1995) and Rosebrough (2010) suggested that, based on mound form predominance in mound groups and regions and a general clinal pattern of effigy mound forms, the mound groups are likely the product of a corporate group social structure managing and staking claim to territories and the scarce resources in those areas in a lineage oriented land tenure system. This is one of the principles this research will address. The difference is that this analysis will examine variation in the dimensions of burial (postmortem treatment and vertical and horizontal position in mound) and other features (frequency of type and vertical and horizontal position in mound). That is to say that the lineal groups managing the specific mound groups ritually symbolize their dead and other sacred features (mounds and internal mound features) as a way of communicating and symbolizing identity that is unique from those around them.

In short, this dissertation research investigates the social organization of the Effigy Mound peoples by incorporating aspects of what have traditionally been described as processual and postprocessual theoretical approaches. Specifically, the initial research by Saxe (1970), Binford (1971), Mallam (1976), Goldstein (1995), and Lackey-Cornelison (2012) informs the empirical approach of this research with the idea that the mortuary program, on some level, provides a means through which to explore society through burial and ritual. Practice theory enables variation in the burial program to be explained from an agent driven perspective; agents include both community agency and individual agency. These concepts will be used to examine both systematic variations in the dimensions of the mortuary program of the people who built effigy mounds in Wisconsin, and also provide explanations for the inherent idiosyncrasies represented in the mound groups investigated here.

Chapter 3: Research Questions

3.1 Introduction

As stated in Chapter 1 and 2, this research takes a contextual bioarchaeological approach (Buikstra et al. 2011). Therefore, it is important to address these contextual and biological data in a manner which will elucidate sociocultural patterns and variation among Effigy Mound peoples. This chapter introduces the research questions posed in this study and describes the impetus for each question. It is generally understood that the Late Woodland period in the Eastern Woodlands was a time of climactic cooling and drying. As a result, there was a shift from the settlement pattern seen during the Middle Woodland period when larger habitation sites along primary riverine tributaries shifted to secondary tributaries and the uplands (Milner 2004; McElrath et al. 2000). It is commonly held that this Late Woodland shift in settlement pattern resulted in variability in the social systems, increased regionalization, and the emergence of segmented societies (Milner 2004). It is these shifts in settlement and social context that motivated this study. Applied to Effigy Mound cultural and biological material, it is expected that there should be great variability.

Chapters 1 and 2 emphasized that the studies that inspired the specific questions for this study arose from Mallam's (1976) and Goldstein's (1995) interpretations on the social organization of Effigy Mound peoples. They found that there were specific mound forms that dominated each mound group and broader regions of the Effigy Mound areas. Both of these studies found that the builders of the mound groups were likely semi-autonomous groups that returned to their perspective mound groups in the warmer months to engage in subsistence activities, ritual activities, and mound building and maintenance that, at least to some degree, incorporated mortuary ritual. Further, the prominence of specific mound forms built in specific mound groups indicated a corporate social organization based on one or a few related lineal groups.

This study applies similar logic by investigating the internal ritual and mortuary features of the mounds to understand the ritual structure, and by extension, the social organization of the Effigy Mound peoples. It has been demonstrated that the dimensions of the mortuary ritual and context can reflect the social organization of the larger society (Saxe 1970; Binford 1971; Brown 1971; Tainter 1978; Goldstein 1981; Braun 1981; Carr 1995). Further, ethnographic, ethnoarchaeological and archaeological studies of ritual and symbolism have demonstrated that the social organization is reflected in the ritual domain (Goldstein 1981; Howey and O'Shea 2006; Brown 1997). Dimensions of the mortuary domain that may be represented materially include: postmortem handling and treatment of the remains (Carr 1995; Buikstra and Scott 2009), positioning of the remains (Weiss-Krejci 2011), rituals surrounding the preparation for the burial space (Weiss-Krejci 2011), and the organization of the burial space (Goldstein 1980), the postmortem disposition(s) of decedents, and other ritual materials that may be funerary related.

3.2 Research Question #1

Among mound groups and physiographic regions of southern Wisconsin, is there clear patterning in the ***number and co-variation of features in mounds, and the vertical and horizontal positioning of internal mound features*** *(burials, earthen fireplaces, stone altars, clay and pebble cists, and ceramic vessels)?*

The impetus for Research Question 1 was driven by the observation of systematic patterning of burials, earthen fireplaces, stone altars, ceramic vessels, and clay and pebble cists in specific mound groups, as described in the archaeological reports (Barrett and Hawkes 1919; McKern 1928, 1930; Rowe 1956). Specifically, this question explores the frequency, co-variation, and spatial aspects of each mound group and how that may have varied among mound groups and physiographic regions.

The evidence that mound building was accomplished in one episode or season. Unlike other time periods in which mounds were accretional (built up over many years), Effigy Mounds were constructed within a short period of time. As such, mound construction and ritual inclusions were likely planned and structured before the mound was built. This structuring and inclusion of mound features was likely dictated by a spiritual leader who would have shared ritual knowledge (Pollock 2012). If a mound group involved multiple unrelated groups, one would expect great variation in ritual paraphernalia within the mound groups. If, on the other hand, mound groups were maintained by lineal groups, one would expect to find consistency and patterning of ritual behavior within a cemetery (Goldstein 1981). It may also be the case that there was an overarching ritual program, shared among all groups, but the items used in various rituals varied (Morris 1992). Variation may also be introduced by ritual specialists distinguishing themselves through creative symbolizing in the ritual context (Pollock 2012). Comparison among mound groups and physiographic regions could reveal patterning and/or systematic variation.

3.3 Research Question #2

Is there significant patterning (similarities and/or differences) in the postmortem treatment of burials among mound groups and the physiographic regions within which those mounds are found?

Research Question #2 considers ritual practices involving how decedents were ritually manipulated, processed, and interred. Others have investigated the ritual of secondary treatment of remains (Kuijt 2008; Chesson 2007). Some have studied secondary disposal of human remains as a measure of societal complexity (Schroeder 2001). Lackey-Cornelison (2012), in her analysis of the Wisconsin Effigy Mound sample, found that geometric mound forms primarily included secondary burials and effigy mound forms principally included primary burials. She argued that this may have reflected distinctions in social position such that individuals included in effigy forms may have held a ritual role in the community, while those interred in the geometric mounds were symbolic of the corporate group.

This study considers the disposition of the remains in a similar manner to that of Research Question 1. Specifically are these patterns within a mound group for the preference of postmortem treatment of remains interred in effigy and geometric mound forms. If patterns are present, it may be that the groups maintaining the mounds were organized by lineal descent. It may also demonstrate that, at the very least, mound groups were constructed and maintained by autonomous groups that were symbolizing the mortuary ritual to assert group identity.

3.4 Research Question #3

Are there patterns in the selection of effigy or geometric mound forms (with burial) with reference to sex and age? If these patterns exist, are they related to mound groups, mound form, and/or physiographic regions?

Goldstein (1995) and Birmingham and Eisenberg (2000) have made the observation that not all individuals were interred in the mound groups. Even if group numbers were relatively low, one would expect a greater number of individuals to be interred in the mounds. Therefore, it is probable that certain individuals were excluded from mound burial. If this was the case, then one would expect certain individuals to be excluded based on some status, possibly related to age or sex.

The impetus for this question stems from the idea that groups may have bestowed or denied access to mound burial for individuals based on age or sex. It is expected that if the ritual system was maintained by individual groups that there would have been variability in who was represented in the mounds and the form of the mound. In her examination of the skeletal material from seven mound groups, Lackey-Cornelison (2012) found no difference in the frequency of males and females in the mound groups between effigy and geometric mound forms. When Lackey-Cornelison (2012) explored the frequency of age classes in effigy and geometric mound forms she found that juveniles were underrepresented overall and that juveniles were more likely to be found in geometric mound forms. The exception to this was found at Nitschke where a comparatively large number of juveniles were interred in effigy mound forms.

In this study age and sex frequencies will be examined among mound groups and physiographic regions with the idea that, if the mound groups were maintained by specific lineal groups, then it is expected that age and sex differences may have limited membership in the mound groups, and that this may have been differentially represented among mound groups.

3.5 Research Question #4

Does the epigenetic structuring of these populations (at the level of the mound group and physiographic region) suggest the construction and maintenance of mound groups by lineal groups?

Research Question #4 addresses whether the mound groups were built and maintained by lineal groups by using phenotypic traits and attendant biological distance analyses. The basis of epigenetic analysis relies on the understanding that populations that exchange mates will be internally more phenotypically similar than other populations (Stojanowski and Schillaci 2006). Using these phenotypic traits to measure biological distance within and among communities is often used to infer the political and social structure of an archaeological population (Howell and Kintigh 1996).

This study argues that biological distance studies must *also* rely on the burial context to inform the social organization of a community. In this sense, this question shares the same goals as the previous questions in that it provides one way to biologically access social organization. In the same vein, Rosebrough (2010) using a stylistic analysis investigated ceramic attributes and mound form as a measure of population interaction. What she found was that ceramic types, styles and frequencies were more similar within narrow geographic areas, indicating regionally autonomous groups with smaller interaction spheres than one might have found in the Middle Woodland period.

To put this research question into a broader context, the Late Woodland period was a time of population dispersal, regionalization and the creation of segmented societies (Milner 2004). In this scenario, biological distance would be expected to increase as distance between groups increases. If it is the case that lineal groups built and maintained specific mound groups, the expectation is that those interred in the mound groups were phenotypically more similar than those interred in other mound groups. Applying this logic to physiographic regions, it is expected that individuals buried within mounds in a particular physiographic region will be more internally homogeneous than individuals from other physiographic regions.

3.6 Conclusion

The research questions were designed to gain an understanding of patterns and variability of the ritual program, and by extension, the social organization of Effigy Mound peoples. It has been observed that effigy mound styles varied among mound groups and regions, indicating that the mounds groups may have been built and maintained by specific corporate groups, and possibly corporate lineal groups (Mallam 1976; Goldstein 1995; Rosebrough 2010). Answering these research questions will enhance our understanding of the interaction spheres and social organization of Effigy Mound people by exploring the contextual and biological data found in the mounds. As such, this research intends to examine patterns and potential variability within and across mound groups and physiographic regions using the cultural and biological data contained in the mounds. The next chapter describes the materials used to answer the research questions, the methods for data collection, and the methods for analyzing the data.

Chapter 4: Materials and Methods

4.1 Introduction

This chapter will describe the materials and methods used to address the research questions in this study. This study used both biological and archaeological data. The biological data include age, sex and epigenetic/non-metric skeletal traits. Cultural/archaeological data included: the mound groups, excavated mound forms, features contained in the mounds, vertical and horizontal location of burials in the mound, and the disposition of the burials (e.g. primary, secondary, cremation).

Specifically, this study documented sex, age, and epigenetic profiles for each appropriate skeletal element, associated with the Effigy Mound manifestation, housed at the Milwaukee Public Museum (MPM). Sex and age were analyzed to derive the demographic profile of individuals buried within mound groups, physiographic regions and to explore potential systematic patterns in the burial program. Specifically, as outlined in Chapter 3, this study explores whether possible patterns and systematic variation exist among mound groups and physiographic regions in: a) the frequency, covariation, and location of features in the mounds; b) the frequency of age and sex classes interred in geometric and effigy mound forms; and c) the postmortem treatment of decedents and d) the frequency of epigenetic traits.

The research questions presented in Chapter 3 are based on previous research on the Effigy Mound manifestation that found systematic variation in the representations of mound form among mound groups and regions (Mallam 1976; Goldstein 1995) and parallel variation in the form and style of ceramics among the mound groups

(Rosebrough 2010). In fact, Rosebrough (2010), through her analysis of ceramic styles, demonstrated that mound groups were likely maintained by closely related families or lineages.

In this study the same logic is extended to other dimensions of the ritual setting including the burial context, context of other mound features that may have varied due to local differences in construction and management of the effigy mound groups, which may have functioned as high visibility territory markers in a lineage based land tenure system. In addition, biological distance analyses were used to test whether mound groups were constructed and maintained within the context of a lineage based social organization.

4.2 Mound Groups and Physiographic Regions

Three physiographic regions extend through southern Wisconsin, the Western Uplands, Central Plain, and the Eastern Ridges and Lowlands. These are largely defined by the underlying Precambrian, Paleozoic, and Cenozoic rocks. The southern Wisconsin landscape has also been greatly altered by glaciation, glacial retreat, the formation of glacial tributaries, erosion and wind and wave activity. Based on Lawrence Martin's (1965), *The Physical Geography of Wisconsin,* the physiographic regions are described below.

Effigy Mound sites located in the Western Upland physiographic province included: Trowbridge Mound Group (Trempealeau County), Raisbeck Mound Group (Grant County), and Polander Mound Group (Crawford County). The Central Plains physiographic province included the following sites from Marquette County: Kratz Creek Mound Group, McClaughry Mound Group, and Neale Mound Group. The following mound groups are located in the Eastern Ridges and Lowlands physiographic province: Kletzien Mound Group (Sheboygan County), Kolterman Mound Group (Dodge County), Nitschke Mound Group (Dodge County), and Big Bend Mound Group (Waukesha County). The mound groups and their excavations are described in detail in Chapter 4.

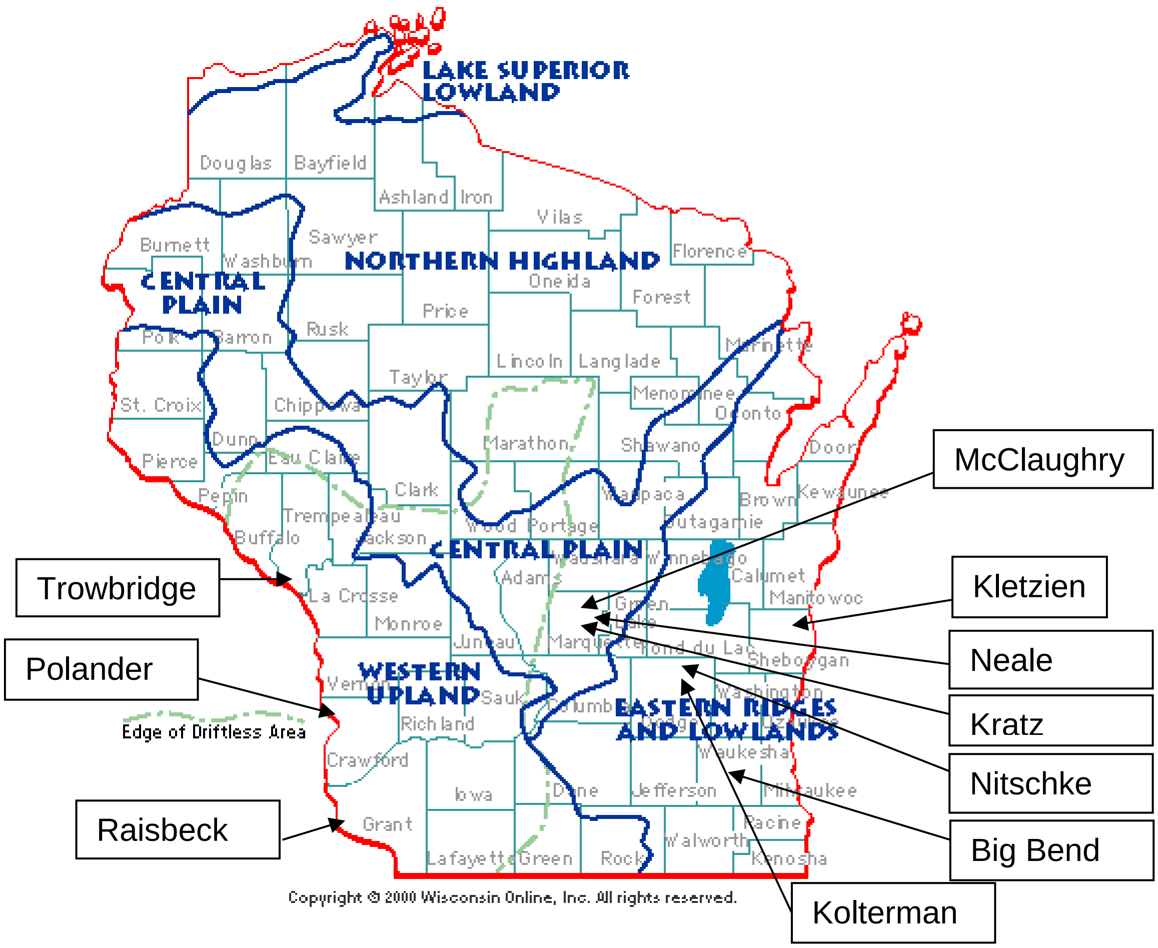


Figure 4.1. Map of Wisconsin physiographic provinces (regions) and the associated mound groups (from Wisconline.com). For interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this dissertation.

4.2.1 Western Uplands Physiographic Province (Region) (Figure 4.2)

In general, the Western Uplands are described as a dissected upland with elevations ranging from 900 feet to 1280 feet above sea level. The area exhibits a rugged and mountainous terrain with trenches and gorges. The topography is due to most of the area situated within the driftless area, an area that was spared from glacial effects during the last glaciation. The driftless area is located in most of southwest Wisconsin and parts of the Central Plain and Northern Highland physiographic provinces. Three factors resulted in the preservation of the Western Uplands during glaciation including: protection from the highlands to the north, the rapid movement of the glacier on the east and west sides, and glacial retreat at the same time the region was being surrounded.

There are two cuestas in this region. A cuesta is a ridge with a steep escarpment on one side and a long, gentle slope on the opposite side. The northern four-fifths of the driftless zone is located on the Lower Magnesium limestone cuesta and the southern one-fifth is located on the Galena-Black River limestone cuesta. Ridges and coulees dominate the Western Uplands. Some prominent features include; the Mississippi on the western margin, the Baraboo Range in Sauk and Columbia Counties, the Military Ridge, which divides the northern and southern tributaries flowing into the Rock River and Mississippi Rivers, and the Blue Mounds (flat-topped ridged hills), Platte Mounds, Sinsinawa Mound, and a large mound near White Oak.

It is should be noted that all three sites are situated on or near the Mississippi river. Although, not located on the ridge tops, they are located on prominent bluff tops within a short distance of riparian natural resources.

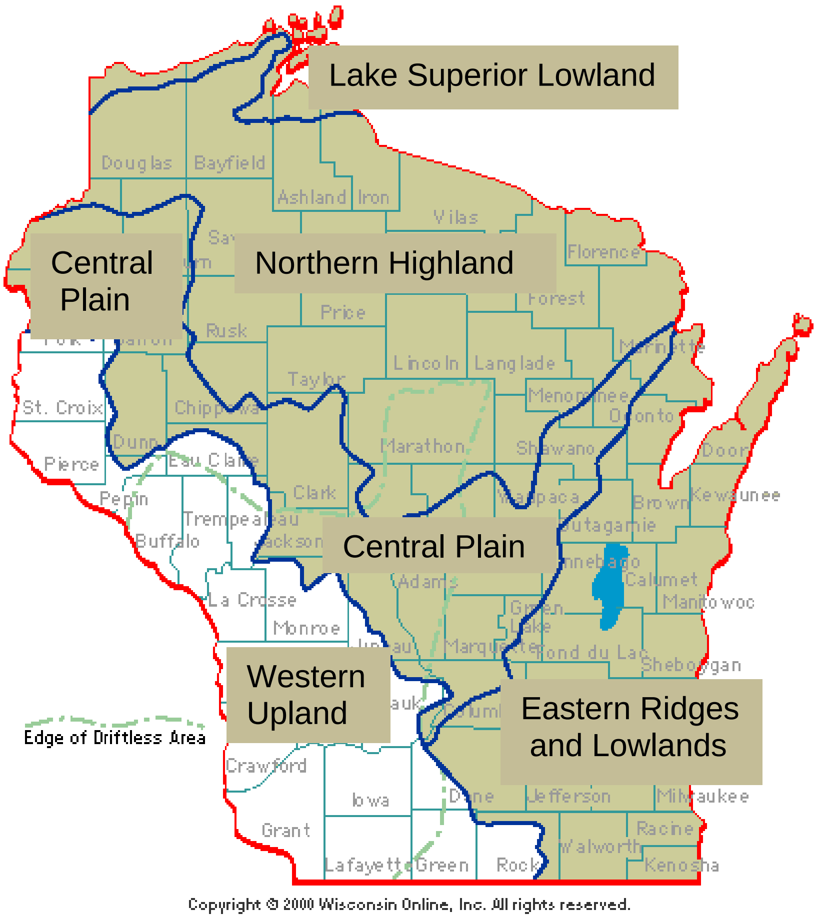


Figure 4.2. Location of Western Upland Physiographic Province (highlighted) - from Wisconline.com

4.2.2 Central Plain Physiographic Province (Figure 4.3)

The Central Plain is primarily characterized by rocky hills, sandstone crags, and gently sloping bluffs. The plain is made up of a Cambrian sandstone belt, roughly crescent shaped. The Central Plain is a region of gradually sloped, low hills created by river deposit, lake accumulation, swamp vegetation and glacial drift. It varies in elevation from 1242 feet at Cumberland in Barron County to 685 feet at Ellis Junction in Marinette County. Today, the region is not ideal for agriculture. The vegetation over much of the area includes evergreens on buttes and tamaracks of the northern forest.

The soil is sandy which promotes the growth of prickly pear and dwarf cacti. Much of the Central Plain is the result of alluvial infilling of valleys.

Primarily bluffs and steep slopes comprise most of the landscape along the western border of the Western Upland. The Central Plain was created through a combination of factors including glaciation, weathering, and wind and stream action. In the glaciated portion of the Central Plain there are flat-topped ridges and hills, commonly referred to as mounds (not to be confused with manmade earthen construction). Here, there are resistant sandstone layers that are slowly weathered and eroded.

The driftless area counties of Wood, Portage, Adams, Juneau, Monroe and Jackson were spared from glaciation. This portion of the Central Plain exhibits mesas, buttes, and pinnacles.

The remainder of the Central Plain, like the western portion, exhibits evidence of glaciation including: scoured out lake basins, undulating moraines, terminal moraines, outwash plains, and sandy soils. In general, there are not as many lakes compared to the rest of the state due to well drained sands. A notable feature is Lake Wisconsin, a glacial lake that originally covered a large portion of central Wisconsin. Today, this lake is represented as a large swampy area with granite, greenstone, sandstone and chert boulders.

All four sites in this study come from the central and southern portion of the Central Plain. The McClaughry, Kratz Creek, and Neal Mound Groups were all located in the Buffalo Lake area, an area which during the Late Woodland would have been a large marsh. As will be described in Chapter 5, while these mound groups tended to be located close to lakes, springs, and creeks, they were situated on bluffs overlooking bodies of water. It is likely these groups were exploiting the rich marsh and springs for their resources.

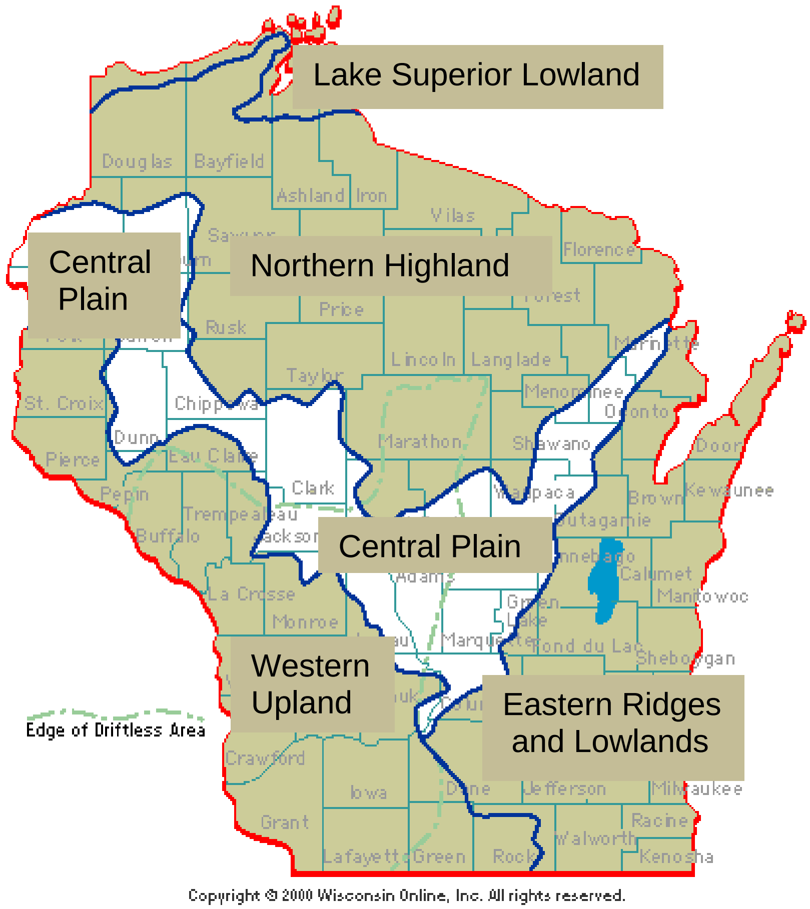


Figure 4.3 Location of Central Plain Physiographic Province (highlighted) - from Wisconline.com

4.2.3 Eastern Ridges and Lowlands Physiographic Province (Figure 4.4)

The Eastern Ridges and Lowlands physiographic region is characterized as a region of relatively level topography with fertile soil and moderate climate. The topography of this region is defined by three underlying cuestas. The steep escarpment was created from river and stream action eroding the softer bedrock, thereby cutting small valleys through the bedrock. The extreme western border contains the Lower Magnesian limestone cuesta and along the eastern border lays the Niagara limestone cuesta. Intermediate between these two cuestas lays the Black River and Galena Limestone beds on which Green Bay and the Lake Winnebago lowlands are contained. Occasionally, small beds of bedrock were left behind and today are represented by flat-topped buttes or mesas. Most of the cuestas were formed by the formation of glacial tributaries.

Glaciation greatly altered the landscape. There are approximately 1,400 drumlins (small hills of glacial drift) in a 4,200 square mile area. These hills are typically longer in one direction, indicating the direction the glacier was traveling. It is estimated that 100 to 200 feet of eastern Wisconsin was scraped away through repeated glaciation. Inorganic matrix left behind by the glaciers include: unsorted till, boulder clay, stratified gravel, sand and clay, limestone, shale, sandstone, and igneous and metamorphic rocks and copper from the north. Other notable topographic features created by glaciation include expansive ground moraines, kettle moraines, and outwash deposits.

All four mound groups in this study were found in the center of the Eastern Ridges and Lowlands region. Unlike the mound groups in the Central Plain, these mound groups tended to be associated with small creeks or rivers. The mound groups themselves tended to be oriented parallel to the tributaries on bluff tops. At Nitschke there was evidence of an ancient garden bed near one of the springs. Each of these mound groups is describe in detail in Chapter 5. It is likely that these groups exploited these streams and rivers for their riparian natural resources.

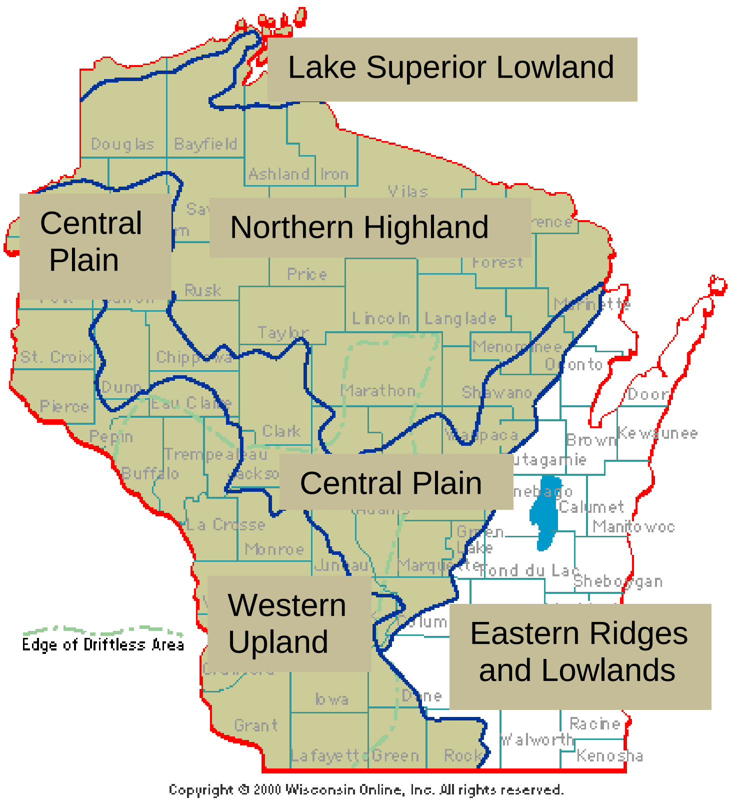


Figure 4.4 Location of the Eastern Ridges and Lowlands Physiographic Province (highlighted) - from Wisconline.com

4.3 Description of Cultural Variables

The cultural data used in this study was primarily drawn from published reports, MPM catalogues, MPM photographs, and field notes held by the MPM. In some cases the reports were relatively complete and descriptive. In a few instances photographs and field notes were used to document and describe the mound groups (See Chapter 5). To get a thorough appreciation of the potential variation between the qualities of the cultural data available for analysis, detailed descriptions of each mound group and how they were excavated warranted their own chapter (Chapter 5). Data originating from the MPM included: data on mound forms within the studied mound groups, burial position and disposition in the mounds, feature location in the mounds, and burial information for internments where skeletal material was lacking from the MPM collection.

Differential mound sampling and excavation by archaeologists of the mound groups resulted in often incomplete, missing, and/or biased samples. Basic burial context was present for many of the burials. Unfortunately, artifact associations with burials were largely absent. However, it is generally understood that few grave items were found directly associated with mound burials (Goldstein 1995; Birmingham and Eisenberg 2000) and there is a lack of provenience in the archaeological records (Ruth 2000).

The following describes the contextual variables used and the values for each variable. All cultural data were taken from written reports, publications, field notes and photographs. Basic data collection proceeded by first delineating mound form followed by whether the mound contained burial(s). Even though there may be some controversy in assigning specific mound forms, for the purpose of this study, the recognized mound forms include conical, oval, linear, compound conical, turtle, panther, canine, deer, bird, squirrel, fish, bear, rabbit, lizard, otter, and problematical (or unclassified). While the overall sample size is large, due to low sample size in each mound group for effigy mound forms, the mounds are analyzed by geometric or effigy mound forms in Chapter 6.

The second class of data collection involved delineating the horizontal and vertical position and disposition of features within the mound. For conical, oval and linear mounds (geometric mound forms) the values for determining the horizontal position in the mound were assigned based on the following criterion: center/near center or periphery. For effigy mound forms the values for determining the horizontal position in the mound were assigned based on the following criterion: head, tail, heart, stomach, hip, wing, and between rear legs. For geometric and effigy mound forms the values for determining vertical position included the following values: mound floor, pit below mound floor, and above mound floor (in mound fill).

Postmortem treatment or the context of disposal of the dead was recorded using two different variables. Assigning values for this variable included recording the observation as primary (in the flesh) burial, secondary burial, cremation, combination of secondary and primary burial, or a mix of secondary and cremation. These burial categories were generated based on observed burial dispositions reported in the published reports and field notes.

Since it has been observed that earthen fireplaces, stone altars, ceramic vessels and clay and pebble cists occurred in similar locations to where a burial would occur, data for these features were also collected. These burial features may carry meaning that could potentially vary among mound groups and mound forms and therefore, could signify variation in social organization among mound group communities or among physiographic regions.

4.4 Description of Skeletal Materials and Methods

Data was collected for age and sex so that an analysis of the demographic profile could be reconstructed for individual burials, mounds, mound groups and physiographic regions. The partitioning of the demographic profile regarding aggregations of sexes and age categories among mound groups and physiographic regions was largely determined by analysis of the materials available at the MPM. Unfortunately, not all of the skeletal material described in the reports was available for analysis probably due to preservation issues. Although these skeletal remains were not directly analyzed, the burial descriptions were included in the database for analysis. For these burials the site reports were relied on to determine whether a burial was in a mound, and if so, the burial disposition and sex and age were recorded. Burial disposition and sex and age determination of these burials were partitioned in the database.

Data collection of the skeletal remains consisted of documenting the skeletal elements present, followed by the collection of the appropriate data for age, sex, and epigenetic trait presence. Initially, it was believed that the MPM NAGPRA inventory documents could be relied on to identify the appropriate skeletal elements for analysis. However, after the initial research trip to the MPM, it was discovered that there were discrepancies between the inventory and what was actually present in the collections. It was decided that a complete inventory would be performed prior to analysis of the skeletal remains. Therefore, data collection involved laying out the bones for an entire burial (if possible), rearticulating skeletal elements, and inventorying the remains.

The skeletal collection, for the most part, was largely fragmentary, therefore to simplify data collection a large amount of time was spent reconstructing crania for analysis and reuniting loose dentition with the appropriate mandibula or maxillae. Finally, anthroposcopic and/or metric data were collected on each bone. In this study, the individual was not the minimum unit for data collection and analysis. Since the collections consisted predominantly of comingled remains, the individual bone was the level of inquiry. Individuals were ultimately derived from the MNI of each burial.

In Ruth's (2000) text, determination of sex was based solely on nonmetric data. The frequency of identification of sex increased in this study because anthroposcopic and metric data were used to determine sex. Anthroposcopic assessment utilized the methods of Phenice (1969), Rogers and Saunders (1994), and Stewart (1979). Metric data of the long bones was collected following the standards of Buikstra and Ubelaker (1994) and France (1998) for sex determination. Since the collections were fragmentary and long bones were the predominant skeletal elements, sex determination was accomplished frequently using postcranial metrics. The only measurements that were used to assess sex in this study were those that have been derived from Native American populations (France 1998); primarily comparative data from the Arikara, Central California (2500 BC - 500 BC) and the Libben site, Late Woodland Ohio (Table 4.1).

Sex determination was based on multiple measurements and, when possible, nonmetric analysis. Based on the cutoff values of measurements and anthroposcopic observation, sex determination categories were assigned as: male, female, probable male, probable female, indeterminate, and indeterminate juvenile. If the measurements were at or near the cut-off measurements or the skull and innominate morphology was inconclusive, indeterminate sex was recorded. Therefore, each bone was scored as male, female, probable male, probable female, indeterminate, and indeterminate juvenile. Although the overall sample size is large, due to small sample sizes of individual mound groups, probable males and probable females were recoded and analyzed as males and females for analyses in Chapter 6.

Table 4.1. Sex determination cut-off points for long bone measurements

Skeletal Element	Measurement	Cut-off measurements from Arikara, Central California, and Libben Site, Late Woodland Ohio (France 1998)
Humerus	Maximum head diameter	43.9 mm – Arikara, 44.3 – Central CA
Humerus	Maximum biepicondylar width	58.2 mm – Arikara, 59.3 – Central CA
Femur	Maximum head diameter	44.6 mm – Central CA
Femur	Bicondylar width	77.49 mm – Central CA
Femur	Midshaft A-P diameter	29.01 mm – Central CA
Femur	Midshaft circumference	81.00 mm – Libben Site, Ohio

As previously mentioned, Ruth (2000) grouped individuals into five broad age categories. Her subadult Individuals were assigned based only on dental development and eruption and epiphyseal closure of the long bones. To analyze whether certain age groups were included or excluded more frequently, in this study, Scheuer and Black's (2004) text was consulted for evaluation of juvenile material to more accurately estimate age. In the absence of dentition, bone development and measurements were used to estimate the age of subadults. In addition, this study used standard aging techniques for assessment of dental development established by Buikstra and Ubelaker (1994).

Adult age determination methods included: Suchey and Katz (1998) for assessment of pubic symphysis morphology; Iscan et al. (1984 and 1985) for sternal rib end morphology; and Lovejoy et al. (1985) for auricular surface morphology. Due to the fragmentary state of most of the skeletal remains, occlusal dental attrition was used as a suitable method for determination of biological age (Buikstra and Ubelaker 1994). Further, it has been found that in many studies seriation of mandibles based on dental wear has proven to be effective in determining the MNI and estimated age (Jackes 2011).

Numerous examples of dentition from individuals between the age of five years and 20 years were examined to determine the rate of wear in the collection. For example, it was observed that just prior to completion of second permanent molar eruption, the cusps of the first permanent molars tended to range from barely distinguishable, blunted cusps to complete flattening of the cusps with attendant patches of dentine exposure. This indicates that between the age of six and 12 years, or over the course of six years, molar cusps were rapidly rounded or flat (stages 3-4 using the Scott system, 1979). Subsequently, by the age of 20-25 all molar occlusal cusps were flat or exhibited extensive dentine exposure. Ultimately, for many individuals over the age of 16 years, reference individuals that had other age indicators were used to assess dental wear of individuals that did not possess other age indicators to determine age. The dental wear of these older age categories (i.e. 16-19 years, 20-25 years, 26-30 years, and 30 + years) were corroborated with other age indicators where it was possible (e.g. from adult single primary burials).

The goal of age determination was to categorize individuals into one of the following age categories (values): infant (0-2 years), young child (2-4 years), older child (9-12 years), young adolescent (12-15 years), adolescent (16-19 years), young adult (19-25 years), middle adult (26-30 years) and old adult (30+ years).

Due to low numbers of individuals aged zero to 15 years and a large number of adults (greater than 16 years) that could not be assigned a specific adult age category, juveniles and adults were recoded as juvenile or adult for analyses in Chapter 6.

An analysis of MNI was conducted for each burial, mound, and mound group. MNI was determined in a stepwise fashion by first determining the most frequently occurring redundant skeletal elements. Using Bedford et al.'s (1993) multifactorial aging method, age was determined for all elements to determine whether there were inconsistencies between the known repeated skeletal elements and skeletal age indicators. For example, MNI may have been initially determined by repetition of four adult left femora. A closer inspection of the burial revealed two juvenile mandibles. In this case, the MNI would result in four adults and two juvenile individuals.

Epigenetic research was utilized for understanding the biological and social relationships within and between human groups. Epigenetic traits can be described as the discontinuous expression of morphological traits and the frequency of trait expression within a population. Epigenetic analyses test hypotheses on the biological behavior of populations.

Epigenetic data are assumed to be heritable. However, expression of many of these traits can be influenced by extraneous effects including, environmental effects, sex, age, and asymmetry (for paired traits). Epigenetic non-metric data may be considered discrete, quasi-continuous, or continuous. Most discrete data are really quasi-continuous data in which the trait may manifest varying degrees of expression (Saunders 1977). Discrete analysis is usually relatively straightforward in terms of data collection, especially if presence/absence data are collected and the quasi-discontinuity of trait expression is ignored. However, some researchers believe that much can be learned about the effects of age, sex, and the environment by analyzing continuous variations of trait expression (Corruccini 1974; Saunders 1977). Finally, epigenetic analysis is not inhibited by fragmentary or culturally deformed skeletal material (Cheverud et al. 1991; Fulginiti 1993; Konigsberg et al. 1993).

The advantage of using a nonmetric approach in this study is that the methods do not require intact and complete human remains (Cheverud et al 1991; Fulginiti 1993; Konigsberg et al. 1993). Merbs (1966) successfully documented marked differences between two Dane County Wisconsin Effigy Mound sites in the expression of rare epigenetic cranial traits. Although metric data are considered by some (Corruccini 1974) to be more meaningful genetic measures, morphometrics have been documented to be sensitive to secular trends including alterations in anterior-posterior dimensions that may have been the result of nutritional changes during historic times (Koningsberg etal 1993; Kouchi 2000). If similar secular changes occurred in prehistoric populations, then caution must be used for the independent utility and validity of craniometric data as precise indicators of biological distance. Due to the fragmentary nature of the remains and the absence of cranial material in the Wisconsin Effigy Mound sample, this study will use the epigenetic methods defined by Buikstra and Ubelaker (1994) for cranial traits and Saunders (1977) for infracranial traits.

Cranial and infracranial epigenetic data were collected following the description and methods of Buikstra and Ubelaker (1994) and Saunders (1977) (see data collection form in Appendix A). Postcranial epigenetic traits were collected for bones that most frequently occurred in the collection. Traits that were observed for the femur included presence or absence of Poirer's facet and the third trochanter (Saunders 1977). Traits that were observed on the humerus included: presence of a septal aperture (distal humerus) and presence or absence of a supratrochlear spur (Saunders 1977). The trochlea of the ulna was observed to determine whether the trochlea exhibited two discrete facets or whether the facet was a single continuous facet (Saunders 1977).

Finally, the distal tibia was evaluated for the presence or absence of both distal anterior and distal lateral squatting facets (Buikstra and Ubelaker 1994).

Although data on non-metric traits were collected based on the variations in expression of some traits according to Buikstra and Ubelaker (1994), the traits used in the biological distance analyses required conversion of traits to presence or absence. If multiple response traits could not be converted to binary traits, they were excluded from further analysis. Also, Smith's Mean Measure of Distance analysis requires only two responses. Further, traits were excluded if there was a small number of responses as present. As an extreme example, there were no observations of supratrochlear spur. Therefore, it made no sense to include those traits for the analysis.

4.5 Statistical Methods

SPSS/IBM (IBM SPSS Statistics for Windows, Version 21.0) statistical software was used for data entry and analysis. To answer the research questions, basic descriptive statistics were obtained including the frequency of mound forms, frequency of mound features, frequency of burial position and disposition, frequency of age and sex, and frequency of epigenetic traits.

If descriptive statistics yielded appropriate sample sizes, categorical inferential probability statistical analyses were performed including Pearson's Chi-square and Fisher's Exact tests. Chi-square and Fisher's exact tests were used to investigate patterns in the distribution among observed variables.

If a Chi-square test resulted in robust differences, binary or multinomial logistic regression tests were performed to analyze the specific differences among mound groups and physiographic regions and to calculate an odds ratio. The logistic regression statistics are based on the Chi-square statistic but have the advantage of identifying the sources of variability within a sample. These differences are calculated by providing an odds ratio for each dependent variable. The analysis holds one independent and dependent variable constant and compares each variable to these control variables. Therefore, it is most useful to choose a variable that is closest to the statistical mean of the sample. The probability statistic is reported along with the frequency of occurrence of each dependent variable occurring compared to the control variables. Fisher's Exact, Chi-square, and Logistic Regression tests were used as a tool for identifying important variation of two or more variables. However, it should be noted that these probability statistics were not used to test for statistical significance since it is the case that the sample could be biased, the degree of which the bias is unknown. Further, it should be understood that what is observed in this study are the residues of ritual, behaviors for which simple descriptions of variation and idiosyncrasies may be more appropriate than the 95% confidence interval (Gigerenzer 2004). Therefore, many of the discussions of the data are based on apparent patterns, variability, and idiosyncrasies of mortuary ritual.

To investigate Research Question 4, whether the mound groups are constructed and maintained by lineal groups, Chi-square and Fisher's Exact tests were performed. These tests were performed to investigate whether traits demonstrated variability among samples to justify their use in further biological distance analyses.

When possible, age and sex were determined for each observed skeletal element. Potential age and sex effects on epigenetic traits were analyzed using Chi-square tests, Fisher's exact tests, and binomial logistic regression. This was followed by identification of similarities or important differences in the frequency of the traits among mound groups and physiographic regions.

The data for epigenetic traits that presented adequate sample sizes (n > 70) were exported to R statistical software for analysis of Smith's Mean Measure of Divergence (MMD). Harris and Sjøvold (2003) and Sołtysiak (2011) provide a detailed account of the statistical procedures used in this analysis. Two Excel files were created for MMD analysis. The first file includes the number of trait observations for each mound group or physiographic region. The second Excel file included the percentage of trait presence for each mound group or physiographic region. An R script, provided by Sołtysiak (2011), was used to generate the results of the MMD. MMD measures the similarity in groups of unknown data. A squared MMD matrix is generated which reports each genetic numerical value between each pair-wise comparison of the groups. In other words, the statistic compares each mound group to every other mound group based on similarities of multiple non-metric traits. The greater the MMD value indicates greater biological distance (divergence). A standard deviation matrix is also generated. If the sum of two standard deviations exceeds the MMD matrix values, the comparison between the two samples is statistically significant (Harris and Sjøvold 2003; Donlon 2000). Because the frequencies of many of the traits were generally low, the Freeman and Tukey Grewal correction was used in the MMD analysis (Harris and Sjøvold 2003; Sołtysiak 2011).

To visually examine the relationship among the mound groups and physiographic regions Euclidean distance calculations were used to produce cluster dendrograms and multidimensional scaling scatterplots (Sutter and Verano 2007).

4.6 Conclusion

The purpose of this chapter was to describe the cultural and skeletal materials and methods used to analyze (1) the geographic, cultural and biological variables, (2) the various methodologies for determining age and sex and (3) the statistical and descriptive analyses for distinguishing regularities, variability, and idiosyncrasies among the mound groups and physiographic regions.

Chapter 5: Effigy Mound Group Descriptions

5.1 Introduction

The focus of this research relies on a firm understanding of the archaeological context in which Effigy Mound features occur. Given that Late Woodland effigy mound groups are viewed as multi-component and multi-function community projects, the skeletal remains are treated as one component of the ritual context, in essence they represent a feature or artifact of the social system in which they were a part. To begin to understand the Effigy Mound manifestation patterns and variation in monumental alteration of the landscape, this chapter will summarize the original reports, publications, and site notes to give the reader a sense of the variation inherent in mound group architecture.

As will be demonstrated below there were differences in how mounds were constructed, which mound forms were more numerous, and how burial and other features were incorporated into the mounds. These descriptions provide the basis for analyzing whether sociocultural variation among mound groups and physiographic regions occurs. They serve to reinforce the patterns and variability of Effigy Mound communities participating in a generalized ritual and social system, and for most mound groups, by idiosyncratic means. The evidence suggests that, while mound construction brought groups together (i.e. through resource procurement and mound building), at the same time the individual groups “acted out” the ritual programs in a variety of ways. This is especially true if one examines the context of the burials and the differential use of other features such as earthen fireplaces, stone altars, the inclusion of faunal remains and domesticated dogs, clay and pebble cists, complex alternating strata in mound construction, charcoal layers, ceramic materials, celts, projectile points, clay pipes, shell beds, shell beads, and empty pits that likely served as containers for organic materials.

Most of the mound groups in this research were excavated by W.C. McKern, whom, when he began his excavations, was interested in whether the Kratz Creek Mound group observations by Barrett and Hawkes (1919) represented a typical Effigy Mound group or whether there was potential variation in this Late Woodland phenomenon. As can be seen in McKern’s reports, his impressions and definition of the Effigy Mound peoples evolved as he excavated and reported on more sites. In the 80 years since McKern's work, much has been learned about the Effigy Mound manifestation. As such, the work of Goldstein (1995), Birmingham and Eisenberg (2000), and Rosebrough (2010) are referenced to get a sense of the current theoretical positions relating to Effigy Mound content and context, and the social organization and settlement pattern of the Effigy Mound peoples.

The Effigy Mound manifestation is chiefly characterized by the presence of mound groups which contain low earthen mounds of zoomorphic shapes such as bear, panther, turtle, buffalo, lizard, bird or anthropomorphic forms (Goldstein 1995; Birmingham and Eisenberg 2000). More numerous, but nonetheless associated with these mound groups, are conical and flat topped conical mounds. In addition, there are oval mounds, linear mounds and compound conical mounds. Effigy Mound groups range from three to over 100 mounds. There is no apparent systematic organization other than the mounds tend to be located on prominent landforms and blend into the natural topography.

Goldstein (1995) outlined the variation in construction and contents of the Effigy Mounds. While each effigy mound was constructed in one episode, three distinct methods were employed in their construction. In the first and most common method, the A-horizon (humus zone or loam) was removed, creating an intaglio of the mound, followed by the erection of the mound above the ground surface. The second method involved constructing directly on the ground surface. Occasionally, an intaglio was created followed by an excavation below A-horizon, soil or sand was re-deposited in the empty space and then the mound was erected. Most often, instead of a burial, fire hearths or clay cists were found in the head or heart region. Not all mounds incorporated burials, but when present, the burials were generally located in the head, heart, center of the body, or hip of the effigy form. The majority of burials were secondary bundle burials. However, there were some primary flexed and extended burials and a few cremations. Cremations appeared in three different forms; in situ cremation, cremains processed elsewhere and brought to the mound, and burned bone that may not have been burned on purpose but were near other fire features. Burials could occur on the mound floor, in excavations below the mound, or within the mound fill. When all burials from mound groups have been aggregated into a single sample; children, adults, males and females were generally equally represented in the mounds (Ruth 2005). Grave furniture was rare, but when it occurred, items were generally utilitarian artifacts.

The geographic distribution of the Effigy Mound manifestation included the southern hardwood forests, prairies, oak savannas of southern Wisconsin, northern Illinois, eastern Iowa, and southeastern Minnesota (Birmingham and Eisenberg 2000).

Effigy Mound groups tend to be clustered near resource rich aquatic resources within this region.

Rosebrough (2010) deconstructed the idea that there was a defined “Effigy Mound Tradition” by demonstrating, based on ceramic styles and mound form, that the Effigy Mound Tradition was incredibly diverse and that only one site conformed to the traditional definition. The title described the results of her research perfectly; “Every Family a Nation.” In her study she suggested that each site was unique in its own right, not just in mound construction, but in the styles of pottery fabricated and used. This is important since, in the following site descriptions it is apparent that there was great variation in mound construction, burial context, and in the incorporation of other features and artifacts in the mounds.

As stated previously, the mound groups were primarily excavated by W.C. McKern as part of a program funded by the Milwaukee Public Museum to understand who constructed the Effigy Mounds , why they were built and used, how the mounds were built, and to understand the temporal dimensions of the Effigy Mound manifestation. These projects focused investigations to a band through Wisconsin running east to west. Since it was believed that commerce, exchange of ideas, and material culture flowed on a north to south trajectory, proceeding within the confines of the roughly north to south tributaries, the east to west sampling method was chosen as an adequate method since it would crosscut those tributaries. Also, since the Kratz Creek Mound group had already been excavated and reported by Barrett and Hawkes, McKern wanted to test other mound groups against the Kratz Creek mound group to understand potential variation in the Effigy Mound manifestation.

McKern (1928) described the archaeological field methods and excavation strategies as follows. Documentation of the mound groups was accomplished by surveying and mapping the entire sites, followed by the measurement and survey of each mound. Conical mounds were trenched from side to side and expanded in the center when a feature was encountered. Linear mounds were trenched lengthwise. Effigy mounds were excavated in the center of the head, in the body center where the legs or wings intersected the body, in the center of the body behind the shoulders, in the center of the body between the nose and base of the tail, and occasionally other areas were trenched to insure the excavators were not missing important features. Excavation was expanded if features were encountered. To mention this excavation method is important since it could have introduced further bias, thereby omitting important features in unexpected locations in a given mound.

Since my analysis tests whether there are differences in social organization among mound groups and potential differences among physiographic regions of Wisconsin, the following mound group descriptions are organized by physiographic regions, including the Western Uplands, Central Plain, and the Eastern Ridges and Lowlands (Figure 5.1). This may help the reader get a sense for qualitative similarities and differences within and between mound groups and physiographic regions. The completeness of the individual mound group descriptions were tied to the availability of field notes, photographs and published reports for each mound group. Therefore, some of the mound groups may only include brief descriptions. Each mound group description is presented through text, site maps (Figures 5.1 - 5.10) and context tables (Appendix B).

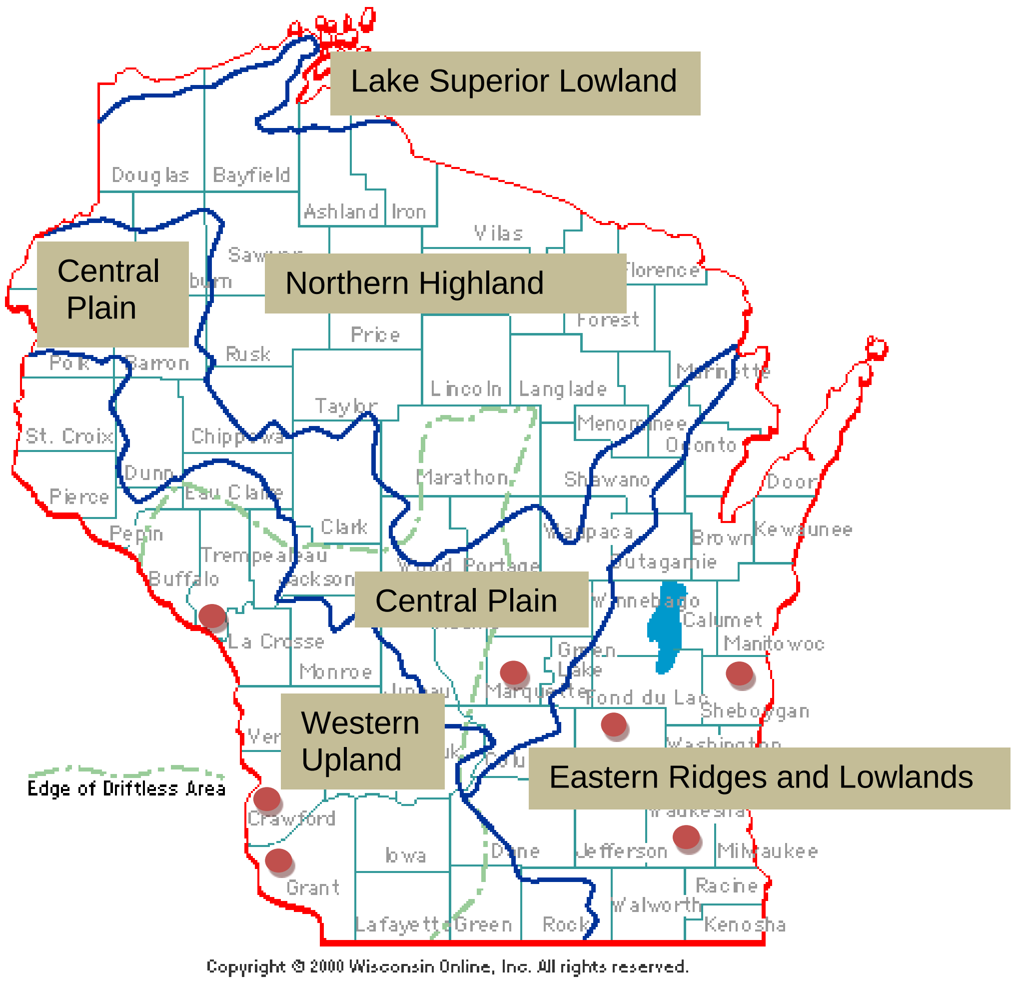


Figure 5.1 Map of Wisconsin Physiographic Regions and mound group locations. Mound group locations are indicated by red bullets - from Wisconline.com

5.2 Western Uplands Physiographic Region

5.2.1 Trowbridge Mound Group, Trempealeau County (Site # 47-TR-28/66)

Excavated by W.C. McKern (1928) Field Notes and McKern (1925)

See site map in Figure 5.2 and Appendix B (Table B.1) for a summary of mound contents

The Trowbridge site was first surveyed by Squire (Squire and Davis 1848). The Trowbridge Mound Group was excavated by McKern in 1928 but the site report was never published. Fortunately, the site notes were located in the Milwaukee Public Museum (MPM) library collections. This site summary is based on the original field notes of W.C. McKern. It should be cautioned that there is a slight discrepancy between materials reported in the field notes and what was represented in the MPM catalogues.

The Trowbridge Mound group is located on the Trowbridge Farm in Trempealeau Township, Trempealeau County, Wisconsin, east of Trempealeau Bay, a bay connected directly to the Mississippi River. Two other mound groups, Shrake I and Shrake II, lie directly to the northwest and north respectively. These groups have temporal affiliations with the Middle Woodland period. The Trowbridge Group was composed of 30 conical mounds, one linear mound and two effigy mounds. The Trowbridge Mound Group appeared to be divided into two distinct groups, a larger northern group of 26 mounds and a southern cluster of six mounds. Lying in between the two groups were two large conical mounds and a fox-like effigy mound. These mounds were widely spaced compared to the groups to the north and south.

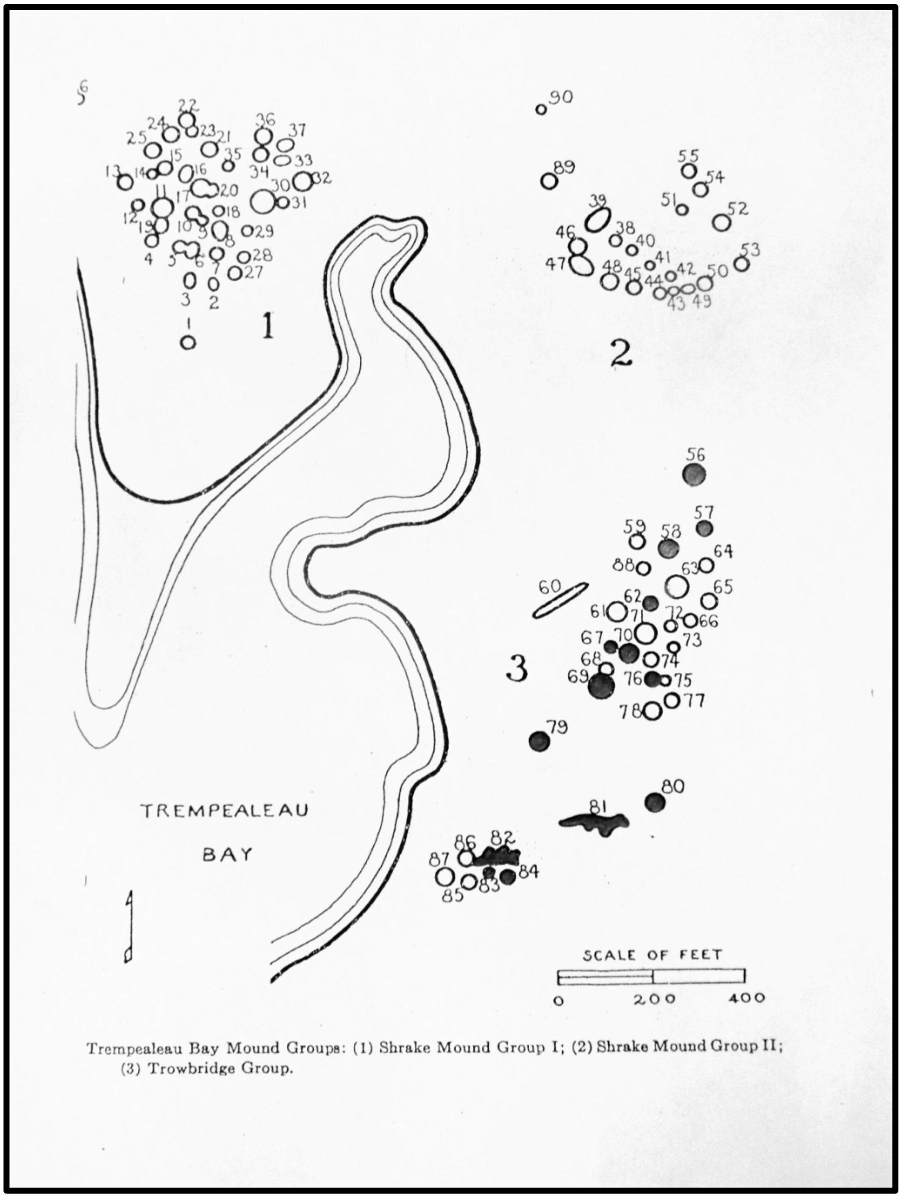
Mound construction seemed to be consistent throughout the site. There was no stratigraphic evidence of a grass line, indicating the humus layer was removed prior to construction of the mounds. No stratification of the mounds was apparent and all sands and soils appeared to be extracted locally. However, there was a difference in the type of materials used between the northern and southern groups. The northern-most mounds (MD#s 56, 57, 58, 62, 67, 69, 70, 76) were constructed of a blackish sand or loam which rested directly on yellowish sand. The southern-most mounds (MD#s 80, 81, 82, 83, 84) were constructed of yellowish sand, which was sometimes mottled with darker soil, and rested on slightly lighter colored sand.

Burials were a common feature in the excavated mounds at Trowbridge. Of the 14 mounds excavated, 10 of which were conical mounds, 13 contained burials. Five of the conical mounds held two burials and two conical mounds contained three burials. Four of the conical mounds contained single burials; notably three of these were part of the southern-most group. Both fox-like effigy mounds contained burials. Secondary bundle burials dominated the burial type at Trowbridge. Conical mounds held 10 secondary bundle burials, two primary burials, two compound primary and secondary burials, and three indeterminate burials. The oval mound (Mound 79) held one burial with eight extended primary, two secondary bundles, and one indeterminate disposition type. Both of the fox-like effigy mounds contained a single burial; Mound 81 contained a primary flexed burial and Mound 82 an indeterminate burial type. Of particular interest is that Mounds 79 and 80, both conical mounds, each contained 11 individuals in a large subfloor pit. These mounds were also two of the three mounds separated from the clustering of the other two groups. One important difference between the two mounds was that Mound 79 contained almost all individuals as primary flexed burials and Mound 80 contained all secondary burials.

The location for burial within mounds varied. In almost all the conical mounds burials tended to occur near the center of the mound. For the conical mounds six of the burials were in the mound fill at varying depths above the mound floor (range = 0.4' - 2.06'), three burials were directly on the mound floor, and seven burials were in pits of varying depths (i.e. between one and two feet) below the mound floor. Conical Mound 67 was unusual in that Burial 1 was located above the subfloor pit of Burial 2. The space between the pit and Burial 2 contained artificially placed gravel, instead of the typical black sand in most of these mounds. The burial of oval Mound 79 was contained in a large pit that covered almost the entire floor of the mound. Both of the burials in the fox-like mounds occurred in pits below the mound floor.

There were few non-burial features in the Trowbridge Mound group. Mound 57 contained two copper celts two feet above Burial 1. The fox-like Mound 81 contained an empty subfloor pit below the hip position which could have contained a burial. Mound 81 also contained a bed of clam shells on the floor of the mound in the center of the body (stomach). Similarly, fox-like Mound 82 contained an empty pit below Burial 1 and another empty pit below the hip position.

As mentioned previously, the mound content inventories do not correspond between the mound data sheets and museum catalogs. The catalogs contain the items listed on the field data sheets but also contained additional materials. Therefore, both were consulted for describing the associated burial contents and other objects incorporated in the mound fill. There were a number of objects associated with burials. Burial 1 of Mound 58 contained two copper celts and one bone bead. Burial 2 of Mound 62 contained two projectile points associated with small bits of human bone. Burial 1 of Mound 69 held a projectile point and carbonized wood directly on top of the burial and four copper fragments directly under the burial. Mound 70 contained one quartzite implement associated with Burial 3 and one potsherd over the face of one of the extended males of compound Burial 3. There were several potsherds associated with the large primary and secondary burial in Mound 79. There was one stone spud celt next to the western-most skull of Burial 1 in Mound 82 and there were several potsherds under the skulls in this burial. Finally, there were two potsherds under Burial 1 in Mound 84. Objects that were found in the mound fill included: a chert implement in Mound 56; a chert implement, pieces of stone, and potsherds in Mound 62; a hammerstone, a quartzite implement, two quartzite projectile points, a piece of hematite, and potsherds in Mound 79; and potsherds in Mounds 67, 82 and 84.



Trempealeau Bay Mound Groups: (1) Shrake Mound Group I; (2) Shrake Mound Group II; (3) Trowbridge Group.

Figure 5.2 Trowbridge Mound Group map, Trempealeau County (McKern 1931). Excavated mounds are shaded.

5.2.2 Raisbeck Mound Group, Grant County (Site # 47-GT-112)

Excavated by W.C. McKern (1928); Published by Chandler W. Rowe (1956)

See Appendix B (Table B.2) for a summary of mound contents

The Raisbeck mound group was originally excavated by W.C. McKern in 1930 and was published by Rowe, originally for his dissertation and later in the Milwaukee

Public Museum Publications in Anthropology No. 3. The Raisbeck mound group was located in Grant County, Wisconsin, on the property of Clarence Raisbeck. The mound group consisted of 80 mounds including 38 conical mounds, 14 linear mounds, 13 bird mounds, 11 canine mounds, three oval mounds, and one problematical mound. No known map exists for this mound group.

Mound construction appeared to begin for most mounds with the removal of the humus layer. The mounds did not exhibit stratification or the use of non-local materials in construction. The most common feature, besides burials, appeared to be the inclusion of earthen fireplaces and stone altars.

Twenty-one mounds were excavated by McKern including; 14 conical mounds, two conical mounds, one oval mound, three bird effigy mounds, and one canine effigy mound. At Raisbeck disposal of the dead included 21 burials; including two single primary burials, two multiple primary burials, three single bundle burials, eight multiple bundle secondary burials, one bundle burial with partially cremated remains, and five burials had an indeterminate burial disposition. Of the four primary burials, three occurred in conical mounds and one occurred in the center of a linear mound in a subfloor pit. In conical mounds burials occurred above the mound floor, on the mound floor, and in subfloor pits and all burials were in or near the center. In all four effigy mounds there were subfloor pit burials in the heart position. Canine effigy Mound 11 contained subfloor pit burials in the heart and head position. An exceptional burial occurred in conical Mound 66 where one large bundle burial occurred above the mound floor included 30 individuals.

Other than burials there were 21 features; including 19 earthen fireplaces and stone altars, one dog burial, and one clay dome-like structure. The ceramic assemblage consisted of approximately 445 rim and body potsherds. The pottery was grit tempered with a paste of reddish clay. Elbow pottery pipes, with incised lines around the bowl, were also excavated from some of the mounds. The stone tools consisted of 36 projectile points including 26 stemmed and side and corner notched points and there were 10 that were too fragmentary for classification. Three perforators or drills were also among the stone tools in the Raisbeck mound group. Bone artifacts consisted of two bird leg awls, one antler awl and one turtle plastron “mesh spreader”.

5.2.3 Polander Mound Group, Crawford County (Site #47-CR-39)

Excavated and Reported by W.C. McKern (1929), Thomas (1894)

See site map in Figure 5.3 and Appendix B (Table B.3)

In 1929 W.C. McKern conducted several surveys and excavations in LaCrosse, Vernon and Crawford Counties. Unfortunately, McKern only provided a brief description of the Polander Mound Group in his 1929 Milwaukee Public Museum Yearbook manuscript. Originally, Cyrus Thomas (1894) reported on the excavation of twelve mounds, nine mounds containing burials. Cyrus Thomas reported the burials were contained within stone walls and stone lined pits. McKern decided to excavate seven mounds unexcavated by Thomas. Of these seven mounds, the results of only one of the mounds were presented in any detail; oval Mound #7. McKern mentioned that all of the mounds excavated contained one to two burials (described below); however he does not report on which of the other six mounds were excavated. Mounds 4, 18, and 19 were three of the mounds not reported on; however skeletal remains from these mounds were analyzed at the MPM.

The Polander Mound Group was located in Seneca Township, Crawford County, Wisconsin. It was located on a steep talus slope at the base of a riverside cliff. The site was composed of 20 conical mounds, four linear mounds, one oval mound, and one biconical mound.

Mound construction at the Polander site was unusual. As mentioned previously Thomas interpreted the burials as entombed. McKern found that burials occurred directly under a plat of large stones, some difficult to remove by one person. McKern reported that, for every mound excavated, a plat of stones was found overlaying the burials. He believed that Thomas misinterpreted these plats as tombs, principally because they tended to collapse around the bodies as the body decomposed and also from the compressive forces from above. The oval Mound 7 matrix is reported as follows. The top of the mound was composed of about one foot of earthen fill. At about a foot in depth a stone plat, roughly 35 feet in length and 15 feet in width was encountered. Under this stone plat was a burial composed of three individuals, two primary flexed adults and one bundle burial of a child. These remains were not available for study at the MPM. Below this burial two to three feet of soil was excavated before another stone plat was encountered. This stone plat was circular and measured approximately 25 feet in diameter. Under this stone plat was a single large burial composed of a tightly compacted group of 31 primary extended individuals. Note: the archaeologists designated this as a single burial; however, others may have characterized this as multiple burials. McKern reports that there is a great range of ages and both sexes were represented in this burial.

There were several artifacts found associated with this multiple individual internment, including several potsherds, two bone tubes from elk long bones, two fragments of worked bone, worked unio shells, a celt fragment, and a string of 20 ellipsoidal copper beads.

The following summarizes the findings of Thomas's (1894) excavations. All the burials mentioned below were reported to be enclosed in stone walled tombs or stone lined subfloor pits. Mound 3 contained 12 skeletons and Mound 4 contained a "folded" (tightly flexed) individual. One bundle burial in Mound 6 was contained in a stone lined tomb near the top of the mound and the remains of four flexed burials were below that burial. Mound 8 contained two bundle burials, one with two individuals and the other with three individuals. Mound 9 contained two individuals in a bundle burial. Mound 11 contained a flexed individual near some charred stones. Mound 12 contained an extended burial in a limestone vault. Mound 16 contained one half of a skeleton in a "stone vault". Finally, Mound 17 contained three flexed skeletons.

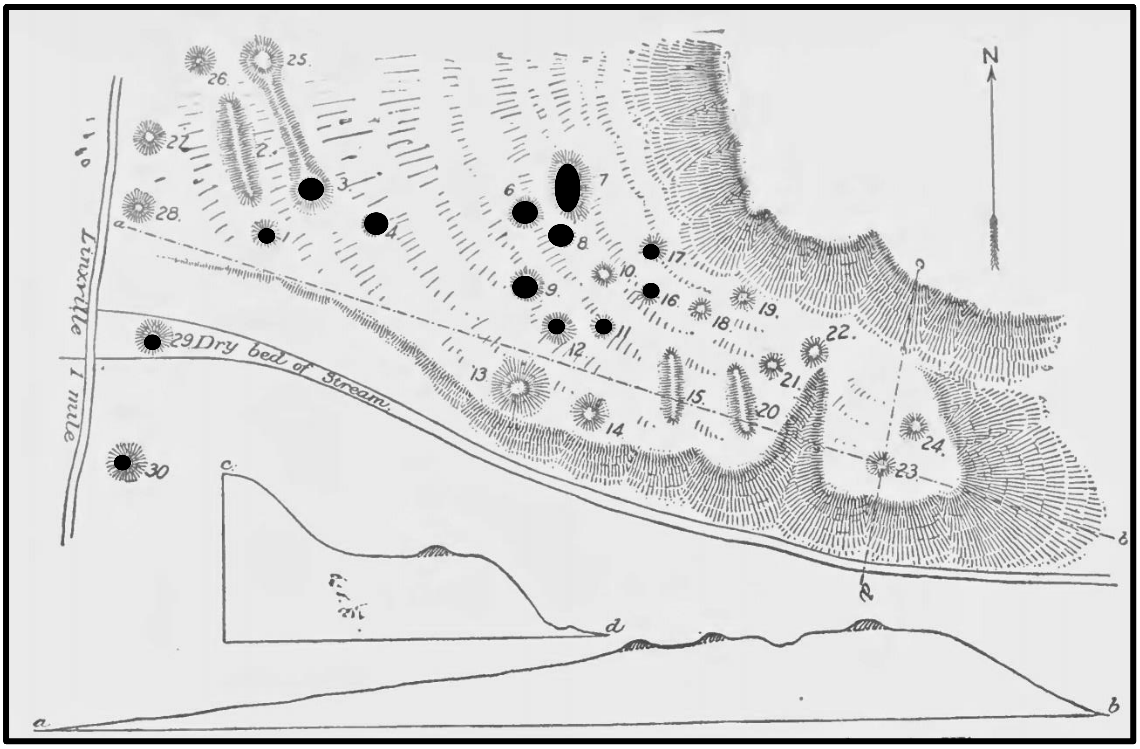


Figure 5.3 Polander Mound Group map, Crawford County (From Thomas 1894). Excavated mounds are shaded.

5.3 Central Plains Physiographic Region

5.3.1 Kratz Creek Mound Group, Marquette County (Site # 47-MQ-39)

Excavated and reported by Barrett and Hawkes (1919)

See site map in Figure 5.4 and Appendix B (Table B.4) for a summary of mound contents

The Kratz Creek mound group was located in the Buffalo Lake region of Marquette County, Wisconsin. The mound group was located on a formerly aboriginal wild rice marsh where fish and waterfowl were plentiful. At the time of excavation the mound group was located on the banks of Kratz Creek and Buffalo Lake. The mound group was divided into two large sections which can be further broken down into four smaller units. There were 51 mounds composed of effigy, linear, and conical forms.

The main group, east of the mouth of Kratz Creek encompassed 36 mounds with Mound 20 somewhat distant from this group. The groups seemed to be pointing to the large conical Mound 1 on a bluff overlooking Buffalo Lake (Barrett and Hawkes 1919). The second group was composed of five effigy mound forms east of the main group about 1200 feet. The third group was composed of four mounds (two conical and two effigy mound forms) west of Kratz Creek. The fourth group was composed of six conical mounds to the west of group 3; along the shore of Buffalo Lake. The geometric mound forms included conical and linear mounds. The effigy mound forms included panthers, bears, a bird, a lizard, and a rabbit.

Many of the mounds contained intentional stratigraphic layers with, alternating layers of imported “sacred earths” (term from Barrett and Hawkes 1919) and local soils. The soils, sands and clays that were transported to the site were used under or around burials, between fire layers, and also around stone altars and animal remains. The four types of imported matrix included light yellow sand, golden sand, white sand, red sand and red clay. These sands and clay layers were interspersed with and contrasted with the local soils. In addition, there were interspersed layers of fire-blackened and charcoal ash and layers of decomposed organic matter.

Many mounds, especially effigy mound forms were begun as intaglios, followed by the laying down of alternating strata of sands, intentional surface burning, and clay. According to Barrett and Hawkes (1919) mound construction of most mounds at Kratz Creek appear to have begun as conical forms. For mounds that did not begin with the excavation of intaglios, construction of most of the mounds involved the initial removal of the humus layer. The effigy mound forms appear to have been first constructed of small conical mounds followed by filling in to achieve the final effigy shape. Conical mound construction began with the laying down of a thin layer of imported sand, followed by the altering layers of local matrix and imported earths. Effigy mound construction also involved the alternating imported matrix, local matrix and ash and charcoal layers.

Of the 36 mounds excavated at Kratz Creek only seven contained burials, three of which contained multiple burials in the same mound. The mounds that contained burials included: conical Mounds 1, 8, and 50; panther Mounds 3, 5, and 41; and rabbit Mound 9. There were four primary burials in the mound group and one mound that contained two primary flexed burials, a bundle burial, and a cremation. Burial disposition in the conical mounds included all three being centrally located, with two burials occurring above the mound floor and one burial in a subfloor pit. Burial position in the three panther mounds included: three burials in the heart position above the mound floor in Mound 3; a burial in the center of the body above the mound floor in Mound 5; and in the heart position in a subfloor pit of Mound 41. Burial in rabbit Mound 9 was located in a subfloor pit in the hip position.

Conical Mound 1 was an unusual mound because it contained a multiple bundle burial (Burial 1) with 109 individuals represented, two primary burials immediately above Burial 1, and a crematory (Altar 7) with burned human bone. Burial 1 was in a large subfloor pit below the mound. Important features associated with Burial 1 were the alternating strata of sands below the burials, the presence of several fireplaces and altars surrounding the burials, and the alternating layers of fire-strata and light and dark sands in the mound construction. Barrett and Hawkes (1919) believed this mound was the center-piece in the mound group because all of the other mounds seemed to be pointing to this one.

According to Barrett and Hawkes (1919) the linear and conical mounds were used for primary burial, secondary burial, crematories, a space for unburned offerings, animal sacrifices, and the repository of stone implements. They also describe crematory altars for animals, goods, and possibly humans. The effigy mound forms were primarily used for mortuary purposes. Burial types consisted of primary, cremation and partial cremation, and bundle burial. Artifacts associated with burials, earthen fireplaces and stone altars included quartzite projectile points, pottery fragments, and charred wooden remains of a paddle.

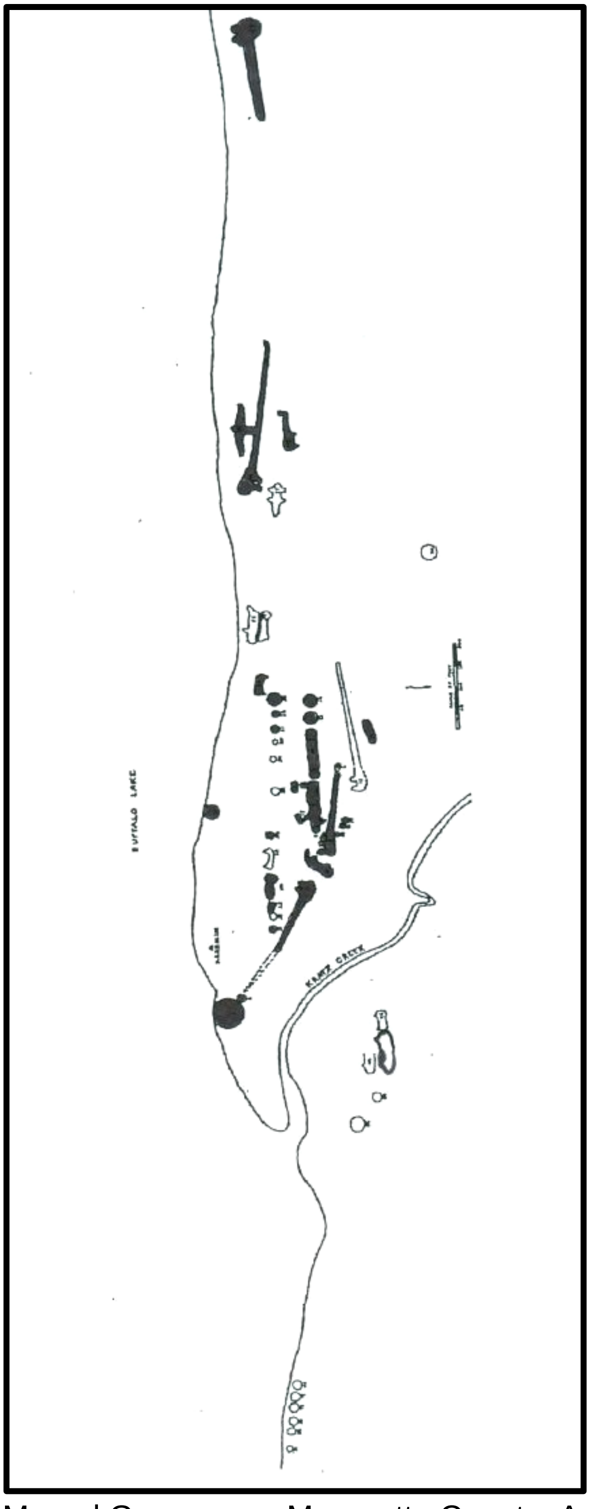


Figure 5.4 Kratz Creek Mound Group map, Marquette County. Adapted from Barrett and Hawkes 1919. Excavated mounds are shaded.

5.3.2 McClaughry Mound Group, Marquette County (Site # 47-MQ-38)

Excavated and reported on by McKern (1928)

See site map in Figures 5.5 and Appendix B (Table B.5) for a summary of mound contents

The McClaughry mound group was located on the shores of Buffalo Lake in Pauckwaukee Township, Marquette County, Wisconsin. The mound group was composed of 82 mounds in two distinct mound groups. Site I was composed of 60 conical and effigy mound forms, including 43 conical mounds, four oval mounds, five biconical mounds, three linear mounds, three effigy mound forms, and two “problematical” effigy mound forms. This mound group tended to be grouped compactly in a pattern that paralleled the lake shore. There was a freshwater spring and stream associated with the mound group, as well as evidence of campsites east and west of the mound group and also associated with the mounds. The Site II mound group was composed of 22 conical mounds north of the eastern end of Site I. Campsites were found associated with this mound group as well.

With the exception of a parallel arrangement along the lake shore, there did not seem to be evidence of intentional orientation. The mound materials appeared to have been mined from the local area and there was no difference in the matrix between the geometric mound forms and the effigy mound forms. Features encountered in the mounds consisted of stone altars, burials, earthen fireplaces, ceramic vessels and fragments, and small artifacts. However, many of the mounds contained no features or artifacts. All of the burials were inclusive (interred at the time of mound construction) and were found on the mound floor, in the mound fill, and below the mound floor.

Thirty-five mounds were excavated including; 23 conical mounds, four biconical mounds, one linear mound, one egg-shaped mound, and five effigy mound forms (one bird, one skunk or squirrel, one panther, one fish, and one bear). At Site I 46 burials were recovered including 29 bundle burials, nine flexed primary burials, and four burials in which burial disposition could not be determined. Of the 23 conical mounds excavated 19 contained burials; burials ranged from one to five individuals. Of the four biconical mounds two contained burials. Conical Mound 28 contained an unusual burial pattern when compared to the other mounds. Burials were arranged in three separate burial strata. The first burial stratum (near the top of the mound) contained three primary flexed burials; stratum two contained one flexed, three bundle burials, and three indeterminate burials; and stratum three contained a large bundle burial in a large subfloor pit. Of the five effigy mound forms excavated four contained burials including; one central bundle burial in a bird effigy mound, two bundle burials in the hip and tail of a problematic effigy mound, two flexed burials in the shoulder and center of the head of a panther effigy mound, and three bundle burials in the tail and head of a fish effigy mound.

Earthen fireplaces, stone altars, clay and pebble cists, and ceramic vessels, constituted the other features at McClaughry. Earthen fireplaces and stone altars tended to be associated with burials or were in locations where a burial would have been expected. Eleven earthen fireplaces and 13 stone altars were uncovered at McClaughry.

Clay and pebble cists were bowl-shaped features with sloping walls, constructed of red baked clay and pebbles for reinforcement. The floor of the cists had concave bottoms with small stones embedded. At McClaughry 10 cists were excavated, including eight in conical mounds and two in effigy mounds. All of the cists were closely associated with burials.

Ceramic vessels and fragments were found in 28 mounds at McClaughry, however most of the potshards were loose in the mound fill. Some were associated with earthen fireplaces and stone altars and it appeared that others were intentional inclusions within the mound fill, especially where groups of potsherds together. In Mound 57 a portion of a foot and leg modeled from clay was uncovered.

Although rare, artifacts were found associated with burials. An unworked piece of float copper and a copper chisel were found beneath a skull in a bundle burial (Mound 28, Stratum 2), and another copper awl was centrally placed in a bundle burial in Mound 49. A piece of red sandstone was placed beneath the skull of a flexed burial (Mound 49). One pottery pipe was included in a bundle burial in Mound 51 and two pottery pipes were found in Mound 16 unassociated with any burials. Two projectile points were placed in a compound flexed primary and bundle burial in Mound 53. In a few cases potsherds were found associated with burials.

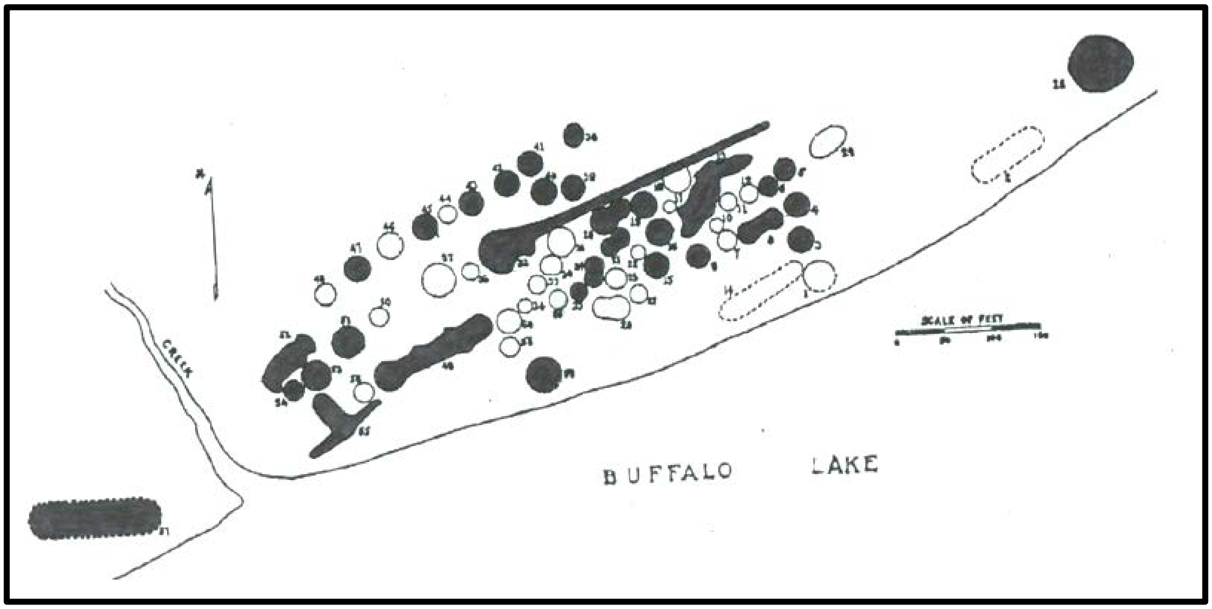


Figure 5.5 McClaughry Mound Group - Site I map (near Buffalo Lake), Marquette County (Adapted from McKern 1928). Excavated mounds are shaded.

5.3.3 Neale Mound Group, Marquette County (Site # 47-MQ-49)

Excavated and reported by McKern (1928)

See site map in Figure 5.7 and Appendix B (Table B.6) for a summary of mound contents

The following description was summarized from McKern's (1928) report on the Neale and McClaughry mound groups. The Neale Mound group was located in Marquette County on the shores of Pauckwaukee Lake, immediately adjacent to steep hills and springs to the eastern and western ends of the site. The mound group was composed of 88 mounds including 28 effigy mound forms, 47 conical, and 13 mounds in which shape could not be determined. Surface surveys suggested the presence of camp sites associated with the mound group.

After removal of the humus zone, effigy mound forms were constructed of yellowish sand with mottled dark spots. Conical mounds were constructed of a darker matrix or black silt from the area. Although many of the mounds contained no features, other mounds included stone altars, burials, earthen fireplaces, ceramic vessels and potsherds and other small artifacts. Of the nine excavated conical mounds two contained centrally placed burials. Of the 15 excavated effigy mound forms, eight contained nine burials. However, two of the conical mounds could have contained burials but the remains were too disintegrated to distinguish specific skeletal elements. All effigy mound form burials were in subfloor pits and burials were placed behind the shoulder in the “heart” position, and in the center of the body (stomach position).

With the exception of a few potsherds, there were almost no artifacts associated with burials in the Neale mound group, however one oblong piece of serrated slate, two serrated scrapers, a spud celt, six hard sandstone and granite stones were found within mounds. Other features included 11 earthen fireplaces and stone altars and15 clay and pebble cists. Earthen fireplaces, stone altars and cists occurred on the mound floor as well as above the mound floor at varying depths from the top of the mounds.

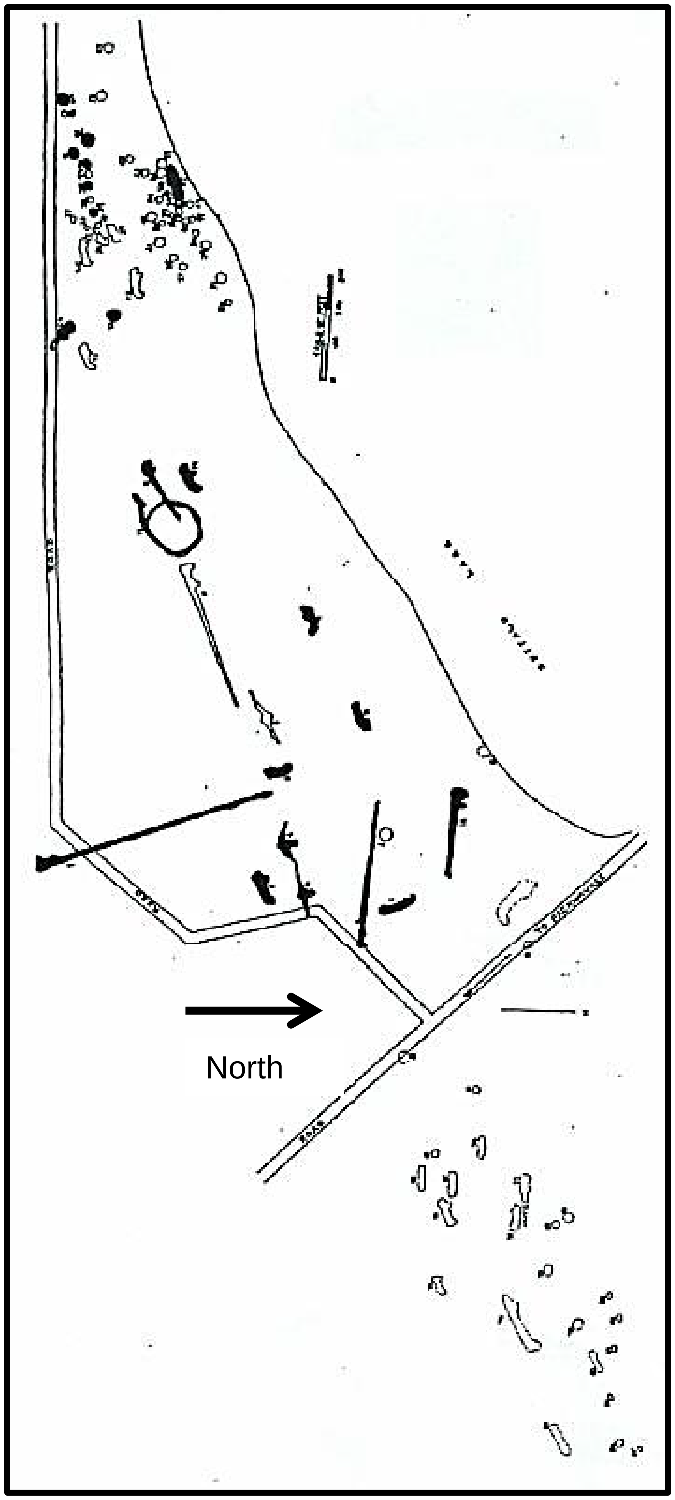


Figure 5.6 Neale Mound Group map, Marquette County (McKern 1928). Excavated mounds are shaded.

5.4 Eastern Ridges and Lowlands Physiographic Region

5.4.1 Kletzien Mound Group, Sheboygan County (Site # 47-SB-61)

Excavated and reported by WC McKern (1925, 1930)

See site map in Figure 5.10 and Appendix B (Table B.7) for a summary of mound contents

The Kletzien Mound group was located in Wilson Township, Sheboygan County, Wisconsin. The mound group was made up of two subgroups, one on top of a flat bluff north of Hartman's Creek and another on the east bank of the Black River. Six campsites were found associated with the Kletzien mound group. Mound forms included 22 effigy mound forms, five short linear mounds, two oval mounds, and four conical mounds. The effigy mound forms included seven deer mounds, six panther mounds, and nine unclassified effigy mounds. Typically panther mounds have long straight tails but two were found at Kletzien to have tails that angled upward near the tip of the tail.

An analysis of the mounds themselves led McKern (1930) to make the following observations. Most of the effigy mound forms at Kletzien appeared to be oriented towards the south. Mound material appeared have been derived from the immediate area. Mound matrix consisted of rusty yellow sand, mottled with humus. Seventeen effigy mound forms and nine geometric mound forms, and one indeterminate mound were excavated. With the exception of the floor of four mounds, there was no evidence of intentional stratification in mound construction. At Kletzien the humus zone was removed previous to mound construction. Four of these mounds had a sub-mound floor stratification consisting of a layer of grayish sand, followed by the burning of brush before the mound was erected. A single panther effigy intaglio contained this white sand layer in its base but the layer of burning was absent.

Features in the mounds consisted of burials, earthen fireplaces, and ceramic vessels; however there were very few artifacts. Of the 17 effigy mound forms excavated nine contained burials; including two out of the three panther mounds, and three of the six deer effigy mounds, and four of the eight unclassified effigy mounds. Of the nine geometric mounds excavated six contained burials including; both conical mounds, all three oval mounds, and one of the four linear mounds excavated. There were no other features in the mounds that did not contain burials.

McKern (1930) described the burial provenience as follows. Of the 27 mounds excavated there was only one mound, a panther effigy mound, which contained more than one burial. Burial types were primary flexed and secondary bundle burials. Flexed burials occurred in one conical mound and four effigy mounds. Bundle burials occurred in one linear mound, one effigy mound, and one effigy mound form contained a compound burial consisting of a flexed and bundle burial. The number of individuals per burial varied from one to three individuals. The horizontal position of the burials in the effigy mound forms included; five in the "heart" position, one in the hip position, and three in the center of the body. In conical mounds the burials occurred in or near the center. The burials in the linear mound occurred along the major axis of the mound. In the vertical dimension, burials occurred on the mound floor or in an excavation below the mound floor.

As noted earlier other features only occurred in mounds containing burials and included earthen fireplaces and ceramic vessels. Seven earthen fireplaces were uncovered on the mound floors of five effigy mound forms, one linear mound, and one oval mound. Five of the earthen fireplaces were found within the same mound as burials; the two remaining earthen fireplaces were found in direct association with burials. In the effigy mound forms earthen fireplaces occurred in the shoulder (heart position) of one panther effigy mound, the center of the shoulder (heart position) of one deer effigy mound, the center of the hip in one deer effigy mound, the center of the body of an unclassified effigy mound form, and in the terminal end of one unclassified effigy mound.

Artifacts at Kletzien were rare. Two antler tine stone tool pressure flaking tools were found with a bundle burial in a panther mound (Mound 3). A polishing stone was uncovered in the mound matrix in a linear mound (Mound 12). A flat piece of sandstone was uncovered beside a fireplace on the floor of an effigy mound form (Mound 27). Finally, a group of potsherds were found on the floor of a linear mound (Mound 8), proximate to a burial.

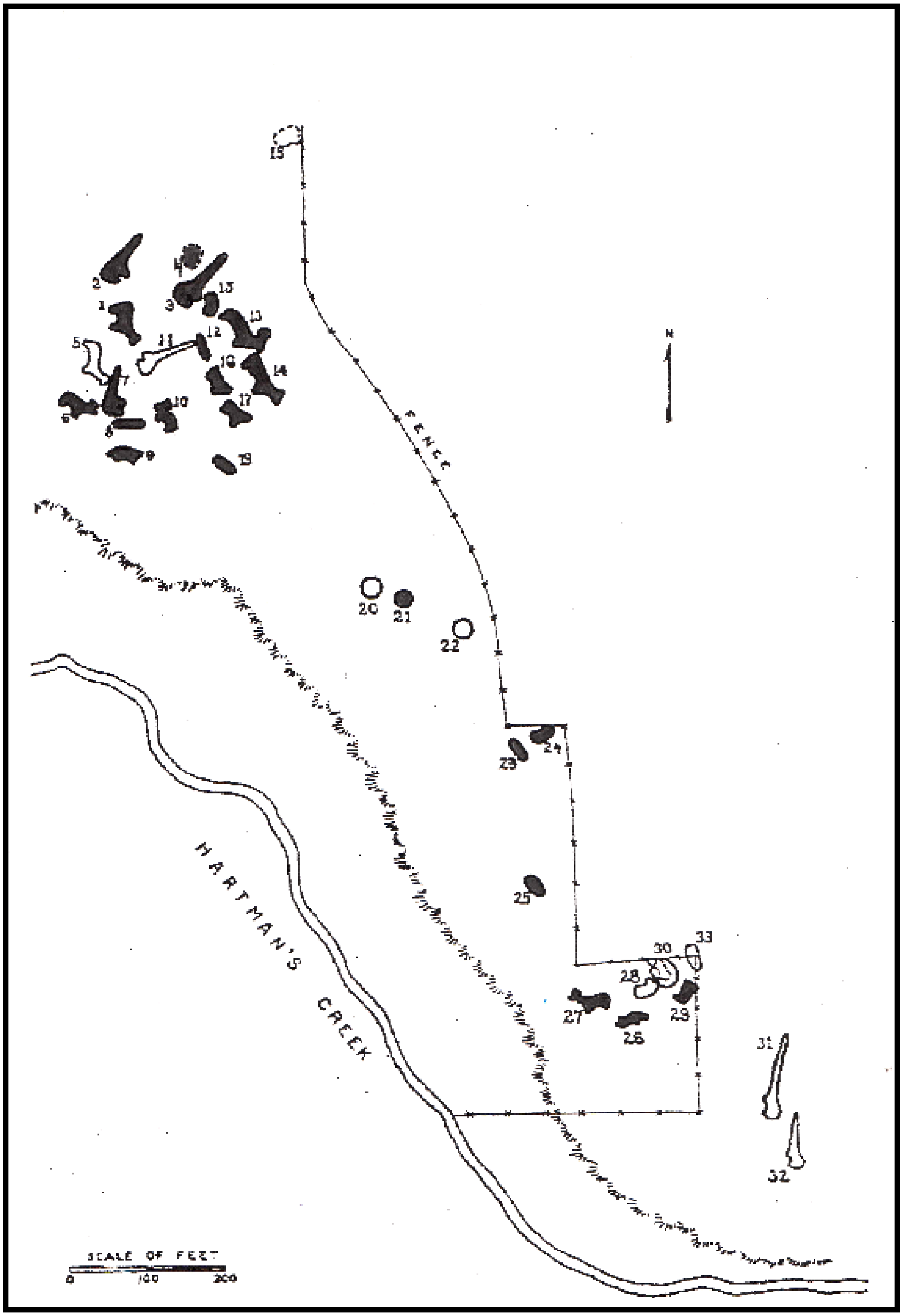


Figure 5.7 Kletzien Mound Group map, Sheboygan County (Adapted from McKern 1930). Excavated mounds shaded.

5.4.2 Kolterman Mound Group, Dodge County (Site # 47-DO-189)

Excavated and Reported by Warren L. Wittry and E.G. Bruder (1955), Bruder (1953)

See site map in Figure 5.11 and Appendix B (Table B.8) for a summary of mound contents

The Kolterman Mound group was located near the town of LeRoy, Dodge County, Wisconsin. The original mound group was composed of 22 mounds but a road construction project in the late 1800s destroyed Mounds 16, 20 and a portion of Mound 15 (otter effigy). In 1954 another road construction project threatened to destroy Mounds 15, 16, 17, 18 and 20. Therefore, Mounds 15, 16, 17, 18 and 20 were planned for excavation. Mounds 17 and 18 were the only mounds sufficiently excavated and sampled.

The existing mound group was located along a creek (200-300 feet distant) and not far from the Horicon Marsh. The mounds were arranged parallel along a creek to the east. To the west and cutting into the mound group was a highway. Further to the west, next to the highway was what is termed an “old Indian trail”. At the time of the survey in 1953 there were 20 mounds including; seven otter mounds, nine conical mounds tightly clustered, one conical mound at the south end next to the otter group, one linear mound, one panther mound, and one mound that had an odd curving shape. This last mound was described as two adjoining mounds. Bruder (1953) described the results of a survey of the mound groups he conducted prior to excavation. Samples from Mounds 17 and 18 yielded uncalibrated radiocarbon dates of 1,180 years BP, or AD 776, within the Late Woodland time period (Wittry 1956).

As previously mentioned, Wittry and Bruder conducted a salvage operation of Mounds 15, 16, 17, 18 and 20. Mounds 17 and 18 were completely excavated. Otter Mound 17 contained two features, both in the “heart” position. The first was Burial 1 which was a primary flexed burial of a male in a 1.2 foot deep pit below the mound floor. The only surviving elements were the lower leg bones and the skull. This burial was associated with an elbow pottery pipe. Also of note was that the skull exhibited occipital deformation which is not typical of Effigy Mound burials. Burial 2 consisted of a cremation approximately one foot in diameter and varying between 0.5’ - 0.8’ below the mound floor. It consisted of approximately 50 small calcine bone fragments indicative of green bone cremation.

Otter Mound 18 contained three features. The first feature was an earthen fireplace in the hip position and 1.2 feet below the mound floor. The second consisted of a large glacial boulder in the head position of the effigy mound, which the mound was likely built around. The third feature was a cremation burial in the “heart” position and was 0.9 foot to 1.1 feet below the surface of the mound. The cremains consisted of 74 calcine bone fragments and a piece of charred wood. Associated with this burial were a crushed Madisonware Cord Impressed vessel (from one vessel) and two projectile points.

Mounds 15, 16 and 20 were all sampled using heavy equipment. The surface was scraped until features were exposed. The scraper exposed pits filled with decomposed human bone and charcoal in the centers of each mound. Therefore, these were likely burials. Also, within each mound was a large glacial stone like that of Mound

18. Other objects that were recovered from the fill included chert flakes, hammerstone fragments, and potsherds.

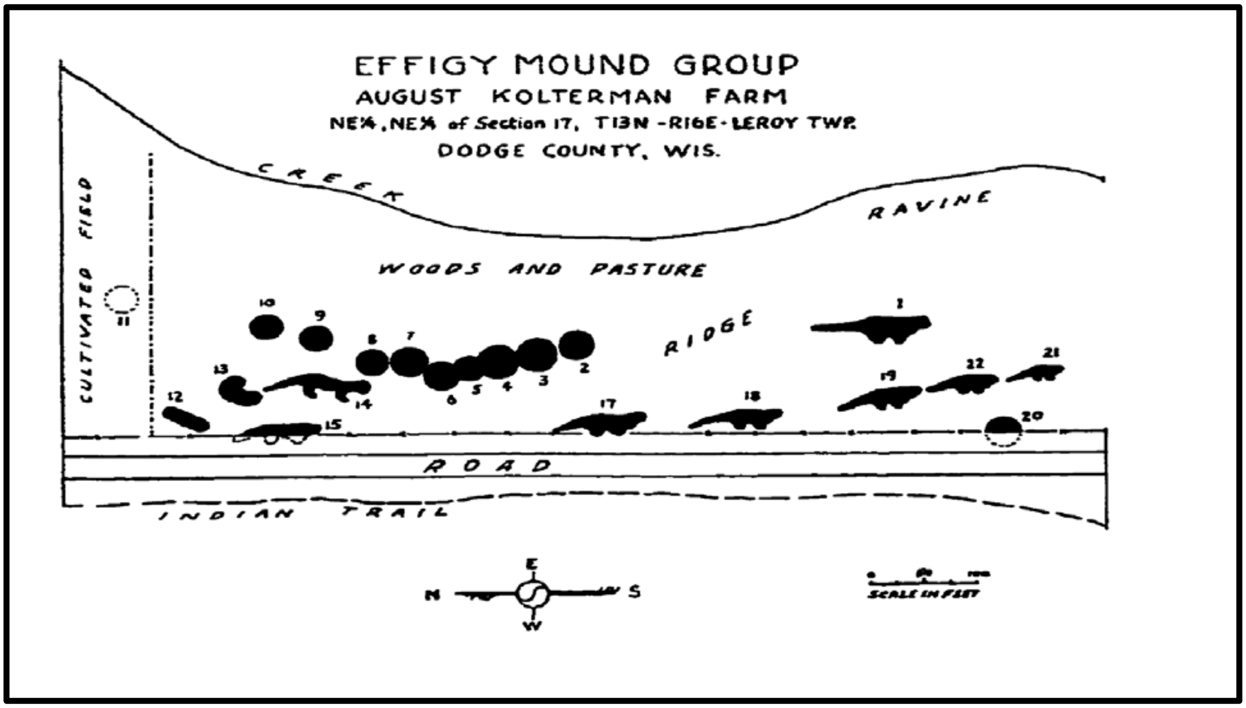


Figure 5.8 Kolterman Mound Group map, Dodge County (Bruder 1953). Shaded mounds do not indicate excavated mounds but were shaded in the original map.

5.4.3 Nitschke Mound Group, Dodge County (Site #47-DO-27)

Excavated and Reported by W.C. McKern (1930)

See site map in Figure 5.12 and Appendix B (Table B.9) for a summary of mound contents

The Nitschke Mound group was located in Burnett Township, Dodge County, Wisconsin. The site was situated along two adjoining ridges, segmented into two subgroups. The site is composed of 62 effigy, linear, oval, and conical mound forms. The Group I mound group, lying in a north to south direction, consisted of 46 mounds and Group II, to the south, consisted of 16 mounds. Of the 62 mounds 30 were effigy mounds consisting of three turtle, five panther, six canine, one buffalo, three deer, three waterfowl, two birds, two gourd-shaped, and five indeterminate effigy mound forms. The Group II mounds were primarily conical mounds. There were a spring and prehistoric garden bed, consisting of parallel rows, associated with the Group I mounds. The Group II mound group also had an adjacent spring that emptied into Horicon Lake, about two miles from the site. There was no evidence of campsites, however the mounds contained campsite debris.

McKern (1930) summarized shape of the mounds, arrangement orientation, and mound matrix as follows. Group I was composed of panther, turtle, canine, waterfowl, other bird, deer, gourd-like, and problematical effigy mound forms. The panther mounds of Group 1 exhibited the tip of the tail turned up and one with the tail turned down. Group II was composed of turtle, bird, deer, hawk or eagle, and waterfowl effigy mounds. The Group I mounds tended to be dominated by canine and panther mounds, whereas the Group II mounds tended to be dominated by bird forms. The arrangement of the mounds tended to be parallel upon the ridge and closely spaced. The matrix used to construct the mounds was from soils in the immediate area. The matrix consisted of gray-black clay soil built upon the adjacent soils and sub-soils. The humus or grass line was largely absent at Nitschke, indicating its removal prior to mound construction.

Features in the mounds consisted of burials, earthen fireplaces, stone altars, animal bone and ceramic vessels. All of the burials were inclusive at the site. Excavation of the mounds revealed that burials were found in both turtle mounds, four of the five panther mounds, the one buffalo mound, one of the two gourd-like mounds, none of the two canine mounds, the one deer mound, two of the three bird mounds, four of the five unclassified effigy mound forms, two of the three linear mounds, 10 of the 12 conical mounds, and within the one oval mound. Overall, 16 of 20 of the effigy mound forms contained burials and 13 of the 16 geometric mound forms contained burials. Three burials occurred in the buffalo and linear mound. Two burials were encountered in two turtle, three conical, one gourd-like, and two unclassified effigy mound forms.

McKern elaborated on the burial proveniences as follows. Primary flexed burials and secondary bundle burials were the only burial types encountered at Nitschke. Flexed burials were encountered in 11 effigy, three conical, one oval, and four linear mound forms. Bundle burials were found in eight effigy and seven conical mound forms. Seven indeterminate burials were encountered in four effigy and three conical mound forms.   The number of individuals in each burial ranged from one to eight individuals, the multiple burials primarily composed of bundle burials. McKern (1930) estimated that 56 individuals were recovered including; 24 primary burials, 25 secondary bundled individuals, and seven indeterminate burials. Three unusual compound burials were encountered. The first burial consisted of four individuals from a deep pit below Mound #9 - Burial 1, composed of three primary flexed adults, one male and two females, and a small infant lain across the chest of one of the females. Two unusual burials occurred in oval Mound 44 and Mound 52 in which the primary flexed burials exhibited an adult female superimposed over an adult male. On the horizontal axis burials within effigy mound forms occurred in the heart position 11 times, in the hip three times, and in the center of the head three times. On the vertical axis burials tended to occur on the mound floor or in excavations below the mound floor.

Seventeen of the burials occurred on the mound floor and 21 were found in oval, rectilinear, or round pits below the mound floor.

As mentioned previously, stone altars and earthen fireplaces occurred at Nitschke. Two stone altars occurred in the Group I mound group, including one in the head of a buffalo mound (Mound 9) above a bundle burial and one in the center of the shoulder in a panther mound (Mound 21) above a bundle burial. One earthen fireplace was found in between the shoulders of a turtle mound (Mound 50) of Group II, above and between two burial pits.

Artifacts at Nitschke tended to be more numerous than at other effigy mound groups. Eleven flaked stone tools were uncovered including; two loose projectile points in the mound fill, two associated with flexed burials in effigy mound forms, five projectile points associated with bundle burials in effigy mound forms, one projectile point associated with an indeterminate burial in an effigy mound form, and one stone celt associated with a flexed burial in an effigy mound form. Several bone implements were recovered from the effigy mound forms including: two bone scrapers, one bone awl, and the calcaneum of a deer under a skull associated with the compound burial in Mound 9; one double-pointed awl and one barbed harpoon associated with a bundle burial in a turtle effigy mound (Mound10); and one barbed harpoon in a bundle burial in a gourd-like mound (Mound 20). Two perforated shell beads and several gastropod shells were found associated with a bundle burial in a turtle mound (Mound 10).

Ceramic vessels and potsherds were associated with burials and recovered in the mound fill. Two ceramic pipes were recovered, one in a conical mound and one in a linear mound. A ceramic container was found associated with an indeterminate burial type in an effigy mound form and potsherds from a single pottery vessel were found under a bundle burial in a panther mound (Mound 21). Potsherds were found loose in the mound fill of seven effigy, two conical, and two linear mounds.

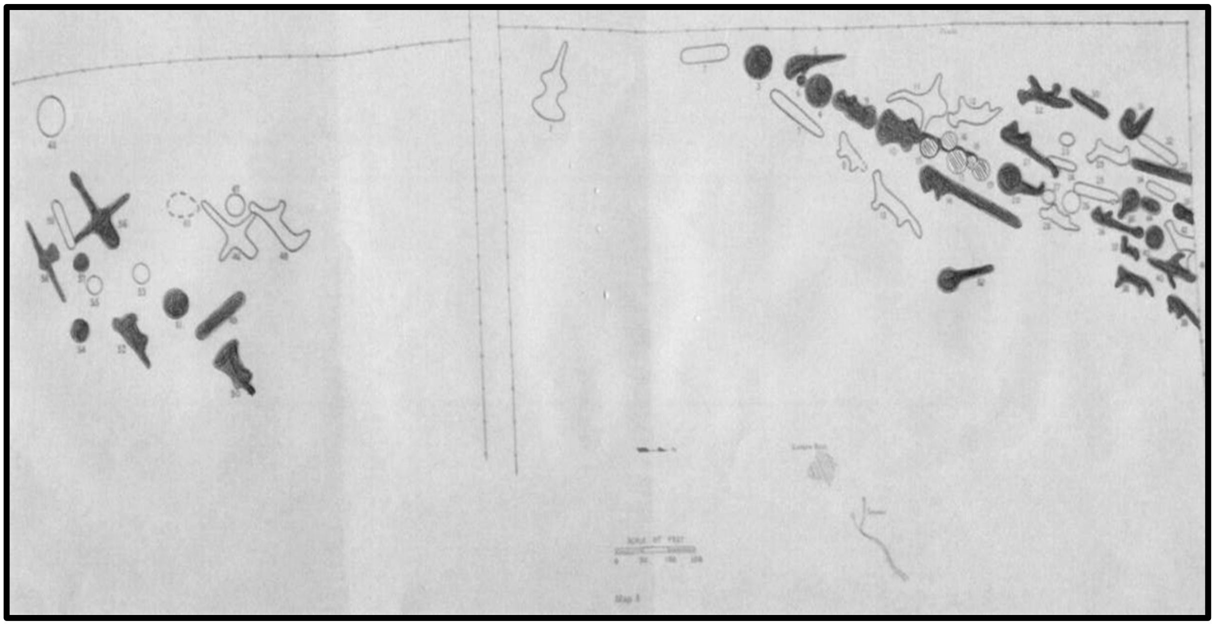


Figure 5.9 Nitschke Mound Group map, Dodge County (McKern 1930). Excavated mounds are shaded.

5.4.4 Big Bend Mound Group, Waukesha County (Site # 47-WK-196)

Excavated by McKern (1936) and reported on by Wood (1936)

See site map in Figure 5.13

The Big Bend mound group was located near the town of Big Bend in Vernon Township, Waukesha County, Wisconsin. The Big Bend mound group was actually composed of two mound groups. Both subgroups are located on the Fox River where the river turns from the east to the southwest. Group II, the mound group of interest in this study, lies one half mile to the southeast of Group I. Group I was composed of six oval mounds, one panther mound, and a fish-hook shaped embankment (mound).

According to an original survey the Group II site was composed of at least 31 mounds. According to MPM accession forms it was composed of 14 linear mounds, one effigy mound form, and 13 conical mounds. In the late 1880's Pete reported two panther mounds, 19 linear mounds, and 10 bird mounds, but he made no mention of the conical mounds (Wood 1936).

Although the records at the MPM indicated this mound group had been excavated by various parties, the MPM holds the contents of a single mound of Group II excavated by McKern. According to museum records, including a newspaper article from 1977 (no source on document), an oblong mound was leveled on the Peterson farm during construction of a parking lot. McKern was subsequently called in to examine and document the exposed skeletons. The newspaper article and accession records indicate that 17 skeletons were documented and removed to the MPM. As an aside, this study documented an MNI of 25 individuals. One of the skeletons had a necklace of shell beads placed around the neck. From the 1934 photograph in the 1977 newspaper article it appeared that the burials were tightly compacted, placed side by side, extended burials. This is the only known information from this site.

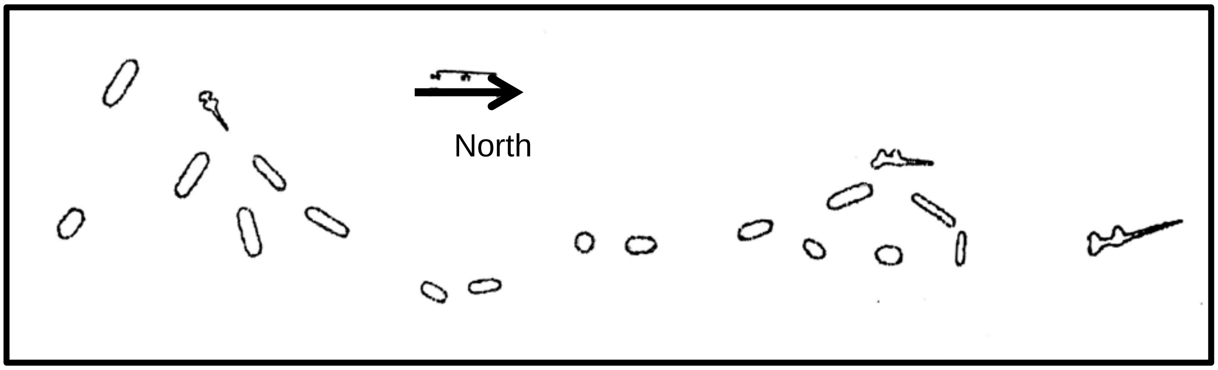


Figure 5.10 Big Bend Mound Group map, Waukesha County (Wood 1936).

Chapter 6: Results

"It is also possible that archaeological data are different enough that they are hard to interweave into the osteological analysis. Archaeological data are often 'messy,' requiring more interpretation and more work than osteological data." Lynne Goldstein (2006)

6.1 Introduction

This chapter describes the analyses and results from the analyses to determine whether individual mound groups and physiographic regions vary in their ritual and mortuary practices. Each research question will be reviewed, followed by the results of each research question.

As mentioned in Chapters 2 and 4, the effigy mound sample (1) represents nine mound groups in a universe of hundreds in southern Wisconsin, (2) not all mounds were excavated in each mound group, (3) most mounds were not completely excavated, (3) the mounds that were sampled were non-randomly selected by the archaeologist, (4) features and skeletal remains were differentially preserved, and (5) there are inconsistencies between MPM records and what was documented in this study. For these reasons the available data are problematic and may or may not be representative of the complete Late Woodland context in southern Wisconsin.

Therefore, the descriptive and categorical inferential probability statistical analyses are used in this research simply to assess patterns and variability in the available samples. As such probability thresholds are reported merely to draw attention to potential important patterns and/or variability among the samples. Thus, many of the ritual patterns, variability and idiosyncrasies are reviewed descriptively rather than statistically.

Before the questions are addressed the basic descriptive statistics will be provided including, frequency of all excavated mound forms, minimum # of individuals, the frequency of burials in each mound group, the frequency of various burial postmortem treatments, and the demographic profiles of each mound group and physiographic region will be summarized.

6.2 Results for Research Question #1

Research Question #1: Are there regularities or important differences in the ***number, co-variation of features in mounds, and vertical and horizontal positioning of internal mound features*** *(burials, earthen fireplaces, stone altars, clay and pebble cists, and ceramic vessels) among mound groups and among physiographic regions of southern Wisconsin?*

6.2.1 Frequency of Features

Research Question # 1 analyzes the frequency of each feature in a mound (ranging from 0-11). In this regard they are treated as counts of the number of each feature occurring. Therefore, Chi-square and Fisher's exact tests were performed on the mound groups and physiographic regions to test for important patterns or differences in the frequency of the various features.

It is important to point out that each of these mound groups have been differentially excavated (both in quantity and method) and mound numbers at each mound groups are not equal. Therefore, a source of variation among mound groups may be the result of sampling bias and bias introduced through variable excavation methods, rather than by cultural activities.

6.2.1.1 Burial Frequency

Table 6.1 and Figure 6.2 present the results of the frequency of burials occurring in mounds, ranging from zero (no burials) to 4 burials. Note, the greatest number of burials occurred as single burials in mounds (n=97) and 79 mounds contain no burials. Of the 217 mounds, 29 mounds contained two burials, while the number of mounds containing three (n=9) and four (n=3) sharply drop off.

Table 6.1 Frequency of burials among mound groups

Mound Group	Number of Burials					Total
	0	1	2	3	4	
Kletzien	13	12	2	0	0	27
Kolterman	0	3	1	0	0	4
Kratz Creek	28	5	1	2	0	36
McClaughry	7	18	7	2	2	36
Neale	13	11	0	0	0	24
Nitschke	9	18	8	2	0	37
Polander	3	8	3	1	1	16
Raisbeck	2	15	3	0	0	20
Trowbridge	4	7	4	2	0	17
Total	79	97	29	9	3	217

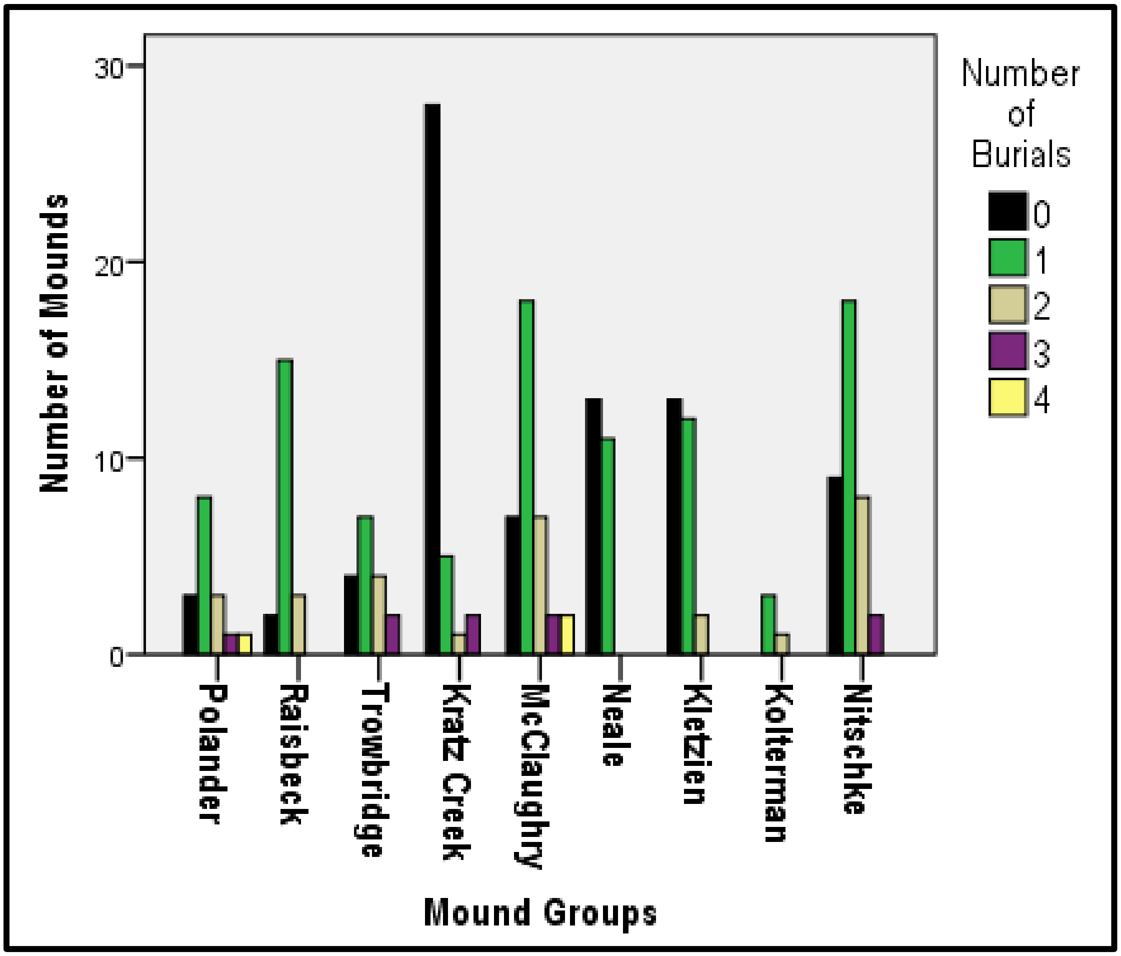


Figure 6.1 Frequency of burials among mound groups

To test whether there were differences among mounds with burial features, the number of mounds containing no burials were excluded from the analysis followed by recoding the variables as containing one burial or multiple burials. The result indicates there are no important differences among mound groups and among physiographic regions.

6.2.1.2 Earthen Fireplace Frequency

This section analyzes the potential differences in frequency for Earthen Fireplaces. As a reminder, an Earthen Fireplace is defined as “a flat, circular area, blackened by charcoal, with elements of ash present” (McKern 1928 p.261).

Table 6.2 presents the results of the frequency of earthen fireplaces represented among the mound groups. Again, similar to the burials contingency table, the occurrence of multiple earthen fireplaces is rare in mounds.

A visual inspection of the frequencies of fireplaces reveals that the fireplaces are rare in mounds with 178 of 213 mounds containing no fireplaces. When they are found, they tend to occur as a single fireplace (n=27/213). The single mound with 11 fireplaces occurs at Kratz Creek – Mound 1, which is an unusual mound in that it contains 111 individuals and several stone altars. It should also be noted that two of the three mound groups from the Western Uplands physiographic region (Trowbridge and Polander) do not contain any earthen fireplaces.

Table 6.2 Frequency of earthen fireplaces among mound groups

	Number of Earthen Fireplaces						Total
	0	1	2	3	4	11	
Kletzien	19	8	0	0	0	0	27
Kolterman	3	1	0	0	0	0	4
Kratz Creek	28	2	1	2	1	1	35
McClaughry	30	6	0	0	0	0	36
Neale	18	4	2	0	0	0	24
Nitschke	36	1	0	0	0	0	37
Polander	13	0	0	0	0	0	13
Raisbeck	14	5	1	0	0	0	20
Trowbridge	17	0	0	0	0	0	17
Total	178	27	4	2	1	1	213

Mounds not containing earthen fireplaces were excluded from the next analysis. A Fisher's exact test was performed which indicated there were no differences in the number of fireplaces among the mound groups or physiographic regions. When the values were recoded as single versus multiple earthen fireplaces, there were still no significant differences among mound groups and physiographic regions.

6.2.1.3 Stone Altar Frequency

This section explores differences in the frequency of stone altars among mound groups and physiographic regions. Stone altars in this research refer to a plat of two or more stones intentionally placed in the mound. These altars usually contain evidence of charcoal and ash but this is not a requirement. The first test considers the mounds that do not contain stone altars and, for the mounds that include them, the number of stone altars in each mound. The second analysis focuses on the frequency of stone altars when the mounds not containing stone altars are excluded. Finally, an analysis of single versus multiple altar mounds was investigated.

Table 6.3 presents the frequency of the number of stone altars among the mound groups. The modal pattern is for stone altars to be absent in mounds (n=181/214). Twenty-two mounds include at least one altar. Notice, similar to that of burials and earthen fireplaces, there were few mounds containing multiple stone altars.

Table 6.3 Frequency of stone altars among mound groups

Mound Group	Stone Altar						Total
	0	1	2	3	4	7	
Kletzien	27	0	0	0	0	0	27
Kolterman	4	0	0	0	0	0	4
Kratz Creek	33	2	0	0	0	1	36
McClaughry	26	5	2	3	0	0	36
Neale	19	3	2	0	0	0	24
Nitschke	34	3	0	0	0	0	37
Polander	11	2	0	0	0	0	13
Raisbeck	10	7	2	0	1	0	20
Trowbridge	17	0	0	0	0	0	17
Total	181	22	6	3	1	1	214

Table 6.4 presents the frequency of the number of stone altars among the physiographic regions. In general, stone altars are more prevalent among the Western Uplands and Central Plain physiographic regions and are also the only two regions that are composed of multiple stone altars in mounds.

Table 6.4 Frequency of stone altars among physiographic regions

Physiographic Region	Number of Stone Altars						Total Mounds
	0	1	2	3	4	7	
Central Plain	78	10	4	3	0	1	96
Eastern Ridges and Lowlands	65	3	0	0	0	0	68
Western Upland	38	9	2	0	1	0	50
Total	181	22	6	3	1	1	214

To investigate differences in the frequency of stone altars present in a single mound, mounds not containing stone altars were excluded from the analysis. Trowbridge (Western Upland) and two of the Eastern Ridges and Lowlands physiographic region mound groups were absent from this analysis since no stone altars occurred in those mound groups.

Finally, the frequency of the presence of single and multiple stone altars were analyzed for potential differences among mound groups and physiographic regions. Results from Fisher's exact tests from these two analyses resulted in small differences in the frequency of stone altars among mound groups and physiographic regions for all tests.

6.2.1.4 Ceramic Vessel Frequency

This section explores the frequency of ceramic vessels among mound groups and physiographic regions. The analysis included mounds containing from zero to two pots. In the second analysis, the frequency of the number of pots occurring only in mounds containing pots was analyzed. Finally, only mounds containing single or multiple pots were included in the analysis.

Figure 6.2 presents the frequency in the number of ceramic vessels among the mound groups and physiographic regions. All mound groups contained at least one vessel and McClaughry had three mounds that contained two vessels. The number of mounds containing vessels were few (n=19/195) and Fisher's Exact tests for any differences resulted in no difference among mound groups and physiographic regions.

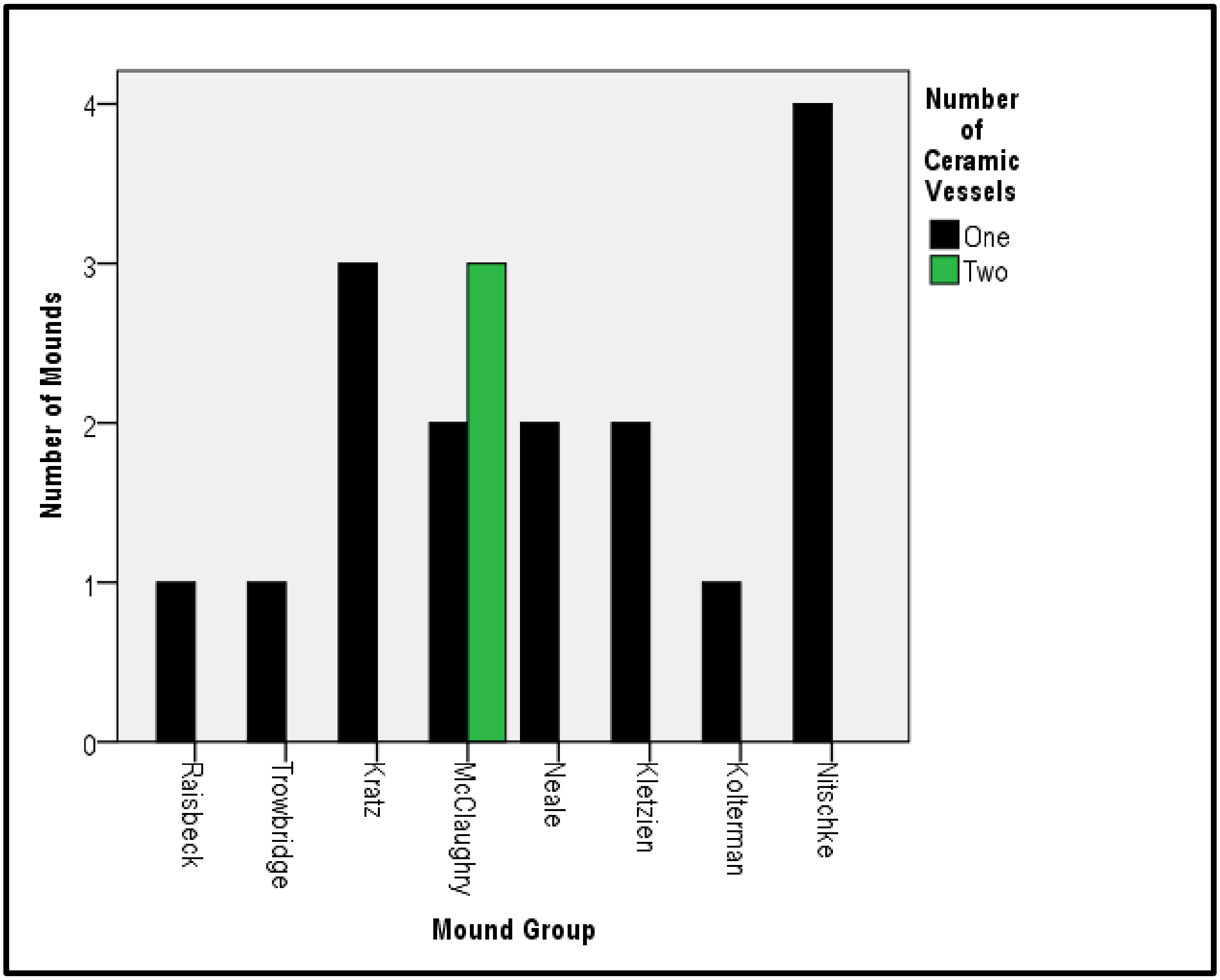


Figure 6.2 Frequency in the number of ceramic vessels among mound groups

6.2.1.5 Clay and Pebble Cist Frequency

Only two mound groups contained this feature, Neale and McClaughry, both are in the Central Plains physiographic region. Out of the total of 214 mounds in this study, only 14 mounds contained clay and pebble cists. At McClaughry two mounds contained one clay and pebble cists and four mounds contained two clay and pebble cists. At Neale three mounds contained one clay and pebble cist, three mounds contained two clay and pebble cists and two mounds contained three clay and pebble cists. No analysis of the frequency of this feature was conducted since the feature appears to be an idiosyncratic ritual feature among these two mound groups.

6.2.2 Co-variation of Mound Features

This section addresses the presence of features and, where present, the co-variation of features in mounds.

The following summary tables and descriptions present the presence or absence of the various features at each mound group. The mound groups are presented in order of the physiographic regions from west to east. There are a total of nine mound groups in this analysis, three mound groups for each physiographic region. Tables 6.5 through 6.13 summarize the frequency of the presence of features among mound groups and physiographic regions. A tally of for the presence of each mound and the features found in each mound can be found in Appendix C.

For each mound group a summary table, the frequency of feature presence, mounds that do not contain any features, and the co-occurrence of mounds containing burial features with the other four features will be described. Since burials were the most common feature found in mounds and the other four features exhibited a low frequency, the co-occurrence of the other four features in mounds with burials and the occurrence of aggregated non-burial features were assessed in mounds where no burials occurred.

6.2.2.1 Polander Results

The following description is based on the results in Appendix C (Table C.1) which presents the presence of the five features included in this research. Table 6.5 summarizes the frequency of occurrence for the presence of features at Polander. The total mounds excavated at Polander included 18 geometric mounds. Of the 18 mounds, 83% (n=15) of the mounds contained burials and 17% (n=3) contained no burials. Only one mound (33%) without a burial also contained one other feature. Mounds with burials that contained any of the four additional features composed 13% (n=2). No clay and pebble cists or ceramic vessels were found at Polander. The frequency of mounds with burials that also contained a stone altar was 7% (n=1) and an earthen fireplace 7% (n=1). There were no occurrences of more than one additional feature found in mounds without burials.

Table 6.5 Frequency of occurrence and co-variation of features in excavated mounds of the Polander mound group

	Frequency	Percent*
Mounds with burial(s)	15	83
Mounds with burials and any other features	2	13
Mounds without burial(s)	3	17
Mounds without burial that contain other features	1	33
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	1	7
Mounds with burials and stone altars	1	7
Mounds with burials and ceramic vessels	0	0
Mounds with burials and 2+ features	0	0
Total number of mounds excavated	18	

To summarize, most of the mounds at Polander contained burials and few other features. Two notable features that occurred at Polander were stone lined burials and burials overlain with stone boulders. These idiosyncratic features will be discussed in more depth in Chapter 7.

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

6.2.2.2 Raisbeck Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.6 summarizes the presence of features in the excavated mounds at Raisbeck. Of the 80 mounds at Raisbeck, the total mounds excavated included 16 geometric and 4 effigy mounds. Mounds with burials composed 90% (n=18) of the sample and 10% (n=2) contained no burials (both geometric mounds). Burials were the most common feature in the mounds but earthen fireplaces and stone altars were also common in mounds. There was only one earthen fireplace in one of the two mounds without burials. Mounds containing both burials and other features composed 72% (n=13) of the sample. Clay and pebble cists were not found at Raisbeck. One ceramic vessel was found in a mound also containing a burial. The frequency of mounds with burials that also contained a stone altar was 56% (n=10) and an earthen fireplace 28% (n=5). There were two occurrences where both an earthen fireplace and a stone altar were found in the same mound as a burial.

Table 6.6 Frequency of occurrence and co-variation of features in excavated mounds of the Raisbeck mound group

	Frequency	Percent*
Mounds with burial(s)	18	90
Mounds with burials and any other features	13	72
Mounds without burial(s)	2	10
Mounds without burial that contain other features	1	50
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	5	28
Mounds with burials and stone altars	10	56
Mounds with burials and ceramic vessels	1	6
Mounds with burials and 2+ features	2	11
Total number of mounds excavated	20	

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

In summary, most of the mounds in the Raisbeck mound group contained burials, including all four of the effigy mounds. Stone altars and earthen fireplaces were a common co-occurrence with burial mounds.

6.2.2.3 Trowbridge Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.7 summarizes the presence of features within excavated mounds at Trowbridge. Of the 33 mounds (31 geometric and two effigy mound forms) at Trowbridge, the number of mounds excavated included 15 geometric mounds and two effigy mound forms. Mounds containing burials composed 76% (n=13) of the sample while 24% (n=4) contained no burials. At Trowbridge, mounds without burials contained no other features. Only one mound with a burial at the site contained a ceramic vessel. In summary, much like the Polander and Raisbeck mound groups, most of the mounds included burials. However, the Trowbridge and Polander groups are similar in that they contain few non-burial features. Like the other two Western Upland mound groups most mounds at Trowbridge included burial features.

Table 6.7 Frequency of occurrence and co-variation of features in excavated mounds in the Trowbridge mound group

	Frequency	Percent*
Mounds with burial(s)	13	76
Mounds with burials and any other features	1	8
Mounds without burial(s)	4	24
Mounds without burial that contain other features	0	0
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	0	0
Mounds with burials and stone altars	0	0
Mounds with burials and ceramic vessels	1	8
Mounds with burials and 2+ features	0	0
Total number of mounds excavated	17	

6.2.2.4 Kratz Creek Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.8 summarizes the presence of features in excavated mounds at Kratz Creek. Of the 51 mounds at Kratz Creek, the total number of mounds excavated included 22 geometric and 14 effigy mounds. Mounds with burials composed 22% (n=8) of the sample and 78% (n=28) contained no burials (both geometric mounds). Mounds without burials that included other features was 14% (n=4). Mounds with burials that also included additional features was 63% (n=5) of the sample. Unlike the other two Central Plains mound groups, Kratz Creek contained no clay and pebble cists in the mound group. Mounds with burials that also contained earthen fireplaces composed 50% (n=4) of the sample and stone altars composed 25% (n=2) of the sample. Three (38%) mounds with burials

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

also contained ceramic vessels. Finally, burials that also included two or more features included 50% (n=4) of the sample.

Table 6.8 Frequency of occurrence and co-variation of features in excavated mounds in the Kratz Creek mound group

	Frequency	Percent1*
Mounds with burial(s)	8	22
Mounds with burials and any other features	5	63
Mounds without burial(s)	28	28
Mounds without burial that contain other features	4	14
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	4	50
Mounds with burials and stone altars	2	25
Mounds with burials and ceramic vessels	3	38
Mounds with burials and 2+ features	4	50
Total number of mounds excavated	36	

In summary, the Kratz Creek mounds are predominantly free of burials. Mounds without burials may contain other features including earthen fireplaces or stone altars. However, for most of the mounds that contained burials there were also earthen fireplaces, stone altars, and ceramic vessels.

6.2.2.5 McClaughry Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.9 summarizes the presence of features in excavated mounds at McClaughry. Of the 82 mounds at McClaughry, the total mounds excavated included 29 geometric mound forms and six effigy mound forms. Mounds with burials composed 80% (n=28) of the sample and

[*] Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

20% (n=7) contained no burials. Mounds without burials that included other features was 43% (n=3) of the sample.

Mounds with burials with additional features was 57% (n=16) of the sample. Twenty-one percent (n=6) of mounds with burials at McClaughry also contained clay and pebble cists. While mounds containing burials and earthen fireplaces composed 18% (n=5) of the sample, mounds with burials and stone altars composed 32% (n=9). Mounds with burials that also contained ceramic vessels composed 14% (n=4). Mounds with burials that also included two or more non-burial features included 25% (n=7) of the sample.

Table 6.9 Frequency of occurrence and co-variation of features in excavated mounds in the McClaughry mound group

	Frequency	Percent*
Mounds with burial(s)	28	80
Mounds with burials and any other features	16	57
Mounds without burial(s)	7	20
Mounds without burial that contain other features	3	43
Mounds with burials and cists	6	21
Mounds with burials and earthen fireplaces	5	18
Mounds with burials and stone altars	9	32
Mounds with burials and ceramic vessels	4	14
Mounds with burials and 2+ features	7	25
Total number of mounds excavated	35	

In summary, the McClaughry mounds predominantly contained burials. Mounds not containing burials may have contained other features including earthen fireplaces, stone altars, or ceramic vessels. However, for most of the mounds that contained burials all four of the other features were found frequently.

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

6.2.2.6 Neale Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.10 summarizes the presence of features in excavated mounds at Neale. Of the 88 mounds at Neale, the total number of excavated mounds included nine geometric and 15 effigy mound forms. Mounds with burials composed 46% (n=11) of the sample and 54% (n=13) contained no burials. Sixty-four percent of the mounds without burials (n=7/13) contained other features. Four of these mounds contained clay and pebble cists. One of these four mounds contained clay and pebble cist, an earthen fireplace, and a stone altar.

The frequency of mounds with burials that included clay and pebble cists was 27% (n=3/11) of the sample. Thirty-six percent of mounds with burials (n=4/11) also contained earthen fireplaces. Mounds with stone altars and burials composed 27% (n=3/11). Two (18%) mounds with burials also contained ceramic vessels. Mounds with burials that also included two or more additional features composed 36% (n=4/11) of the sample.

Table 6.10 Frequency of occurrence and co-variation of features in excavated mounds in the Neale mound group

	Frequency	Percent*
Mounds with burial(s)	11	46
Mounds with burials and any other features	7	64
Mounds without burial(s)	13	54
Mounds without burial that contain other features	6	46
Mounds with burials and cists	3	27
Mounds with burials and earthen fireplaces	4	36
Mounds with burials and stone altars	3	27
Mounds with burials and ceramic vessels	2	18
Mounds with burials and 2+ features	4	36
Total number of mounds excavated	24	

In summary, the Neale mound group presents relatively even numbers of mounds with and without burials. Mounds without burials may contain other features including earthen fireplaces, stone altars and clay and pebble cists. However, for most of the mounds that contained burials there were also clay and pebble cists, earthen fireplaces, stone altars, and ceramic vessels.

6.2.2.7 Kletzien Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.11 summarizes the presence of features in excavated mounds at Kletzien. Of the 33 mounds at Kletzien, the number of mounds excavated included eight geometric mound forms, 17 effigy mounds forms and two indeterminate mound forms. Mounds with burials composed 52% (n=14) of the samples and 48% (n=13) of the mounds contained no burials.

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

Mounds without burials that included other features was 15% (n=2/13), and both mounds included earthen fireplaces.

Mounds with burials that also included additional features was 57% (n=8/14) of the sample. Both clay and pebble cists and stone altars were absent in the mound group. Mounds with burials that also contained earthen fireplaces composed 43% (n=6) of the sample. Two (14%) mounds with burials contained ceramic vessels. None of the mounds with burials contained more than one additional feature.

Table 6.11 Frequency of occurrence and co-variation of features in excavated mounds in the Kletzien mound group

	Frequency	Percent*
Mounds with burial(s)	14	52
Mounds with burials and any other features	8	57
Mounds without burial(s)	13	48
Mounds without burial that contain other features	2	15
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	6	43
Mounds with burials and stone altars	0	0
Mounds with burials and ceramic vessels	2	14
Mounds with burials and 2+ features	0	0
Total number of mounds excavated	27	

In summary, the Kletzien Creek mounds have a fairly equal proportion of mounds with and without burials. Mounds without burials rarely contained any other features. In general, there seems to be a strong association between the presence of a burial and the co-occurrence of other features (i.e. earthen fireplaces and ceramic vessels).

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

6.2.2.8 Kolterman Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Of the 22 mounds that originally composed the Kolterman group, the total number of mounds excavated included four effigy mound forms. Mounds with burials composed 100% (n=4) of the mounds. Only one mound contained both an earthen fireplace and a ceramic vessel.

6.2.2.9 Nitschke Results

The following description is based on the results in Appendix C which presents the presence of the five features included in this research. Table 6.12 summarizes the presence of features in excavated mounds at Nitschke. Of the 62 mounds at Nitschke, excavated included 18 geometric mound forms and 14 effigy mound forms. Mounds with burials composed 76% (n=28) and 24% (n=9) contained no burials. There were no features included in any other mounds that did not also contain burials. Mounds with burials that include additional features was 21% (n=6/28) of the sample. Mounds with burials that also contained earthen fireplaces composed 4% (n=1) of the sample and stone altars composed 11% (n=3) of the sample. Three (11%) mounds with burial contained ceramic vessels. Only one mound with a burial feature contained more than one additional feature.

Table 6.12 Frequency of occurrence and co-variation of features in excavated mounds in the Nitschke mound group

	Frequency	Percent*
Mounds with burial(s)	28	76
Mounds with burials and any other features	6	21
Mounds without burial(s)	9	24
Mounds without burial that contain other features	0	0
Mounds with burials and cists	0	0
Mounds with burials and earthen fireplaces	1	4
Mounds with burials and stone altars	3	11
Mounds with burials and ceramic vessels	3	11
Mounds with burials and 2+ features	1	4
Total number of mounds excavated	37	

In summary, the Nitschke mounds predominantly contained burials. Mounds without a burial feature contained no additional features. However, the presence of additional features is minimal at Nitschke.

Table 6.13 presents the presence of mound features among all mound groups. The majority of mounds contained burials except for Kratz Creek and Neale. Additional features were common when burials were also present at Raisbeck, Kratz Creek, McClaughry, Neale, and Kletzien. Mounds that did not contain burials usually did not contain other features in the mound. Mounds that contained earthen fireplaces and stone altars and burials were not that frequent, but when earthen fireplaces and stone altars were present they tended to co-occur in the same mound with a burial.

* Percentiles do not total 100% because each row is an independent examination of the presence or co-variation of features.

Table 6.13 Summary table of frequency and approximate percentage of features occurring in mound groups. (PL=Polander, RB=Raisbeck, TB=Trowbridge, KZ=Kratz Creek, MC=McClaughry, NL=Neale, KL=Kletzien, KM=Kolterman, NK=Nitschke)

	PL	RB	TB	KZ	MC	NL	KL	KM	NK
Mounds with burial	15 83%	18 90%	13 76%	8 22%	28 80%	11 46%	14 52%	4 100%	28 76%
Mounds with burials with any features	2 13%	13 72%	1 8%	5 63%	16 57%	7 64%	8 57%	1 25%	6 21%
Mounds without burials	3 17%	2 10%	4 24%	28 78%	7 20%	13 54%	13 48%	0 0%	9 24%
Mounds without burial that contain any features	1 33%	1 50%	0 0%	4 14%	3 43%	6 46%	2 15%	0 0%	0 0%
Mounds with burials and cists	0 0%	0 0%	0 0%	0 0%	6 21%	3 27%	0 0%	0 0%	0 0%
Mounds with burials and Earthen Fireplaces	1 7%	5 28%	0 0%	4 50%	5 18%	4 36%	6 43%	1 25%	1 4%
Mounds with burials and stone altars	1 7%	10 56%	0 0%	2 25%	9 32%	3 27%	0 0%	0 0%	3 11%
Mounds with burials and ceramic vessels	0 0%	1 6%	1 8%	3 38%	4 14%	2 18%	2 14%	1 25%	3 11%
Mounds with burials and 2+ features	0 0%	2 11%	0 0%	4 50%	7 25%	4 36%	0 0%	1 25%	1 4%
Total number of mounds excavated	18	20	17	36	35	24	27	4	37

Table 6.14 summarizes the presence of features in mounds among the physiographic regions.

6.2.2.10 Western Upland Physiographic Region Results

The Western Uplands physiographic region was composed of 84% (n=46) of mounds with burials mounds and 16% (n=9) did not contain burials. Of the mounds that did not contain burials, 22% (n=2/9) contained other non-burial features. The frequency of mounds containing burials and other features was 35% (n=16/46). No clay and pebble cists were uncovered in the Western Uplands mound groups. Mounds containing burials and earthen fireplaces composed 13%(n=6/46) of the sample. Mounds containing burials and stone altars composed 24% (n=11/46) of the sample.

Mounds containing both burials and ceramic vessels and more than one additional feature composed 4% (n=2/46) of the sample.

In summary, the Western Uplands mounds predominantly contained burials. Few of the mounds with burials contained other features. Finally, about one-third of the mounds contained other features, suggesting a weak association between burials and other features.

Table 6.14 Summary table of frequency and approximate percentage of features occurring in physiographic regions.

	Western Uplands	Central Plain	Eastern Ridges and Lowlands
Mounds with burial	46 84%	47 49%	46 68%
Mounds with burials with any features	16 35%	25 53%	15 33%
Mounds without burials	9 16%	48 51%	22 32%
Mounds without burial that contain any features	2 22%	13 27%	2 9%
Mounds with burials and Clay and pebble cists	0 0%	9 19%	0 0%
Mounds with burials and Earthen Fireplaces	6 13%	13 28%	8 17%
Mounds with burials and stone altars	11 24%	14 30%	3 7%
Mounds with burials and ceramic vessels	2 4%	9 19%	6 13%
Mounds with burials and 2+ features	2 4%	15 32%	2 9%
Total number of mounds excavated	55	95	68

6.2.2.11 Central Plain Physiographic Region Results

The Central Plains physiographic region was composed of 49% (n=47/95) of mounds with burial features and 51% (n=48/95) of mounds without burials (Table 6.14). Twenty-seven percent (n=13/48) of mounds without burials contained other features.

The frequency of mounds with burials that contained any other features was 53% (n=25/47). Although no clay and pebble cists were found at Kratz Creek, mounds with burials also containing clay and pebble cists composed 19% (n=9/47) of the sample. Mounds with burials that also co-varied with earthen fireplaces composed 28%(n=13/47) of the sample. Mounds with burials that also contained stone altars composed 30% (n=14/47) of the sample. Mounds with burials that also contained ceramic vessels composed 19% (n=9/47) of the sample. Mounds with burial that also contained more than one additional feature composed 32% (n=15/47) of the sample.

In summary, the Central Plains mounds were composed of approximately equal numbers of mounds with and without burial features. Approximately one-fourth of the mounds without burial contained other features, while over half the mounds with burial contained other features, suggesting a weak association of burials with other features.

6.2.2.11 Eastern Ridges and Lowlands Physiographic Region Results

Table 6.14 summarizes the results of the number of mounds with features present. Within the Eastern Ridges and Lowlands physiographic region 68% (n=46/68) of mounds contained burials and 32% (n=22/68) of mounds did not. Nine percent (n=2/22) of mounds without burial contained other features.

The frequency of mounds containing burials and any other features was 33% (n=15/46) of the sample. Mounds with burials and earthen fireplaces composed 17% (n=8/46) of the sample. Mounds with burials and stone altars composed 7% (n=3/46) of the sample. Mounds containing burials and ceramic vessels composed 13% (n=6/46) of the sample. Finally, mounds with burial and more than one additional feature comprised 9% (n=2/46) of the sample.

In summary, a little over two-thirds of the mounds contained burials and those that did had about a third with associated features. For this region, the mounds without burial had a very low frequency of any of the other four features.

6.2.3 Horizontal and Vertical Position of Features

Thus far Research Question #1 dealt with the relative frequencies and associations of the various features among the mound groups and physiographic regions. The next section addresses another dimension of the ritual program of the effigy peoples that constructed and maintained the mound groups. Specifically, this section focuses on the spatial preference for placement of various features, on the horizontal and vertical axis of effigy and geometric mound forms.

Before describing the horizontal and vertical positioning of specific features, the frequency of specific mound forms in the study is reviewed. As can be observed in Table 6.15 there are 21 different mound forms in this research. The first four are commonly categorized as geometric forms and the remaining 17 are commonly categorized as effigy forms. Problematic and Unclassified forms are those that either did not fit a predefined category or were eroded beyond recognition. These forms were typically defined as some type of effigy form. The two Indeterminate mound forms could not be classified as either geometric or effigy forms. Because mound forms are diverse, the mound forms were recoded into two broad categories of effigy and geometric mound forms. The indeterminate forms were excluded from the analyses in this section.

Table 6.15 Frequency and percentage of mound forms excavated in each mound group

Mound Form	Frequency of Excavated Mounds	Percent of Sample
Conical	109	50.2
Linear	13	5.9
Oval	8	3.6
Biconical	4	1.8
Turtle	2	1.0
Beaver	1	0.5
Egg	1	0.5
Fish	1	0.5
Gourd-like	1	0.5
Lizard	1	0.5
Moccasin	1	0.5
Squirrel	1	0.5
Rabbit	1	0.5
Buffalo	1	0.5
Otter	3	1.4
Panther	18	8.3
Bear	9	4.1
Bird	10	4.6
Deer	8	3.6
Problematic Effigy	13	6.0
Unclassified form	4	1.8
Indeterminate	2	0.9
Canine	5	2.3
Total	217	100.0

Table 6.16 describes the frequency of the mound forms after they were recoded as geometric or effigy mound forms. The indeterminate mounds were excluded from the analysis. It must be cautioned that the frequencies represent only the mounds excavated and not the total number of mounds in each mound group.

Table 6.16 Frequency of excavated mound forms in each mound group

Mound Group	Geometric	Effigy	Total
Kletzien	8	17	25
Kolterman	0	4	4
Kratz Creek	22	14	36
McClaughry	31	5	36
Neale	9	15	24
Nitschke	18	19	37
Polander	16	0	16
Raisbeck	16	4	20
Trowbridge	15	2	17
Total	135	80	215

Table 6.17 presents the frequency distributions of mound forms among the physiographic regions. Although geometric forms appear to be the dominant form overall, clearly effigy mound forms dominate the Eastern Ridges and Lowlands. Again, these frequencies include only the mounds excavated and not all the mounds observed in the regions.

Table 6.17 Frequency of effigy and geometric mound forms among the physiographic regions

Physiographic Regions	Geometric	Effigy	Total
Central Plain	62	34	96
Eastern Ridges and Lowlands	26	40	66
Western Upland	47	6	53
Total	135	80	215

In this section, all features in the horizontal dimension will be examined as though from a bird's-eye view with the following values used to assess the geometric mounds including: center and far from center. For effigy mound forms the following “anatomic” values were used including: head, heart, hip, tail, stomach, between rear legs. For both geometric and effigy mound forms the following values will be used to analyze the vertical dimension: a) above mound floor, b) on mound floor, c) and below mound floor. An important confounding effect in this section is that rarely were entire mounds excavated; instead excavators exposed areas of the mounds that, from previous excavations, demonstrated a patterned presence of features.

6.2.3.1 Horizontal Dimension of Burial Features

Figure 6.3 presents the frequency of the horizontal position of burials in effigy mound forms. Polander was excluded from this analysis since all mounds in that mound group were geometric forms. There are a total of 60 burials in effigy mound forms and 39 of those were found in the heart position. Although burials occur most often in the heart position of effigy mound forms, burials can also occur in the head, stomach, hip, tail, and between the rear legs. It should be noted that, if a burial occurs in an effigy mound form, the burial was typically found interred in the heart position first, followed by additional burials occurring elsewhere in the mound.

The result of a Fisher’s exact test indicated no important differences in the frequency of horizontal position among mound groups ($p=0.543$) and physiographic regions ($p=0.577$).

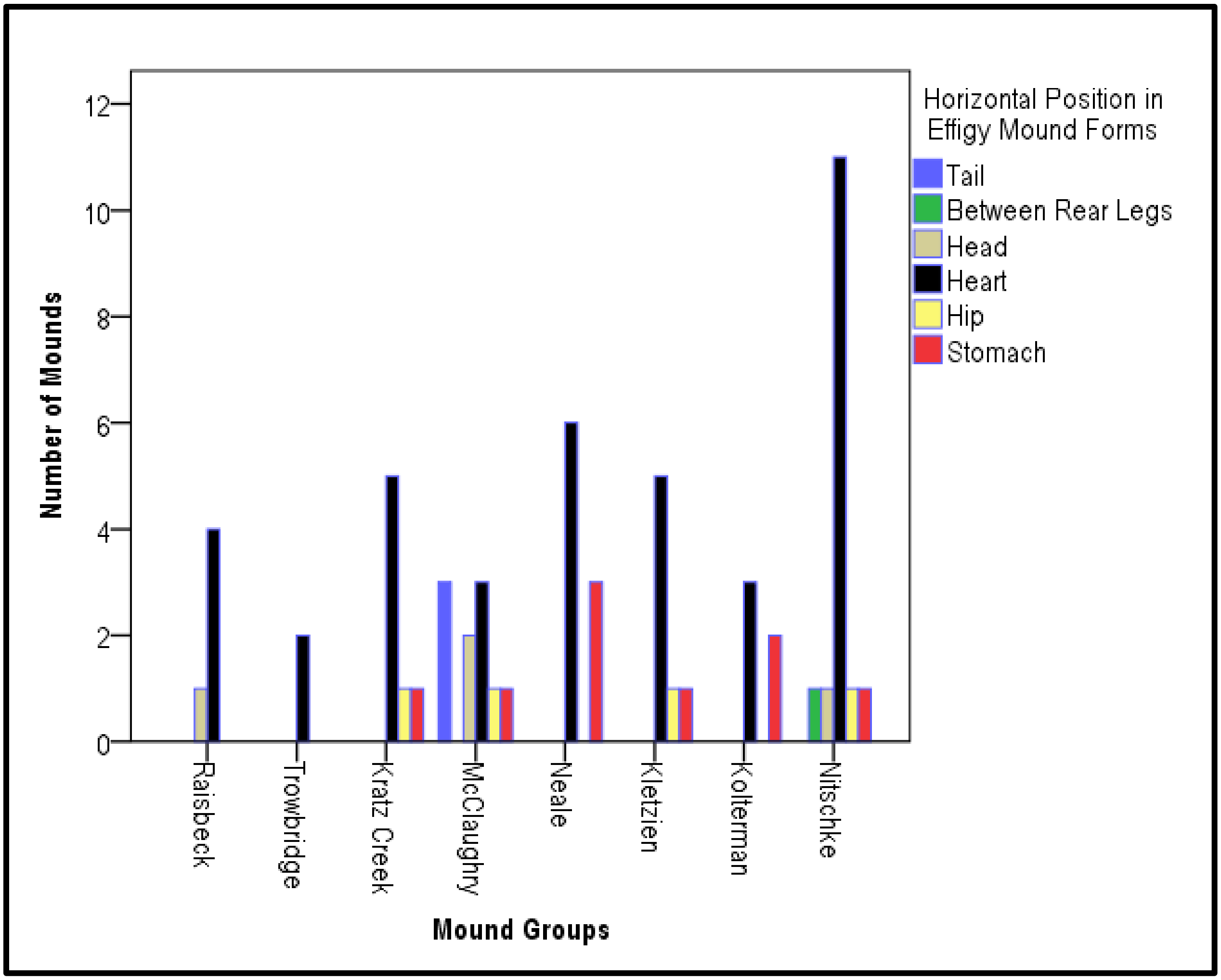


Figure 6.3 Frequency of the horizontal position of burials in effigy mound forms among mound groups

Next, the horizontal position of burials in geometric mounds was examined. Two possibilities are possible for the position of burials in geometric mounds; in or near the center of the mound or far from center. There were a total of 117 burials in geometric mound forms, only nine of which were found far from the center of the mounds for all mound groups. Therefore, it is concluded that the typical burial pattern among all mound groups was in or near the center of a geometric mound.

6.2.3.2 Horizontal Dimension of Clay and Pebble Cist Features

Since clay and pebble cists only occur in the Neale and McClaughry mound groups it makes little sense to analyze these data. At both McClaughry and Neale two clay and pebble cists were found in effigy mound forms. At McClaughry one was found in the tail and one was found in the heart position. At Neale one clay and pebble cist was found in the head position and one was found in the heart position. At McClaughry seven clay and pebble cists were found in the center of geometric mound forms and one was found far from the center. In geometric mound forms at Neale nine clay and pebble cists were found in the center and three were found far from the center. It appears these features at these two sites were found in the same locations as burials would be found, suggesting these features had important meaning to the people who built the mounds.

6.2.3.3 Horizontal Dimension of Earthen Fireplace Features

Figure 6.4 presents the frequency and expected counts of the horizontal positions of earthen fireplaces in effigy mound forms. Two of the Western Upland mound groups were excluded because a) there were no effigy mound forms at Polander and b) no earthen fireplaces were found in the Trowbridge effigy mound forms. To review, the heart position is the mode for burial deposition in effigy mound forms, followed closely by the hip and stomach positions. With the exception of Kletzien and Kolterman, this same pattern is evident for earthen fireplaces.

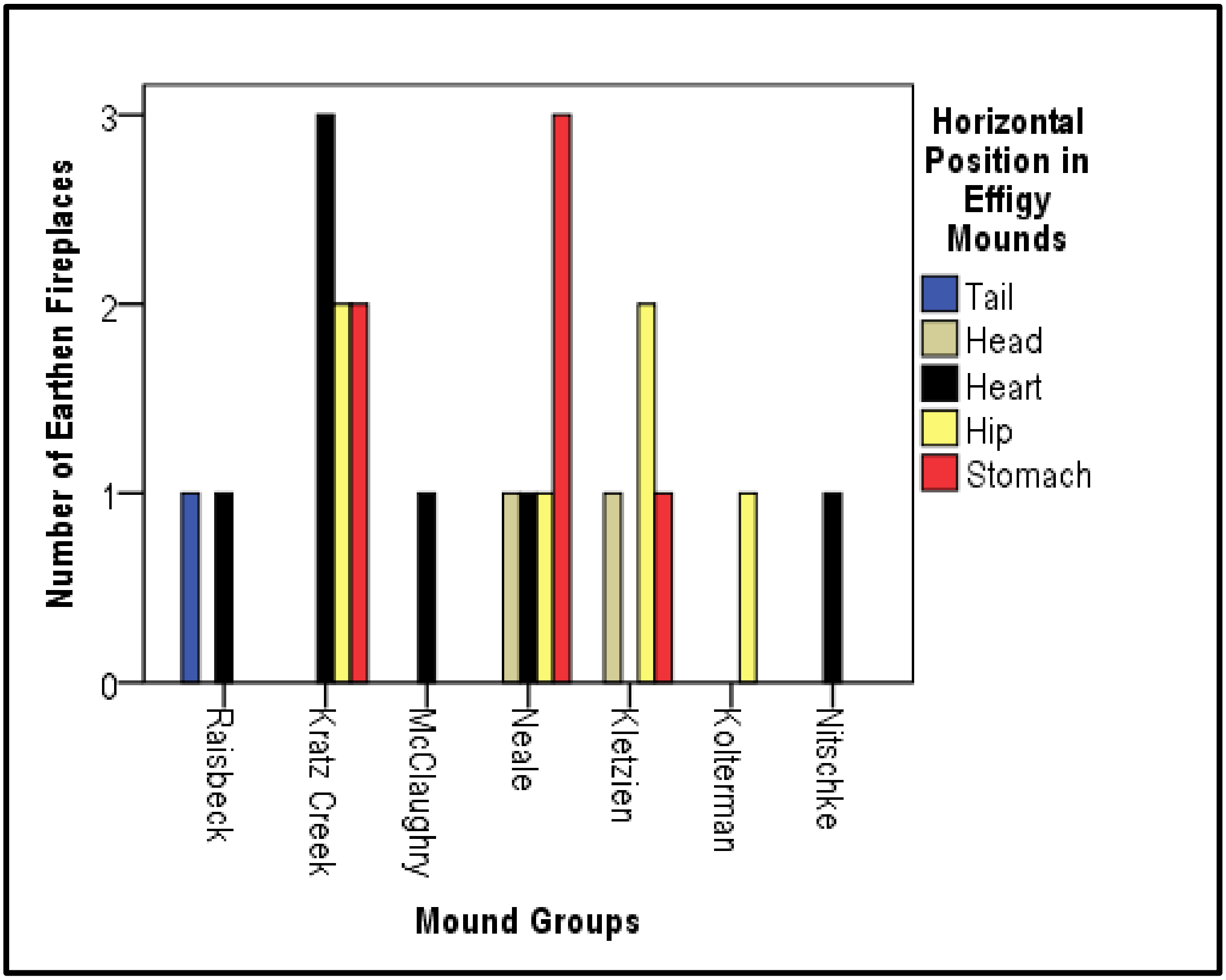


Figure 6.4 Frequency of the horizontal position of earthen fireplaces in effigy mounds among mound groups

The next analysis focuses on the horizontal position of earthen fireplaces in geometric mounds among mound groups. Table 6.18 presents the frequency of fireplaces among the mound groups. Of the 28 geometric mounds, only six mounds contained earthen fireplaces far from the center. Five of the nine groups are represented since earthen fireplaces were absent from geometric mounds at Polander and Trowbridge (Western Uplands) and Nitschke (Eastern Ridges and Lowlands) and there were no excavated geometric mounds at Kolterman.

Table 6.18 Frequency of horizontal positions of earthen fireplaces in geometric mound forms among mound groups

Mound Group	Center	Far From Center	Total
Kletzien	2	0	2
Kratz Creek	6	0	6
McClaughry	4	2	6
Neale	2	2	4
Raisbeck	8	2	10
Total	22	6	28

6.2.3.4 Horizontal Dimension of Stone Altar Features

Table 6.19 presents the frequency of stone altars among the mound groups. Four of the nine mound groups are represented since stone altars were absent from effigy mounds at Polander and Trowbridge (Western Uplands), Kratz Creek (Central Plains) and Kolterman and Kletzien (Eastern Ridges and Lowlands). Again, the modal horizontal position was in the heart position, followed closely by the head position.

Table 6.19 Frequency of the horizontal positions of stone altars in effigy mound forms among mound groups

Mound Group	Wing	Head	Heart	Stomach	Total
McClaughry	0	2	4	2	8
Neale	0	1	1	0	2
Nitschke	0	1	1	0	2
Raisbeck	1	1	0	0	2
Total	1	5	6	2	14

For geometric mound forms (Table 6.20) six of the nine groups are represented since stone altars were absent from geometric mound forms at Trowbridge (Western Uplands) and Kletzien (Eastern Ridges and Lowlands) and there were no excavated geometric mound forms at Kolterman. Of the 34 geometric mounds, 10 mounds contained stone altars far from the center.

Table 6.20 Frequency of the horizontal positions of stone altars in geometric mound forms among mound groups

Mound Group	Center	Far From Center	Total
Kratz Creek	6	0	6
McClaughry	5	4	9
Neale	3	0	3
Nitschke	1	0	1
Polander	2	0	2
Raisbeck	7	6	13
Total	24	10	34

6.2.3.5 Horizontal Dimension of Ceramic Vessel Features

The next analysis focuses on the horizontal position of ceramic vessels in effigy mound forms among mound groups. Table 6.21 presents the frequency of ceramic vessels among the mound groups. Four of the nine groups are represented since stone altars were absent from effigy mound forms in all three Western Upland sites, and Kolterman and Kletzien (Eastern Ridges and Lowlands). Again, the modal horizontal position is in the heart position, followed by the stomach position. Of the nine ceramic vessels found in effigy mound forms three were from Nitschke (Eastern Ridges and Lowlands). All three Central Plains mound groups contained ceramic vessels in effigy mound forms.

Table 6.21 Frequency of the horizontal positions of ceramic vessels in effigy mound forms among mound groups

Mound Group	Heart	Hip	Stomach	Total
Kratz Creek	2	0	0	2
McClaughry	2	0	0	2
Neale	0	1	1	2
Nitschke	1	0	2	3
Total	5	1	3	9

Table 6.22 presents the frequency of ceramic vessels within geometric mound forms among the mound groups. Five of the nine groups are represented since ceramic vessels were absent from geometric mounds at Polander and Raisbeck (Western Uplands); Neale (Central Plains); and Kolterman (Eastern Ridges and Lowlands) had no excavated geometric mound forms. Of 11 instances of ceramic vessels occurring in geometric mound forms, only three were found far from center.

Table 6.22 Frequency of the horizontal positions of ceramic vessels in geometric mound forms among mound groups

Mound Group	Center	Far From Center	Total
Kletzien	1	0	1
Kratz Creek	2	0	2
McClaughry	4	2	6
Nitschke	1	0	1
Trowbridge	0	1	1
Total	8	3	11

6.2.3.6 Vertical Dimension of Burial Features

This section focuses on the analyses of the potential differences of vertical position of burials among mound groups and physiographic regions. Table 6.23 and Figure 6.5 present the frequency of the three vertical positions among mound groups. The most frequent form of burial is in a pit below the mound floor, followed by burial on the mound floor. Unfortunately, due to zero values in many cells and lower than expected cell counts, the results of the Chi-square and Fisher’s Exact tests were inconclusive

Table 6.23 Frequency of vertical burial positions among mound groups

Mound Groups	Mound Floor	Below Mound Floor	Above Mound Floor	Total
Kletzien	5	11	0	16
Kolterman	0	5	0	5
Kratz Creek	0	4	8	12
McClaughry	17	19	10	46
Neale	0	11	1	12
Nitschke	22	14	2	38
Polander	3	10	3	16
Raisbeck	3	11	6	20
Trowbridge	4	8	8	20
Total	54	93	38	185

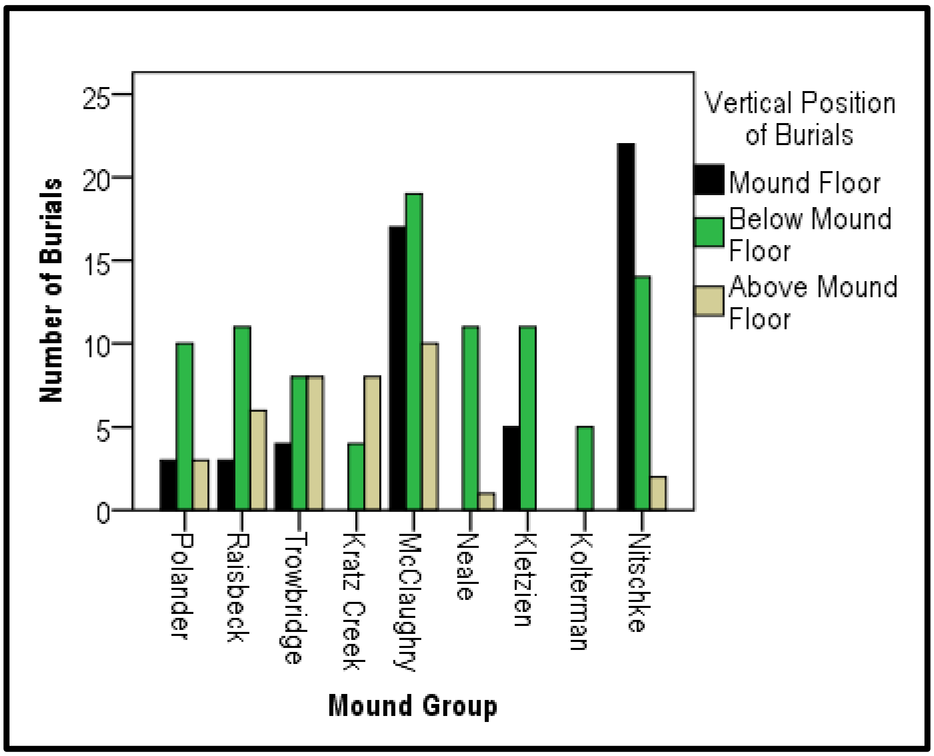


Figure 6.5 Frequency of vertical positions of burials among mound groups

Table 6.24 and Figure 6.6 present the frequency and expected counts for the vertical positions of burials among physiographic regions. What is significant is that there are relatively large differences between the expected and actual counts for the mound floor and above mound floor positions, particularly in the Eastern Ridges and Lowlands and Western Upland regions.

Table 6.24 Frequency and expected counts of vertical burial positions among physiographic regions

Physiographic Regions		Mound Floor	Below Mound Floor	Above Mound Floor	Total
Central Plain	Observed	17.0	34.0	19.0	70.0
	Expected	20.4	35.2	14.4	70.0
Eastern Ridges and Lowlands	Observed	27.0	30.0	2.0	59.0
	Expected	17.2	29.7	12.1	59.0
Western Upland	Observed	10.0	29.0	17.0	56.0
	Expected	16.3	28.2	11.5	56.0
Total		54.0	93.0	38.0	185.0

Figure 6.6 illustrates how the Eastern Ridges and Lowlands are dramatically different in number and proportion of mound floor and above mound floor frequencies, relative to below the mound floor. A Fisher's Exact test indicates important differences (*p*=0.000) in the frequency of vertical positions among the physiographic regions.

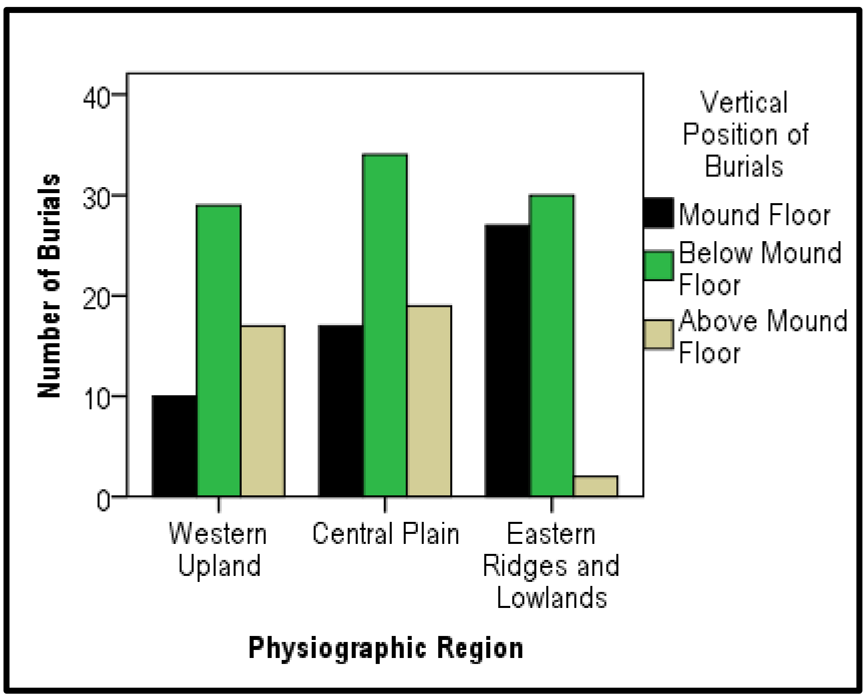


Figure 6.6 Frequency of vertical positions of burials among physiographic regions

6.2.3.7 Vertical Dimension of Clay and Pebble Cist Features

Table 6.25 presents the frequency of clay and pebble cists among the McClaughry and Neale mound groups. As mentioned previously, these are the only two groups where this feature is present. Further, clay and pebble cists frequently occur in pairs and are commonly placed above the mound floor. There are a total of 25 clay and pebble cists, 10 at McClaughry and 15 at Neale. At McClaughry all 10 are above the mound floor, while at Neale, two were on the mound floor, two were below the mound floor, and 11 were found above the mound floor.

Table 6.25 Frequency of the vertical positions of clay and pebble cists among mound groups

Mound Group	Mound Floor	Below Mound Floor	Above Mound Floor	Total
McClaughry	0	0	10	10
Neale	2	2	11	15
Total	2	2	21	25

6.2.3.8 Vertical Dimension of Earthen Fireplace Features

Table 6.26 and Figure 6.7 present the frequency of earthen fireplaces among the mound groups. Six of the nine sites are represented in the table because earthen fireplaces are absent from Polander and Trowbridge (Western Uplands) and Kolterman (Eastern Ridges and Lowlands). As can be seen in Table 6.25 there are important differences between actual and expected counts in many of the cells. In the Raisbeck and Kratz Creek mound groups earthen fireplaces only occur above and below the mound floor. At Neale and Nitschke earthen fireplaces only occur on the mound floor. At McClaughry earthen fireplaces occur on or above the mound floor. At Kletzien earthen fireplaces were found on or below the mound floor.

Of the mound groups containing earthen fireplaces, employing a Fisher's Exact test resulted in important differences (p=.000) in the vertical positions among mound groups.

Table 6.26 Frequency of vertical positions of earthen fireplaces among mound groups

Mound Group		Mound Floor	Below Mound Floor	Above Mound Floor	Total
Kletzien	Observed	5.0	2.0	0.0	7.0
	Expected	3.1	0.9	3.1	7.0
Kratz Creek	Observed	0.0	2.0	10.0	12.0
	Expected	5.2	1.5	5.2	12.0
McClaughry	Observed	3.0	0.0	2.0	5.0
	Expected	2.2	0.6	2.2	5.0
Neale	Observed	8.0	0.0	0.0	8.0
	Expected	3.5	1.0	3.5	8.0
Nitschke	Observed	1.0	0.0	0.0	1.0
	Expected	0.4	0.1	0.4	1.0
Raisbeck	Observed	0.0	1.0	5.0	6.0
	Expected	2.6	0.8	2.6	6.0
Total		17.0	5.0	17.0	39.0

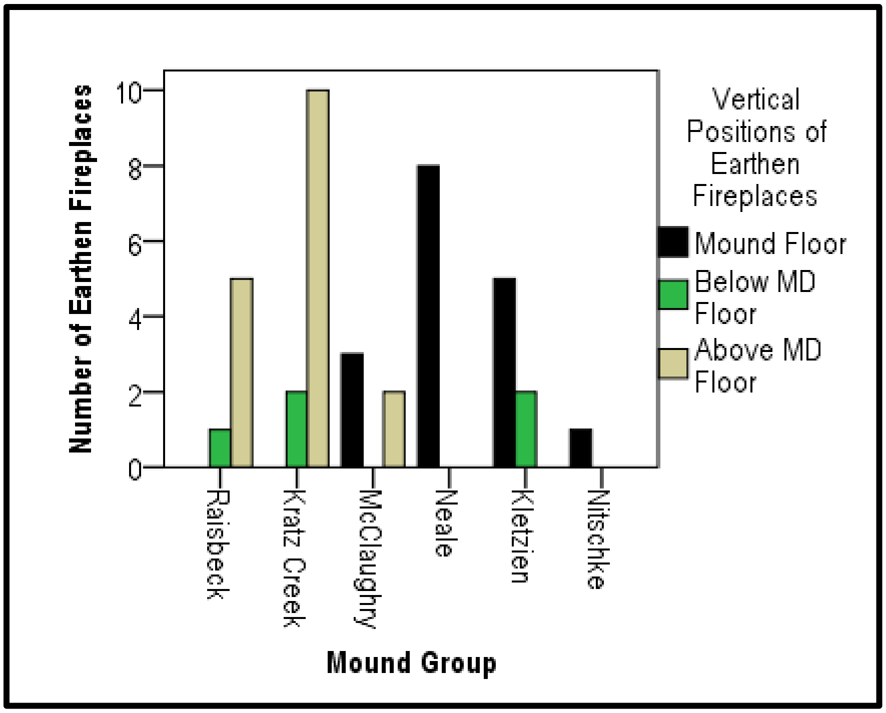


Figure 6.7 Frequency of vertical positions of earthen fireplaces among mound groups

Following are the results of the analysis for patterns and differences among physiographic regions (Table 6.27). Here the differences are evident in that the mound floor and above the mound floor are the typical areas for earthen fireplace placement in the Central Plains. For the Eastern Ridges and Lowlands the most frequent placement was on the mound floor. For the Western Uplands the most frequent placement of earthen fireplaces was above the mound fill. Results of the Fisher's Exact test were that there were important differences (p=0.004) in the vertical position of earthen fireplaces among physiographic regions.

Table 6.27 Frequency of the vertical position of earthen fireplaces among physiographic regions

Physiographic Region		Mound Floor	Below Mound Floor	Above Mound Floor	Total
Central Plain	Observed	11.0	2.0	12.0	25.0
	Expected	10.9	3.2	10.9	25.0
Eastern Ridges and Lowlands	Observed	6.0	2.0	0.0	8.0
	Expected	3.5	1.0	3.5	8.0
Western Upland	Observed	0.0	1.0	5.0	6.0
	Expected	2.6	0.8	2.6	6.0
Total		17.0	5.0	17.0	39.0

6.2.3.9 Vertical Dimension of Stone Altar Features

Table 6.28 and Figure 6.8 present the frequency of stone altars among the mound groups. Six of the nine mound groups are represented. Trowbridge (Western Uplands) and Kletzien and Kolterman are absent from the analysis since no stone altars were found at those sites. Notable is the discrepancy among most counts and expected counts. At Polander the two stone altars were only found on the mound floor. At Raisbeck and McClaughry stone altars were found at all three vertical positions. At Kratz Creek stone altars were found on or above the mound floor. At Neale stone altars were found on or below the mound floors. At Nitschke stone altars were only found above the mound floor.

The results of the Fisher's Exact test indicates important differences (p=.002) in the vertical position of stone altars among mound groups.

Table 6.28 Frequency and expected counts of the vertical positions of stone altars among mound groups

Mound Group		Mound Floor	Below Mound Floor	Above Mound Floor	Total
Kratz Creek	Observed	1.0	0.0	5.0	6.0
	Expected	2.6	1.1	2.3	6.0
McClaughry	Observed	10.0	4.0	3.0	17.0
	Expected	7.4	3.2	6.4	17.0
Neale	Observed	6.0	1.0	0.0	7.0
	Expected	3.1	1.3	2.6	7.0
Nitschke	Observed	0.0	0.0	3.0	3.0
	Expected	1.3	0.6	1.1	3.0
Polander	Observed	2.0	0.0	0.0	2.0
	Expected	0.9	0.4	0.8	2.0
Raisbeck	Observed	2.0	4.0	7.0	13.0
	Expected	5.7	2.4	4.9	13.0
Total		21.0	9.0	18.0	48.0

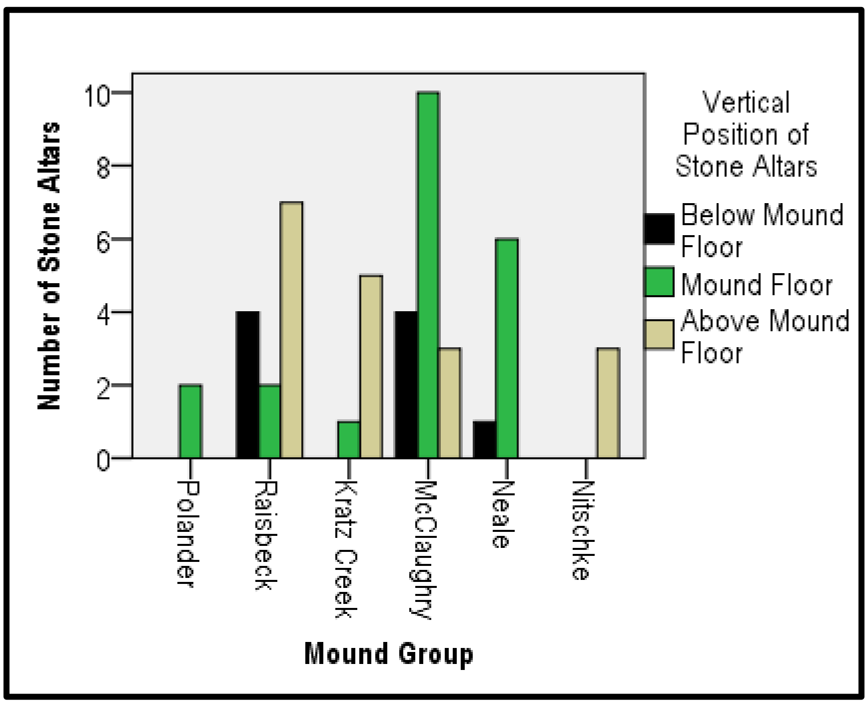


Figure 6.8 Frequency of vertical positions of stone altars among mound groups

Table 6.29 presents the frequency of vertical positions among physiographic regions. In the Central Plain there was a preference for stone altars on the mound floor.

In the Eastern Ridges and Lowlands, although stone altars are rare, three were found above the mound floor. In the Western Uplands there was a preference for deposit above the mound floor; however they were found frequently in the other two locations. The results of the Fisher's Exact test indicates an important difference (*p*=0.066) in the vertical position of stone altars among the physiographic regions.

Table 6.29 Frequency of vertical positions of stone altars among physiographic regions

Physiographic Region		Vertical Positions of Stone Altars			Total
		Mound Floor	Below Mound Floor	Above Mound Floor	
Central Plain	Observed	17.0	5.0	8.0	30.0
	Expected	13.1	5.6	11.3	30.0
Eastern Ridges and Lowlands	Observed	0.0	0.0	3.0	3.0
	Expected	1.3	0.6	1.1	3.0
Western Upland	Observed	4.0	4.0	7.0	15.0
	Expected	6.6	2.8	5.6	15.0
Total		21.0	9.0	18.0	48.0

6.2.3.10 Vertical Dimension of Ceramic Vessel Features

Table 6.30 presents the frequency of ceramic vessels among the mound groups. Six of the nine mound groups are represented. Raisbeck and Polander (Western Uplands) and Kolterman are absent from the analysis since no ceramic vessels were found in those mound groups. The Fisher's Exact tests indicate a shared pattern (p=.433) among mound groups and physiographic regions.

Table 6.30 Frequency of vertical positions of ceramic vessels among mound groups

Mound Group	Mound Floor	Below Mound Floor	Above Mound Floor	Total
Kletzien	1	1	0	2
Kratz Creek	0	1	3	4
McClaughry	2	4	2	8
Neale	2	0	0	2
Nitschke	2	1	1	4
Trowbridge	0	1	0	1
Total	7	8	6	21

6.3 Results for Research Question #2

Research Question #2: Is there significant patterning (similarities and/or differences) in the postmortem treatment of burials (burial disposition) among mound groups and the physiographic regions within which those mounds are found?

This question will be examined in three different ways. The first set of analyses focus on potential differences in the burial disposition of individual burials among mound groups and physiographic regions. Here the level of analysis focuses on the *individual burials* in the mound group. Individual burials may contain multiple individuals with differing postmortem treatments. For example, if a mound contained two burials, one primary and one cremation, the data was recorded as one primary and one secondary burial. Second, the postmortem treatment of aggregated burials (combined postmortem treatment of all burials) within single mounds will be analyzed for potential differences among mound groups and physiographic regions. Here the level of analysis focuses on the *individual mounds* in the mound group. For example, if a mound contained a primary and secondary burial, the mound is characterized as a “mixed” burial mound. Finally, potential differences between geometric and effigy mound forms in the postmortem treatment of *individual burials* are investigated among mound groups and physiographic regions. Here the level of analysis focuses on the *individual burials* in the mound group.

Table 6.31 presents the frequencies for the disposition of burials in each mound group. This table presents the great variation in burial treatment at the mound level. What is clear is that secondary burial treatment is the primary mode of postmortem treatment. Also note that there were 135 mounds that contained some type of burial.

Table 6.31 Frequency of all burial dispositions represented in a mound for all mound groups (Indet = Unknown burial type, 1^0=Primary burial, 2^0= Secondary burial, Crem=Cremation)

	Indet	1^0	2^0	1^0, 2^0	Crem	1^0, 2^0, Crem	2^0, Crem	1^0, Indet	2^0, Indet	1^0 Crem	1^0,2^0, Indet	Total Mounds
Kletzien	6	2	2	1	0	0	0	0	0	1	0	14
Kolterman	2	0	0	0	1	0	0	0	0	1	0	4
Kratz Creek	2	0	1	0	1	1	0	0	0	0	0	8
McClaughry	2	11	11	4	0	0	7	0	1	0	1	29
Neale	4	2	2	0	0	1	0	0	0	0	0	11
Nitschke	5	6	6	4	0	0	0	1	2	0	0	28
Polander	0	5	5	1	0	0	0	0	0	0	0	10
Raisbeck	3	10	10	0	0	0	0	0	1	0	0	18
Trowbridge	2	5	5	1	0	0	0	1	0	0	2	13
Total	26	35	41	11	2	2	7	2	4	2	3	135

Given the great variation in postmortem treatment, the values were recoded as primary, secondary, or a mixed burial (primary and secondary). Secondary burial here includes bundle burials and cremations. Table 6.32 and Figure 6.9 present the frequency of burial type among mound groups, when only individual burials are considered. Secondary burial is the mode for burial while mixed burials are rare when just the burials are considered. All mound groups with the exception of Kletzien, Kratz Creek, and Nitschke exhibited higher frequencies of secondary burials. After the mixed burials were excluded from the analysis, the result of the Fisher's Exact test indicates an important difference (p=0.001) in the frequency of primary and secondary burials among mound groups.

Table 6.32 Frequency of Burial disposition among mound groups

Mound Group		Primary	Secondary	Mixed	Total
Kletzien	Observed	6.0	3.0	1.0	10.0
	Expected	3.7	5.7	0.7	10.0
Kolterman	Observed	1.0	2.0	0.0	3.0
	Expected	1.1	1.7	0.2	3.0
Kratz Creek	Observed	8.0	3.0	0.0	11.0
	Expected	4.0	6.3	0.7	11.0
McClaughry	Observed	6.0	32.0	4.0	42.0
	Expected	15.4	23.9	2.7	42.0
Neale	Observed	5.0	2.0	0.0	7.0
	Expected	2.6	4.0	0.5	7.0
Nitschke	Observed	17.0	12.0	2.0	31.0
	Expected	11.3	17.6	2.0	31.0
Polander	Observed	6.0	11.0	0.0	17.0
	Expected	6.2	9.7	1.1	17.0
Raisbeck	Observed	4.0	12.0	0.0	16.0
	Expected	5.9	9.1	1.0	16.0
Trowbridge	Observed	3.0	10.0	3.0	16.0
	Expected	5.9	9.1	1.0	16.0
Total		56.0	87.0	10.0	153.0

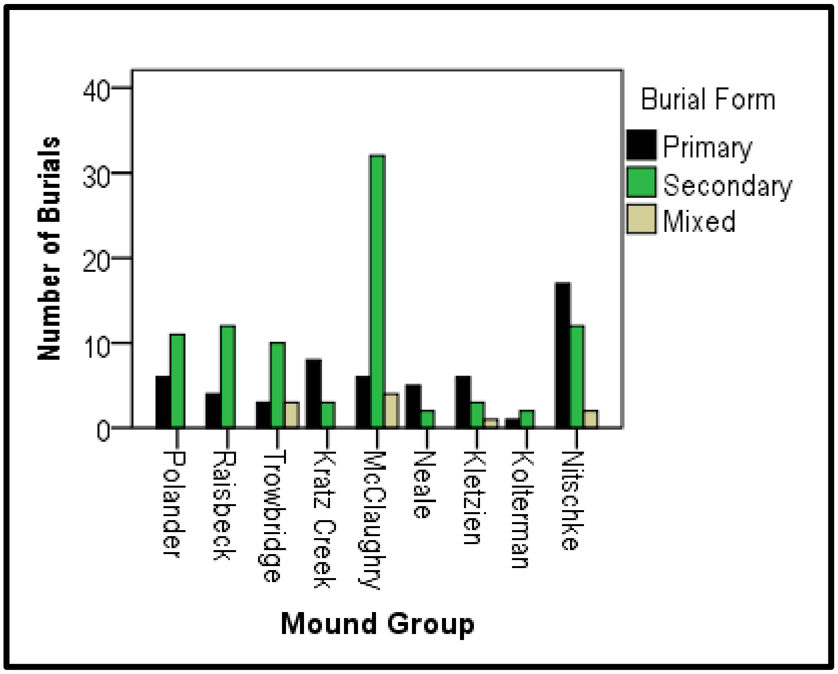


Figure 6.9 Frequency of burial disposition among the mound groups

Figure 6.10 presents the frequency of burial disposition of individual burials among the three physiographic regions (mixed burials excluded). The modal burial for the Western Uplands and Central Plains is secondary burial, while primary is the modal burial form for the Eastern Ridges and Lowlands. The result of the Chi-square analysis was indicates an important difference (Chi-square value = 9.398, Likelihood ratio = 9.309, d.f = 2, p=.009) among physiographic regions for burial disposition.

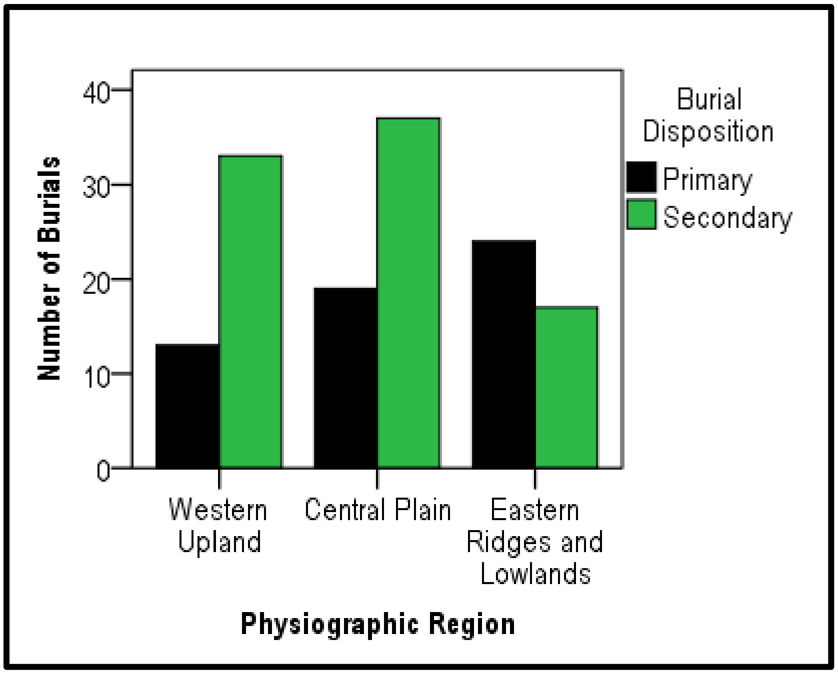


Figure 6.10 Frequency of burial disposition among physiographic regions

In the next analysis, burial disposition will be investigated on the level of the mound. Here, any combination of burial forms is included for the whole mound. For example, if a mound contains one primary burial and one secondary burial, burial disposition was coded as “mixed”. Many of the mounds were excluded from the analysis if any burial disposition was determined to be unknown.

Table 6.33 and Figure 6.11 present the frequency of the aggregated burial disposition represented in the mounds among the mound groups. Again, the predominant form of burial is secondary (n=50/100). Mixed burial mounds were minimal but every mound group (except Raisbeck) had at least one mound with a mixed burial. McClaughry had four mounds that included mixed burial for those mounds. Results from a Fisher’s Exact test indicated important differences (Exact value = 23.741, p = 0.042) in the frequency of postmortem treatment among the mound groups.

Table 6.33 Frequency of burial dispositions in mounds among mound groups

Mound Group		Aggregated Burial Disposition for Mound			Total
		Primary	Secondary	Mixed	
Kletzien	Observed	4.0	2.0	2.0	8.0
	Expected	2.8	4.0	1.2	8.0
Kolterman	Observed	0.0	1.0	1.0	2.0
	Expected	0.7	1.0	0.3	2.0
Kratz Creek	Observed	4.0	1.0	1.0	6.0
	Expected	2.1	3.0	0.9	6.0
McClaughry	Observed	3.0	18.0	4.0	25.0
	Expected	8.8	12.5	3.8	25.0
Neale	Observed	4.0	2.0	1.0	7.0
	Expected	2.5	3.5	1.1	7.0
Nitschke	Observed	10.0	6.0	4.0	20.0
	Expected	7.0	10.0	3.0	20.0
Polander	Observed	4.0	5.0	1.0	10.0
	Expected	3.5	5.0	1.5	10.0
Raisbeck	Observed	4.0	10.0	0.0	14.0
	Expected	4.9	7.0	2.1	14.0
Trowbridge	Observed	2.0	5.0	1.0	8.0
	Expected	2.8	4.0	1.2	8.0
Total		35.0	50.0	15.0	100.0

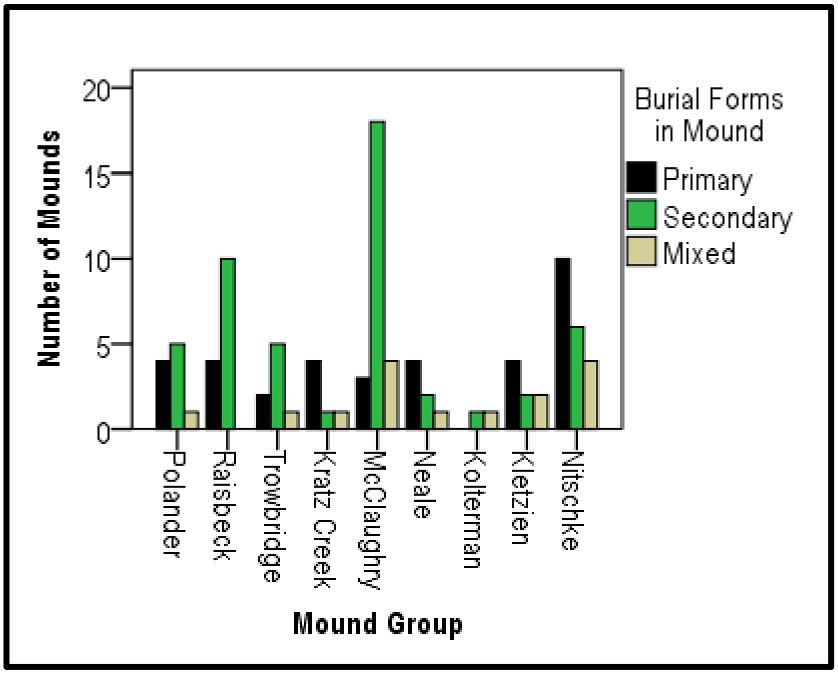


Figure 6.11 Frequency of burial disposition in mounds among mound groups

Table 6.34 presents the frequency of the mounds with the aggregated burial disposition among physiographic regions. There are no notable differences among physiographic regions (Fisher's Exact value = 8.440, *p*=.073).

Table 6.34 Frequency of mounds with aggregated burial disposition among physiographic regions

Physiographic Region		Aggregated Burial Form for Mound			Total
		Primary	Secondary	Mixed	
Central Plain	Observed	11.0	21.0	6.0	38.0
	Expected	13.3	19.0	5.7	38.0
Eastern Ridges and Lowlands	Observed	14.0	9.0	7.0	30.0
	Expected	10.5	15.0	4.5	30.0
Western Upland	Observed	10.0	20.0	2.0	32.0
	Expected	11.2	16.0	4.8	32.0
Total		35.0	50.0	15.0	100.0

This section investigates whether mound form had an influence on burial disposition. The analysis was conducted in two stages: (1) Evaluation of the relationship between mound form and postmortem treatment (burial disposition) and (2) Analysis of variation among the mound groups and physiographic regions.

Table 6.35 presents the frequency of burial disposition by mound form. An examination of the frequencies using Chi-square and Fisher's exact analyses indicates an important difference (Chi-square value = 8.135, Likelihood ratio = 8.063, d.f. = 2, p= 0.015; Fisher's exact = 7.789 p =0.018) in the disposition of burials for the entire sample.

Table 6.35 Frequency of burial disposition among geometric and effigy mound forms

Mound Form		Burial Form			Total
		Primary	Secondary	Mixed	
Geometric Mound Form	Observed	29.0	64.0	8.0	101.0
	Expected	37.0	57.4	6.6	101.0
Effigy Mound Form	Observed	27.0	23.0	2.0	52.0
	Expected	19.0	29.6	3.4	52.0
Total		56.0	87.0	10.0	153.0

Given the low number of mixed burials (n=10) they were excluded from further analyses. Important, however, is the trend among mound groups that mounds are generally used for either primary burial or secondary burial.

Table 6.36 and Figure 6.12 present the frequency of burial disposition in geometric mounds among mound groups. In general, secondary disposal is the modal pattern for burial in geometric mounds. Nitschke and Kletzien (Eastern Ridges and Lowlands) and Kratz Creek (Central Plains) are the only mound groups that have a higher number of primary burials in geometric mounds. Also notable, although secondary burial is the modal form of burial, the three mound groups in the Western Uplands (Polander, Raisbeck, and Trowbridge) have similar patterns in the proportion of primary and secondary burials. The geometric mounds of the Central Plains are quite variable, with Kratz Creek containing more primary burials, Neale containing only primary burials, and McClaughry having a high number (n=25) of primary burials.

Table 6.36 Frequency of burial disposition in geometric mound forms among mound groups

Mound Group		Burial Form/Geometric Mounds		Total
		Primary Burial	Secondary Burial	
Kletzien	Observed	2.0	1.0	3.0
	Expected	0.9	2.1	3.0
Kratz	Observed	3.0	1.0	4.0
	Expected	1.2	2.8	4.0
McClaughry	Observed	4.0	25.0	29.0
	Expected	9.0	20.0	29.0
Neale	Observed	1.0	0.0	1.0
	Expected	0.3	0.7	1.0
Nitschke	Observed	7.0	6.0	13.0
	Expected	4.1	8.9	13.0
Polander	Observed	6.0	11.0	17.0
	Expected	5.3	11.7	17.0
Raisbeck	Observed	4.0	10.0	14.0
	Expected	4.4	9.6	14.0
Trowbridge	Observed	2.0	10.0	12.0
	Expected	3.7	8.3	12.0
Total		29.0	64.0	93.0

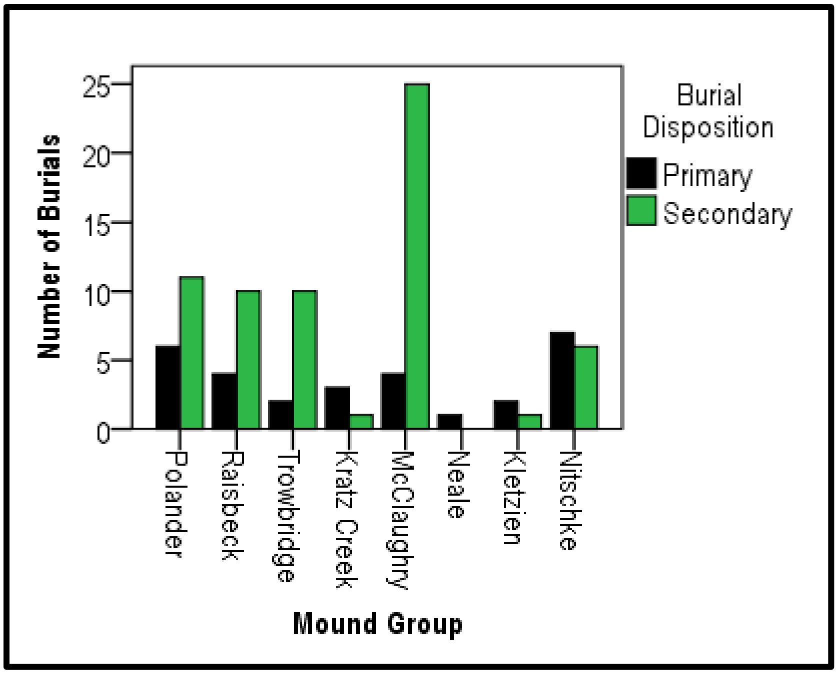


Figure 6.12 Frequency of burial dispositions in geometric mound forms among mound groups

Table 6.37 and Figure 6.13 present the frequency of burial dispositions in effigy mound forms among mound groups. Effigy mounds overall present a different pattern, with primary burials the modal pattern. In the Western Uplands physiographic region, Trowbridge has only primary burials in effigy mounds, Raisbeck has only secondary burials in effigy mound forms, and no effigy mounds were excavated at Polander. In the Central Plains, both Kratz Creek and Neale contain over half the burials as primary burials in effigy mound forms, and McClaughry contains about one-third primary burials in effigy mound forms. In the Eastern Ridges and Lowlands, Kletzien and Nitschke both exhibit greater numbers of primary burials, and Kolterman has a higher number of secondary burials.

Table 6.37 Frequency of burial disposition in geometric mound forms among mound groups

Mound Group		Burial Disposition/Effigy Mound Form		Total
		Primary Burial	Secondary Burial	
Kletzien	Observed	4.0	2.0	6.0
	Expected	3.2	2.8	6.0
Kolterman	Observed	1.0	2.0	3.0
	Expected	1.6	1.4	3.0
Kratz Creek	Observed	5.0	2.0	7.0
	Expected	3.8	3.2	7.0
McClaughry	Observed	2.0	7.0	9.0
	Expected	4.9	4.1	9.0
Neale	Observed	4.0	2.0	6.0
	Expected	3.2	2.8	6.0
Nitschke	Observed	10.0	6.0	16.0
	Expected	8.6	7.4	16.0
Raisbeck	Observed	0.0	2.0	2.0
	Expected	1.1	0.9	2.0
Trowbridge	Observed	1.0	0.0	1.0
	Expected	0.5	0.5	1.0
Total	Count	27.0	23.0	50.0

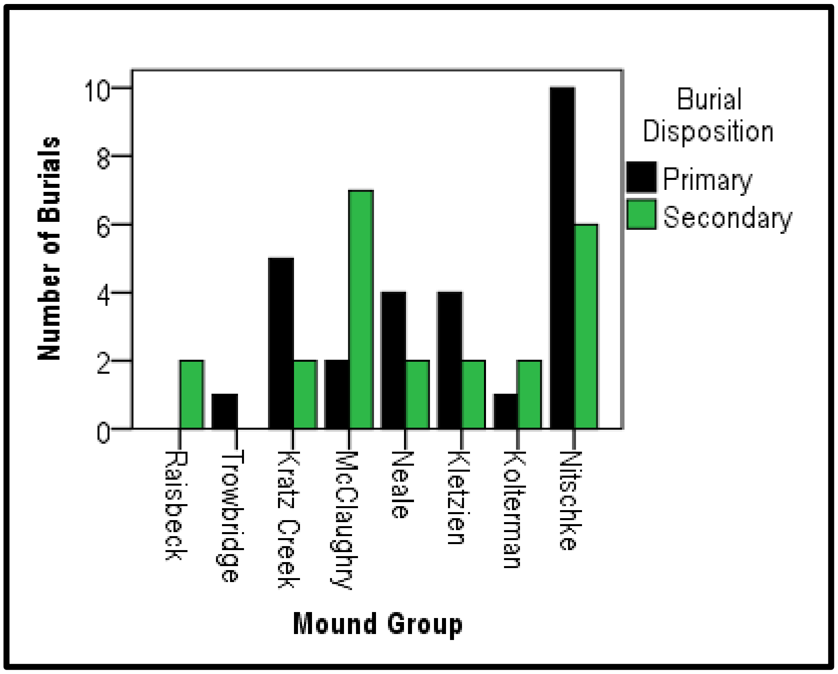


Figure 6.13 Frequency of burial disposition in effigy mound forms among mound groups

Chi-square and Fisher's exact tests were performed to detect variation in burial disposition among mound groups between geometric and effigy mound forms. The Fisher's Exact test indicated an important difference (Exact Value = 15.592, d.f. = 7, p=.015) in burial disposition in geometric mounds. The same test for effigy mounds resulted in similar patterns (Exact value= 8.870, d.f. = 7, p=.222) in burial disposition among mound groups.

Table 6.38 and Figure 6.14 present the frequency of burial dispositions in geometric mound forms among physiographic regions. Secondary burial was the mode in the Western Upland and Central Plains, while in the Eastern Ridges and Lowlands primary and secondary burial were equally represented. A Fisher's exact test indicates variation (Exact significance = 15.592, p = 0.015) in the frequency of burial disposition among physiographic regions.

Table 6.38 Frequency of burial disposition in geometric mound forms among physiographic regions

Physiographic Region		Burial Disposition/Geometric Mounds		Total
		Primary	Secondary	
Central Plain	Observed	8.0	26.0	34.0
	Expected	10.6	23.4	34.0
Eastern Ridges and Lowlands	Observed	9.0	7.0	16.0
	Expected	5.0	11.0	16.0
Western Upland	Observed	12.0	31.0	43.0
	Expected	13.4	29.6	43.0
Total		29.0	64.0	93.0

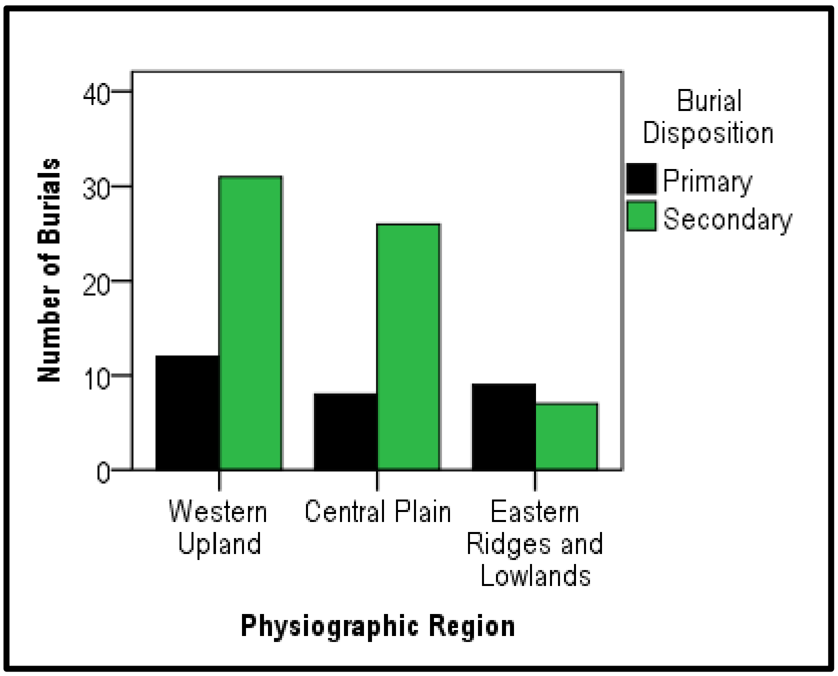


Figure 6.14 Frequency of burial disposition in geometric mound forms among physiographic regions

The final analysis considers possible differences in burial disposition in effigy mound forms among physiographic regions. Table 6.39 presents the frequency of primary and secondary burial dispositions among the physiographic regions. In general there are fewer secondary burials found in effigy forms. However, in the Central Plains there are an equal number of primary and secondary burials. The Western Upland is underrepresented since there were fewer effigy mound forms in that region. The result of a Fisher's Exact test indicates a similar pattern (Exact value = 1.110, $p = 0.596$) in burial disposition among physiographic regions.

Table 6.39 Frequency of burial disposition in effigy mound forms among physiographic regions

Physiographic Region	Burial Disposition in Effigy Mounds		Total
	Primary	Secondary	
Central Plain	11	11	22
Eastern Ridges and Lowlands	15	10	25
Western Upland	1	2	3
Total	27	23	50

6.4 Results for Research Question #3

Are there patterns in the selection of effigy or geometric mound forms (with burial) with reference to sex and age? If these patterns exist, are they related to mound groups, mound form, and/or physiographic regions?

6.4.1 Analysis of Sex by Mound Form Among Mound Groups and Physiographic Regions

Table 6.40 presents the values that were coded for sex and also the frequency of these values among the mound groups. Sex was recoded for the following analyses. Probable male and probable female were recoded as male and female. Indeterminate juveniles and adults were excluded from these analyses respectively, which resulted in 218 identified males (n=103) and females (n=115).

Table 6.40 Frequency of sex categories among mound groups

	Male	Probable Male	Female	Probable Female	Indeterminate Adult	Indeterminate Juvenile	Total Individuals
Big Bend	7	0	4	0	3	11	25
Kletzien	6	0	5	0	2	1	14
Kratz Creek	32	1	34	3	17	32	119
McClaughry	15	4	21	7	31	20	98
Neale	1	0	0	2	3	2	8
Nitschke	10	1	10	2	26	18	67
Polander	12	4	12	3	31	12	74
Raisbeck	15	4	13	4	6	15	57
Trowbridge	6	1	10	2	35	1	55
Total	104	15	15	23	154	112	517

The following analyses focus on the shared patterns and differences of the selection of mound form along the lines of biological sex. In the following test the mounds and their physiographic regions are: Raisbeck, Trowbridge, and Polander (Western Uplands); Kratz Creek, McClaughry, and Neale (Central Plains); and Big Bend, Kletzien, and Nitschke (Eastern Ridges and Lowlands). Kolterman was excluded from these analyses since the sex of those individuals was indeterminate.

As can be seen in Table 6.41, the proportion of females and males were equally represented in geometric mound forms in the Western Upland mound groups of Polander and Raisbeck, while at Trowbridge there were slightly more females than males. In the Central Plains groups, although there were more females than males, they were proportionally similar among these mound groups. Due to preservation issues at Nitschke and a low number of individuals from Big Bend and Kletzien, the Eastern

Ridges and Lowlands have generally low frequencies of identified sex among those mound groups.

Table 6.41 Frequency of males and females in geometric mound forms among mound groups

Mound Group	Number of Males and Females in Geometric Mound Forms		Total
	Male	Female	
Big Bend	7	4	11
Kletzien	2	2	4
Kratz Creek	31	36	67
McClaughry	17	22	39
Nitschke	5	8	13
Polander	16	15	31
Raisbeck	18	17	35
Trowbridge	7	11	18
Total	103	115	218

Table 6.42 presents the frequency of sex in effigy mound forms among the mound groups. The Western Upland mound groups exhibit low frequencies with one identified male at Raisbeck and one identified female at Trowbridge, and Polander is not represented because no effigy mound forms occur in that mound group. In the Central Plains, Kratz Creek contained few individuals in effigy mound forms (n = 3), McClaughry had three times as many females (n = 6, males n = 2)), and Neale also only had three total individuals with identified sex. The Eastern Ridges and Lowlands, represented by Kletzien and Nitschke had a fairly equal distribution of males and females in effigy mound forms.

Chi-square and Fisher’s Exact tests for frequency differences in sex in geometric mounds among mound groups indicated similar patterns (Chi-square exact significance p=.908; Fisher’s Exact sig. p=.906). A Fisher’s Exact test for differences in frequency of sex in also yielded a similar pattern for sex in effigy mound forms among mound groups (*p*=.595).

Table 6.42 Frequency of males and females in effigy mound forms among mound groups

Mound Group	Number of Males and Females in Effigy Mound Forms		Total
	Male	Female	
Kletzien	4	3	7
Kratz	2	1	3
McClaughry	2	6	8
Neale	1	2	3
Nitschke	6	4	10
Raisbeck	1	0	1
Trowbridge	0	1	1
Total	16	17	33

Table 6.43 presents the frequency of both sexes in geometric and effigy mound forms. On the level of the physiographic region there was minimal difference in the frequency of males and females in geometric mound forms (Fishers exact value = 0.357, p = .846) and effigy mound forms (Fisher's exact value = 1.844, p = 0.560).

Table 6.43 Female and male frequency in mound forms among physiographic regions

Physiographic Region		Frequency of Sex in Mound Form		Total
		Male	Female	
Geometric	Western Upland	41	43	84
	Central Plain	48	58	106
	Eastern Ridges and Lowlands	14	14	28
	Total	103	115	218
Effigy	Western Upland	1	1	2
	Central Plain	5	9	14
	Eastern Ridges and Lowlands	10	7	17
	Total	16	17	33

6.4.2 Analysis of Age Distribution by Mound Form Among Mound Groups and Physiographic Regions

The focus of this section is to explore any regularities or variability in the frequency of age classes in geometric and effigy mound forms among mound groups and physiographic regions. Chapter 5 described the age categories for the collection of data. There were nine age categories for data coding. Two additional categories were included when an individual could not be assigned to a specific age class including, “adult” and “juvenile”.

For the first analysis the following age classes were used: 0-4 years, 5-9 years, 9-15 years, 16-25 years, 23-35 years, and 35 + years were examined. The individuals categorized as “adults” and “juvenile” were excluded for the analysis. The frequencies were analyzed for both geometric and effigy mound forms.

Table 6.44 presents the frequency of the age classes in geometric mound forms for each mound group. Notable differences include the absence of any juveniles in the Trowbridge mound group; a generally higher expected frequency of the age classes 9-15 years,16-25 years, and 25-35 years at Kratz Creek; and a lower than expected frequency of 16-25 year olds and a higher than expected frequency of old adults at McClaughry. The results of a Fisher’s exact test indicate important differences (p=.000) in age in geometric mounds among the mound groups.

Table 6.44 Frequency of age classes in geometric mound forms among mound groups

Mound Group		Age Class in Geometric Mound Forms						Total
		0-4 yr	5-9 yr	9-15 yr	16-25 yr	25-35 yr	35+ yr	
Big Bend	Observed	7.0	2.0	2.0	4.0	1.0	8.0	24.0
	Expected	2.5	2.3	2.5	5.6	4.7	6.3	24.0
Polander	Observed	5.0	2.0	1.0	12.0	7.0	9.0	36.0
	Expected	3.7	3.5	3.7	8.5	7.1	9.5	36.0
Raisbeck	Observed	2.0	9.0	4.0	7.0	11.0	11.0	44.0
	Expected	4.6	4.3	4.6	10.4	8.7	11.6	44.0
Trowbridge	Observed	0.0	0.0	0.0	3.0	8.0	4.0	15.0
	Expected	1.6	1.5	1.6	3.5	3.0	3.9	15.0
Kratz Creek	Observed	8.0	9.0	15.0	28.0	15.0	20.0	95.0
	Expected	9.9	9.2	9.9	22.4	18.7	25.0	95.0
McClaughry	Observed	5.0	5.0	6.0	7.0	12.0	20.0	55.0
	Expected	5.7	5.3	5.7	12.9	10.8	14.5	55.0
Kletzien	Observed	0.0	0.0	1.0	1.0	0.0	1.0	3.0
	Expected	0.3	0.3	0.3	0.7	0.6	0.8	3.0
Nitschke	Observed	3.0	1.0	1.0	6.0	3.0	3.0	17.0
	Expected	1.8	1.6	1.8	4.0	3.4	4.5	17.0
Total		30.0	28.0	30.0	68.0	57.0	76.0	289.0

Table 6.45 presents the frequency of age classes in effigy forms among mound groups. One notable difference is the comparatively high number of 0-4 year olds at Nitschke. The pattern in effigy mound forms among mound groups is that they are generally reserved for 16 year olds to old adults. A Fisher's exact test confirmed no statistically significant difference for age class in effigy mound forms among mound groups.

Table 6.45 Frequency of age classes in effigy mound forms among mound groups

Mound Group	Age Class in Effigy Mound Forms						Total
	0-4 yr	5-9 yr	9-15 yr	16-25 yr)	25-35 yr	35+ yr	
Raisbeck	0	0	0	1	0	0	1
Trowbridge	0	0	0	1	0	1	2
Kratz Creek	2	0	0	1	1	1	5
McClaughry	0	0	0	2	2	4	8
Neale	0	0	0	1	0	3	4
Kletzien	0	0	0	3	3	0	6
Nitschke	7	3	3	4	3	5	25
Total	9	3	3	13	9	14	51

The next part of the analysis focuses on the identification of regularities or important differences among mound groups and physiographic regions and considers juveniles and adult age classes only. Juvenile includes individuals with an age determination between zero and 15 years old. Adult includes individuals with an age determined to be over the age of 16 years.

Table 6.46 and Figure 6.15 present the age class frequency in geometric mounds among mound groups. Notable differences in frequency are presented in bold font. Trowbridge is unusual because only one juvenile and 46 adults were interred in geometric mounds. The results of a logistic regression test indicated that adults are 13.731 (Wald Chi-square = 6.315, p = 0.012) times more likely to be found at Trowbridge than juveniles, relative to the other mound groups. At Kratz Creek and Big Bend a significantly greater number of juveniles and a significantly lower number of adults were interred in geometric mounds.

Table 6.46 Frequency of age classes in geometric mounds among mound groups

Mound Group		Age Class in Geometric Mound Forms		Total
		Juvenile	Adult	
Polander	Observed	12.0	62.0	74.0
	Expected	17.0	57.0	74.0
Raisbeck	Observed	15.0	39.0	54.0
	Expected	12.4	41.6	54.0
Trowbridge	Observed	1.0	46.0	47.0
	Expected	10.8	36.2	47.0
Neale	Observed	1.0	1.0	2.0
	Expected	0.5	1.5	2.0
Kratz Creek	Observed	33.0	80.0	113.0
	Expected	25.9	87.1	113.0
McClaughry	Observed	20.0	67.0	87.0
	Expected	20.0	67.0	87.0
Kletzien	Observed	1.0	4.0	5.0
	Expected	1.1	3.9	5.0
Nitschke	Observed	6.0	23.0	29.0
	Expected	6.7	22.3	29.0
Big Bend	Observed	11.0	14.0	25.0
	Expected	5.7	19.3	25.0
Total		100.0	336.0	436.0

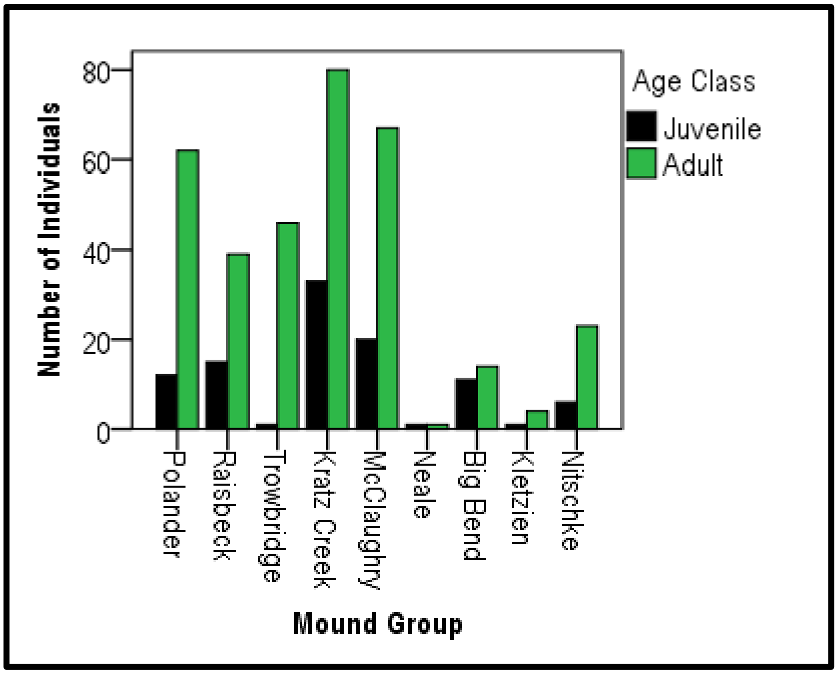


Figure 6.15 Frequency of age class in geometric mound forms among mound groups

Table 6.47 and Figure 6.16 present the frequency of juveniles and adults in effigy mound forms among mound groups. One general pattern is that juveniles were largely excluded from effigy mound burial (Lackey-Cornelison 2012), with Raisbeck, Trowbridge, McClaughry, and Kletzien mound groups containing no juveniles in effigy mound forms. A notable exception is found at Nitschke, where 13 juveniles were found in effigy mound forms. The results of a Fisher's Exact test found differences (Fisher's value = 11.368, *p* = .038) between juveniles and adults in effigy mound forms among mound groups.

Table 6.47 Frequency of age classes in effigy mound forms among mound groups

Mound Group		Age Class in Effigy Mound Forms		Total
		Juvenile	Adult	
Raisbeck	Observed	0.0	3.0	3.0
	Expected	0.6	2.4	3.0
Trowbridge	Observed	0.0	7.0	7.0
	Expected	1.4	5.6	7.0
Neale	Observed	1.0	5.0	6.0
	Expected	1.2	4.8	6.0
Kratz Creek	Observed	2.0	5.0	7.0
	Expected	1.4	5.6	7.0
McClaughry	Observed	0.0	11.0	11.0
	Expected	2.2	8.8	11.0
Kletzien	Observed	0.0	9.0	9.0
	Expected	1.8	7.2	9.0
Nitschke	Observed	13.0	24.0	37.0
	Expected	7.4	29.6	37.0
Total		16.0	64.0	80.0

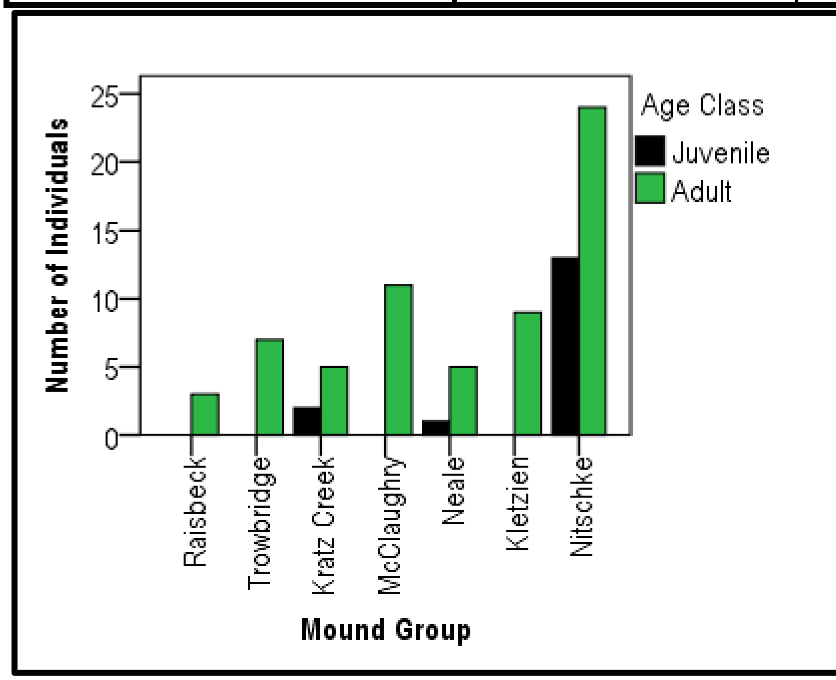


Figure 6.16 Frequency of age class in effigy mound forms among mound groups

Next, the frequency of age class in geometric mound forms was examined among physiographic regions. Table 6.48 and Figure 6.17 present the frequency of age class in geometric mound forms among physiographic regions. All expected counts vary considerably from the actual count, indicating differences in the frequency of age class among physiographic regions. Results of a Chi-square and Fisher's Exact test indicated a difference (Chi-square value=8.325, likelihood ratio=8.549, d.f.=2, exact 2-sided significance=.015) among physiographic regions.

Results of a logistic regression analysis (Wald Chi-square) indicate that juveniles were 2.3 (Wald Chi-square = 5.694, p = 0.017) and 1.9 times (Wald Chi-square = 6.232, p = 0.013) more likely to be found in geometric mounds in the Central Plains and Eastern Lowlands, respectively, than in geometric mounds of the Western Uplands.

Table 6.48 Frequency of age class in geometric mound forms among physiographic regions

Physiographic Region		Age Class in Geometric Mound Forms		Total
		Juvenile	Adult	
Western Upland	Observed	28.0	147.0	175.0
	Expected	40.1	134.9	175.0
Central Plain	Observed	54.0	148.0	202.0
	Expected	46.3	155.7	202.0
Eastern Ridges and Lowlands	Observed	18.0	41.0	59.0
	Expected	13.5	45.5	59.0
Total		100.0	336.0	436.0

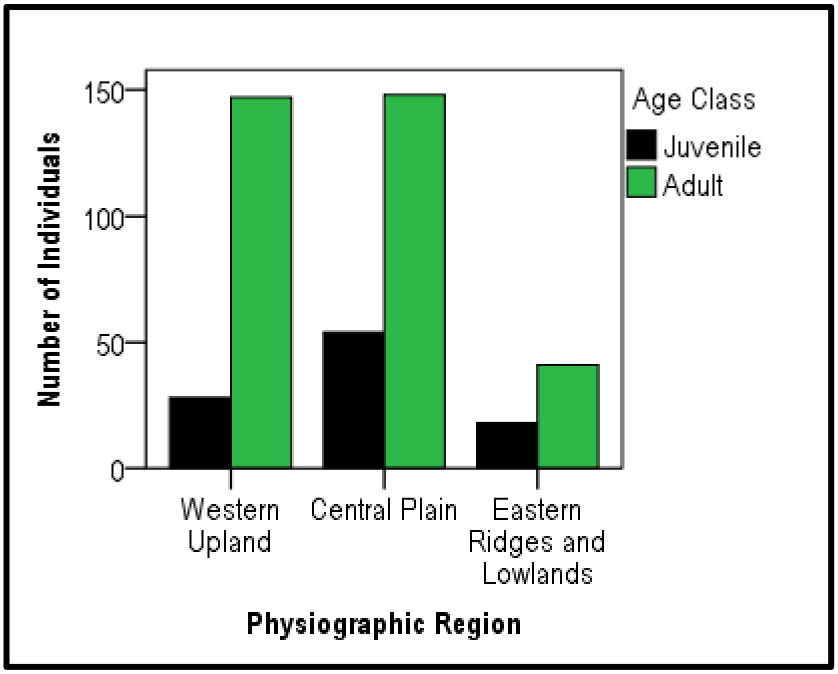


Figure 6.17 Frequency of age class in geometric mound forms among physiographic regions

6.5 Results for Research Question # 4

Research Question #4: Does the epigenetic structuring of these populations (at the level of the mound group and physiographic region) suggest the construction and maintenance of mound groups by lineal groups?

This section describes the frequency of epigenetic traits of the cranial and postcranial skeleton among mound groups and physiographic regions. The first step in this analysis was to determine which traits had an adequate number of responses for each trait. If the relative frequency of a trait was low or if only one value (e.g. absence versus presence) was coded, the trait was excluded from further analysis. The second step in the analysis was to examine any statistically significant differences among mound groups and physiographic regions using Fisher's Exact tests. Fisher's Exact tests were used simply as a method for determining whether there were important differences in the frequencies of traits among mound groups and physiographic regions. The final step in the analysis is to investigate the biological distance among mound groups and physiographic regions using R statistical software to investigate the Mean Measure of Divergence (MMD). Harris and Sjøvold (2003) and Sołtysiak (2011) provide a detailed account of the Smith's MMD method used in this analysis.

The traits and their frequency (number of traits observed) included in this analysis included: left and right supraorbital foramina (n=96 and n=92), left and right supraorbital notch (n=98 and n=90), left and right parietal foramina (n=76 and n=77), left and right tympanic dehiscence (n=102 and n=93), left and right mastoid foramen (n=88 and n= 72), left and right mastoid foramen number (n=88 and n= 72), left and right mental foramen number (n=144 and n=132), left and right mandibular tori (n=142 and n=137), left and right mylohyoid bridge (n=108 and n=106), left and right lambdoid ossicle (n=73 and n=71), left and right third trochanter (n=94 and n=90), and left and right septal aperture (n=61 and n=75). *Note: The Neale mound group was excluded from the mound group analyses due to poor preservation.*

6.5.1 Sex and Age Effects on Trait Frequency

Two tests were run to determine whether there may be a sex or age effect on the frequency in the expression of epigenetic traits. The effect of sex on all the traits in this study was examined using Chi-square and Fisher's Exact tests. Two traits were found to have significant differences between males and females. Table 6.49 presents the frequency of the right lambdoid ossicle. The right lambdoid ossicle was found to be significantly different between the sexes (p=.048) with a higher than expected number of absence of this trait in males and a lower than expected expression of the trait's presence. For females there was a lower than expected frequency for the absence of this trait and a higher than expected frequency in the expression of the right lambdoid ossicle.

Table 6.49 Frequency of right lambdoid ossicle among males and females

Sex		Right Lambdoid Ossicle		Total
		Absent	Present	
Male	Observed	29.0	6.0	35.0
	Expected	25.8	9.2	35.0
Female	Observed	13.0	9.0	22.0
	Expected	16.2	5.8	22.0
Total		42.0	15.0	57.0

As expected, the left and right septal aperture of the humerus also appeared to be linked to sex. Of the 20 females in the sample, eight exhibited this trait and no males exhibited this trait. The right septal aperture results were slightly different but also indicated a strong sex link. While four out of nine males exhibited the trait, 15 out of 33 females exhibited this trait. Therefore, the right lambdoid ossicle, and the right and left septal apertures were excluded from further analysis.

To determine age effects on the expression of traits Chi-square and Fisher's Exact tests were performed on juveniles versus adults. One trait that appears to be influenced by age is the right tympanic dehiscence. Of the 80 observations on the right tympanic dehiscence 10 of these were juveniles. Seven of these individuals expressed the trait. However, the right tympanic dehiscence trait was included in the initial MMD analysis.

6.5.2 Analysis of Epigenetic Trait Frequencies

This section presents the frequency and significant differences of traits among mound groups and physiographic regions. It should be noted that differential preservation played a significant role in the ability to observe many of the features. For example, an inventory of the remains may have revealed a high frequency of femora; however, based on the relative differences in erosion of features on the bone, the observation of the specific features on the bone may not have been possible. A good example of a site with very poor preservation was Nitschke. At this site most of the skeletal elements were present; however the material was fragmentary with the terminal ends of the bones exhibiting significant attrition. Nevertheless, the frequency of each epigenetic trait that approached statistical significance or was statistically significant will be described among mound groups and physiographic regions.

6.5.3 Biological Distance: Mound Groups

Table 6.50 presents the traits that exhibited statistically significant differences among mound groups. These important differences will be described, followed by a presentation of the frequencies of the traits among mound groups and physiographic regions. Four of the traits that indicated significant differences were paired traits and one bilateral trait had unilateral (third trochanter of the femur) significance.

Table 6.50 Frequency and statistical significance of traits among mound groups

Trait	Number	Fisher's Exact Value	Exact Significance
L. Parietal Foramen	76	12.225	0.073
R. Parietal Foramen	77	16.234	0.014
L. Mastoid Foramen	88	13.245	0.054
R. Mastoid Foramen	72	13.895	0.036
R. Mastoid Foramen #	72	22.286	0.030
L. Mandibular Torus	141	17.949	0.004
R. Mandibular Torus	136	12.243	0.062
L. Mylohyoid Bridge	107	12.132	0.047
R. Mylohyoid Bridge	105	20.736	0.001
L. Lambdoid Ossicle	73	12.623	0.065
Sup. Sagittal Sulcus Flexure	98	30.055	0.001
L. Third Trochanter	92	13.297	0.041

Mastoid foramen number and superior sagittal sulcus are traits that have three possible values. Because MMD analyses require only two responses, these two traits were eliminated from biological distance analyses. Because there were multiple responses in all three response categories, eliminating one category could not be justified. Finally, if it were possible to remove one of the values the remaining sample size would be too small.

The first step in the MMD analysis included the remaining 17 traits listed above. The contingency tables for each trait used in the MMD analysis are presented in Appendix D. To perform the MMD analysis two separate Excel files are created, one presenting the mound groups and numbers of observations for each trait and the second presents the percentage of trait presence (Appendix E)(Sołtysiak 2011). In addition to performing Smith's Mean Measure of Divergence, the Freeman and Tukey (1950) function was used to account for small sample size.

The MMD output in R provides four tables of data, including a variable status table (Tables 6.51 and 6.52), the MMD values matrix (Table 6.53), the MMD standard deviation matrix, and the MMD significance matrix (Sołtysiak 2011). The variable status table presents two sets of number for each trait. The first number is the mean MMD for that trait and the second number is the proportion of positive trait responses (Sołtysiak 2011). Higher values for each of the numbers reflect greater biological variation among the mound groups. Table 6.51 presents the variable status for all 17 traits.

Negative mean MMD values indicate the sample size is too small or that the trait frequencies are similar, thus not contributing to variation among the mound groups (Harris and Sjøvold 2003). Traits with a negative mean MMD were removed, followed by another MMD analysis. Table 6.52 presents the variable status for each trait which will be used for further analysis.

Table 6.51 Variable status of non-metric traits in MMD analysis

	Mean MMD for Trait	Proportion of Positive Response
L. Supraorbital Foramen (LSF)	6.546645	0.250000
R. Supraorbital Foramen (RSF)	6.088410	0.500000
L. Supraorbital Notch (LSN)	-2.654590	0.214286
R. Supraorbital Notch (RSN)	-4.199220	0.107143
L. Parietal Foramen (LPF)	13.460190	0.428571
R. Parietal Foramen (RPF)	17.423490	0.642857
L. Tympanic Dehiscence (LTD)	5.094374	0.607143
R. Tympanic Dehiscence (RTD)	-4.271780	0.142857
L. Mastoid Foramen (LMF)	0.314404	0.321429
R. Mastoid Foramen (RMF)	32.446940	0.678571
L. Mandibular Torus (LMT)	2.149499	0.535714
R. Mandibular Torus (RMT)	2.964195	0.500000
L. Mylohyoid Bridge (LMB)	-0.135630	0.357143
R. Mylohyoid Bridge (RMB)	3.058040	0.428571
L. Lambdoid Ossicle (LLO)	10.322550	0.500000
L. Third Trochanter (L3T)	15.214410	0.607143
R. Third Trochanter (R3T)	-4.753260	0.321429

Table 6.52 Variable status of traits that presented positive mean MMD values

	Mean MMD for Trait	Proportion of Positive Response
LSF	6.546645	0.250000
RSF	6.088410	0.500000
LPF	13.460190	0.428571
RPF	17.423490	0.642857
LTD	5.094374	0.607143
LMF	0.314404	0.321429
RMF	32.446940	0.678571
LMT	2.149499	0.535714
RMT	2.964195	0.500000
RMB	3.058040	0.428571
LLO	10.322550	0.500000
L3T	15.214410	0.607143

As presented in Table 6.52, the traits that contribute most to variation include the RMF, RPF, L3T, and LLO. The traits in 6.52 are used for the remainder of the MMD analysis.

Table 6.53 presents the MMD values. Here each mound group is compared to each mound group and assigned a value based on the biological distance. Lower values indicate close relationships and the higher the value the most biologically distant. Table 6.54 presents the standard deviation values for the MMD matrix. If the MMD value exceeds the sum of two standard deviations it is considered to be significantly different at the 95% confidence interval (Donlon 2000; Harris and Sjøvold 2003). The MMD significance matrix is not presented; however, for quick reference bolded values in Table 6.53 indicate significant differences between mound groups.

Table 6.53 MMD Matrix. Bold values indicate significant difference between groups.

	Polander	Raisbeck	Trowbridge	Kratz	McClaugh.	BigBend	Kletzien	Nitschke
Polander	-0.2506	0.3340	-0.0479	**0.3663**	**0.6462**	**0.5788**	**1.2528**	**0.4278**
Raisbeck	0.3340	-0.1433	0.1038	**0.2110**	**0.1972**	**0.2883**	**0.7446**	0.0948
Trowbridge	-0.0479	0.1038	-0.5475	**0.3673**	0.3127	**0.6107**	**1.2854**	0.3699
Kratz	**0.3663**	**0.2110**	**0.3673**	-0.0798	**0.0975**	0.0224	**0.2668**	-0.0034
McClaugh.	**0.6462**	**0.1972**	0.3127	**0.0976**	-0.1264	**0.2184**	0.2268	0.0782
BigBend	**0.5788**	**0.2883**	**0.6107**	0.0224	**0.2184**	-0.3597	0.2300	-0.1029
Kletzien	**1.2528**	**0.7446**	**1.2854**	**0.2668**	**0.2268**	0.2300	-0.3747	**0.4124**
Nitschke	**0.4278**	0.0948	0.3699	-0.0034	0.0782	-0.1029	**0.4123**	-0.1883

Table 6.54 MMD standard deviations

	Polander	Raisbeck	Trowbridge	Kratz	McClaughry	BigBend	Kletzien	Nitschke
Polander	0.1260	0.0942	0.2226	0.0798	0.0877	0.1400	0.1449	0.1008
Raisbeck	0.0942	0.0661	0.1954	0.0499	0.0595	0.1132	0.1178	0.0730
Trowbridge	0.2226	0.1954	0.3384	0.1833	0.1927	0.2369	0.2507	0.2027
Kratz	0.0798	0.0499	0.1833	0.0358	0.0444	0.0985	0.1049	0.0578
McClaughry	0.0877	0.0594	0.1927	0.0444	0.0557	0.1081	0.1162	0.0686
BigBend	0.1400	0.1132	0.2369	0.0985	0.1081	0.1635	0.1675	0.1223
Kletzien	0.1449	0.1178	0.2507	0.1049	0.1162	0.1675	0.1790	0.1286
Nitschke	0.1008	0.0730	0.2027	0.0578	0.0686	0.1224	0.1286	0.0825

At this point, significant biological distances have been demonstrated among the mound groups. However, the actual distances of each mound group relative to other mound groups have not been presented. This is accomplished in three ways including, 1) a presentation of increasing biological distances for each mound group, 2) a hierarchical cluster dendrogram (Figure 6.18), and 3) a multidimensional scaling scatterplot (Figure 6.19).

First, since the MMD value between two groups represents the relative biological distance between the groups Table 6.55 was generated to present the increasing biological distance for each mound group relative to other mound groups.

Table 6.55 Biological distance among mound groups from MMD values

Increasing Biodistance →							
Polander	Trowbridge	Raisbeck	Kratz	Nitschke	Big Bend	Mclaugh	Kletzien
Raisbeck	Nitschke	Trow	McClaugh	Kratz	Big Bend	Polander	Kletzien
Trow	Polander	Raisbeck	McClaugh	Kratz	Nitschke	Big Bend	Kletzien
Kratz	Nitschke	Big Bend	McClaugh	Raisbeck	Kletzien	Polander	Trow
McClaugh	Nitschke	Kratz	Raisbeck	Big Bend	Kletzien	Trow	Polander
Big Bend	Nitschke	Kratz	McClaugh	Kletzien	Raisbeck	Polander	Trow
Kletzien	McClaugh	Big Bend	Kratz	Nitschke	Raisbeck	Polander	Trow
Nitschke	Big Bend	Kratz	McClaugh	Raisbeck	Trow	Kletzien	Polander

Next, Figures 6.18 and 6.19 are provided to demonstrate the relationship and biological distances among the mound groups. Figure 6.18 presents a hierarchical cluster dendrogram produced from the Euclidian distance calculation of the MMD matrix. Figure 6.19 presents a multidimensional probability scaling (PROSCAL) derived from the Euclidian distance calculation of the MMD.

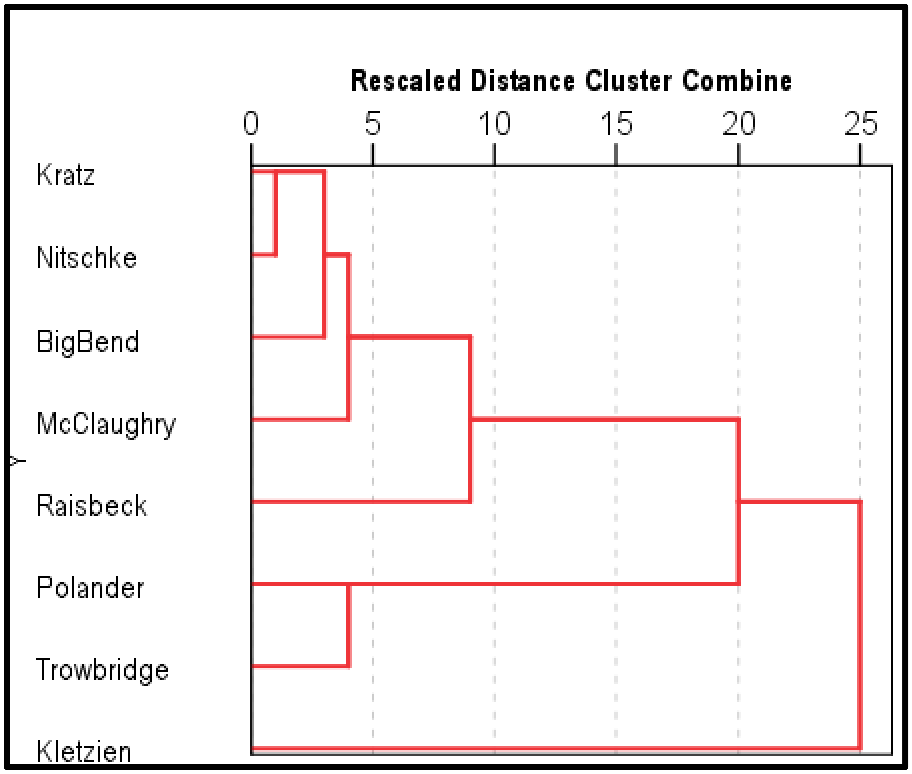


Figure 6.18 Hierarchical Cluster Dendrogram using average linkage (between groups)

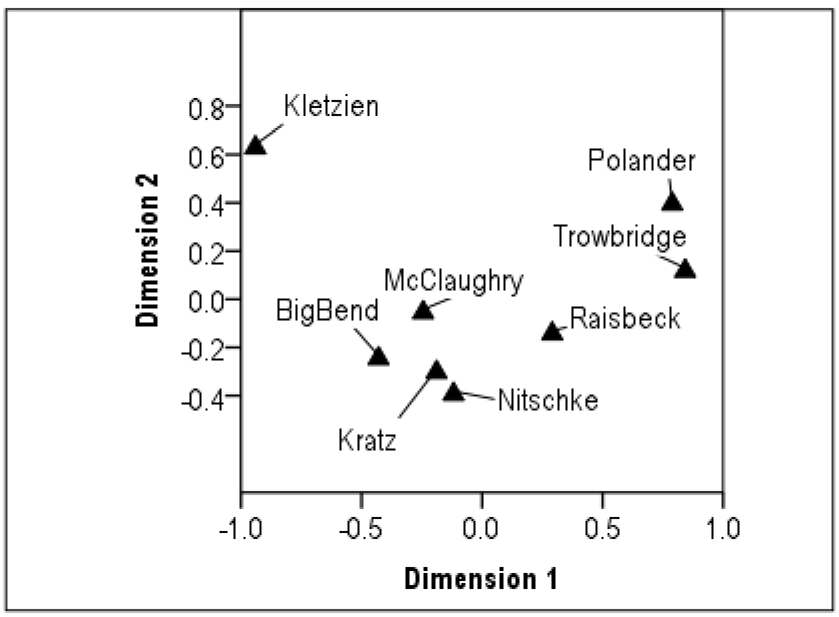


Figure 6.19 Multidimensional Probability Scaling (PROSCAL) scatterplot of the MMD among eight mound groups

In general, there are multiple distinct patterns that emerge from the results presented in the preceding tables and figures. First, there seems to be a close relationship among the Western Upland Groups of Trowbridge, Polander, and Raisbeck (albeit weaker with Raisbeck). Second, Nitschke presents a close biological distance with almost all of the mound groups. Third, Kletzien is significantly different and divergent from almost all of the mound groups. Fourth, with the exception of Kletzien, all of the Central Plains and Eastern Ridges and Lowlands groups are biologically similar. Finally, Raisbeck has a tendency to ally closely with the Central Plains and Eastern Ridges and Lowlands groups, especially Nitschke.

6.5.4 Biological Distance: Physiographic Regions

Table 6.56 includes the traits with demonstrated statistically significant (or approaching significance) differences among physiographic regions. There are some differences for which traits were significantly different compared to the mound groups. The left parietal foramen, left mastoid foramen number, right mandibular torus, sagittal sulcus flexure, and left third trochanter were not significantly different on the regional level. Left tympanic dehiscence exhibited a statistically significant difference among the physiographic regions but not on the mound group level. The frequency tables for all 17 traits are presented in Appendix D.

Table 6.56 Physiographic regions that exhibited significant differences in the frequency of traits

Trait	Number	Fisher's Exact Value	Exact Significance
R. Parietal Foramen	77	10.685	0.005
L. Tympanic Dehiscence	102	5.136	0.070
L. Mastoid Foramen	88	6.681	0.038
R. Mastoid Foramen	72	8.825	0.011
L. Mastoid Foramen Number	88	10.711	0.026
R. Mastoid Foramen Number	72	15.767	0.003
L. Mandibular Torus	142	12.131	0.001
L. Mylohyoid Bridge	108	8.746	0.010
R. Mylohyoid Bridge	106	12.919	0.001
L. Lambdoid Ossicle	73	5.431	0.077

The results of the Mean Measure of Divergence analysis of physiographic regions are presented in this section. As with the mound group data, two tables were created in Excel that presented the number of observations for each trait in each mound group and the percentage of trait presence in each mound group. Table 6.57 presents the variable status when all 17 traits were analyzed. Based on negative mean MMD non-metric trait statuses six traits were removed from further analyses. Variable status for subsequent analyses is provided in Table 6.58.

Table 6.57 Variable status of 17 nonmetric traits

	Mean MMD for Trait	Proportion of Positive Response
LSF	-0.052610	0.333333
RSF	0.356991	0.666667
LSN	-0.053000	0.666667
RSN	-0.222680	0.000000
LPF	0.294305	0.666667
RPF	0.290105	0.666667
LTD	0.335894	0.666667
RTD	-0.006080	0.666667
LMF	0.648870	0.666667
RMF	1.162086	0.666667
LMT	0.457781	1.000000
RMT	0.048460	0.666667
LMB	0.435016	0.666667
RMB	0.738476	1.000000
LLO	0.553474	1.000000
L3T	-0.180410	0.000000
R3T	-0.209720	0.000000

Table 6.58 Variable status of 11 nonmetric traits

	Mean MMD for Trait	Proportion of Positive Response
RSF	0.356991	0.666667
LPF	0.294305	0.666667
RPF	0.290105	0.666667
LTD	0.335894	0.666667
LMF	0.648870	0.666667
RMF	1.162086	0.666667
LMT	0.457781	1.000000
RMT	0.048460	0.666667
LMB	0.435016	0.666667
RMB	0.738476	1.000000
LLO	0.553474	1.000000

Next, the MMD values matrix (Table 6.59) and MMD standard deviation matrix (Table 6.60). As predicted by the mound groups analysis, the Western Uplands groups have a significant biological distance from the Central Plains and Eastern Ridges and Lowlands physiographic regions. Also, the tables indicate a close biological distance for the Central Plains and Eastern Ridges and Lowlands groups.

Table 6.59 MMD values matrix for physiographic regions. Significant differences indicated in bold.

	Western Uplands	Central Plains	Eastern Ridges and Lowlands
Western Uplands	-0.069820	0.209335	0.251185
Central Plains	0.209335	-0.049670	0.023249
Eastern Ridges and Lowlands	0.251185	0.023249	-0.099500

Table 6.60 MMD standard deviation matrix for physiographic regions

	Western Uplands	Central Plains	Eastern Ridges and Lowlands
Western Uplands	0.032736	0.027100	0.037358
Central Plains	0.027100	0.022451	0.032727
Eastern Ridges and Lowlands	0.037358	0.032727	0.044064

To visualize these differences spatially a multidimensional probability scaling scatterplot is presented in Figure 6.20.

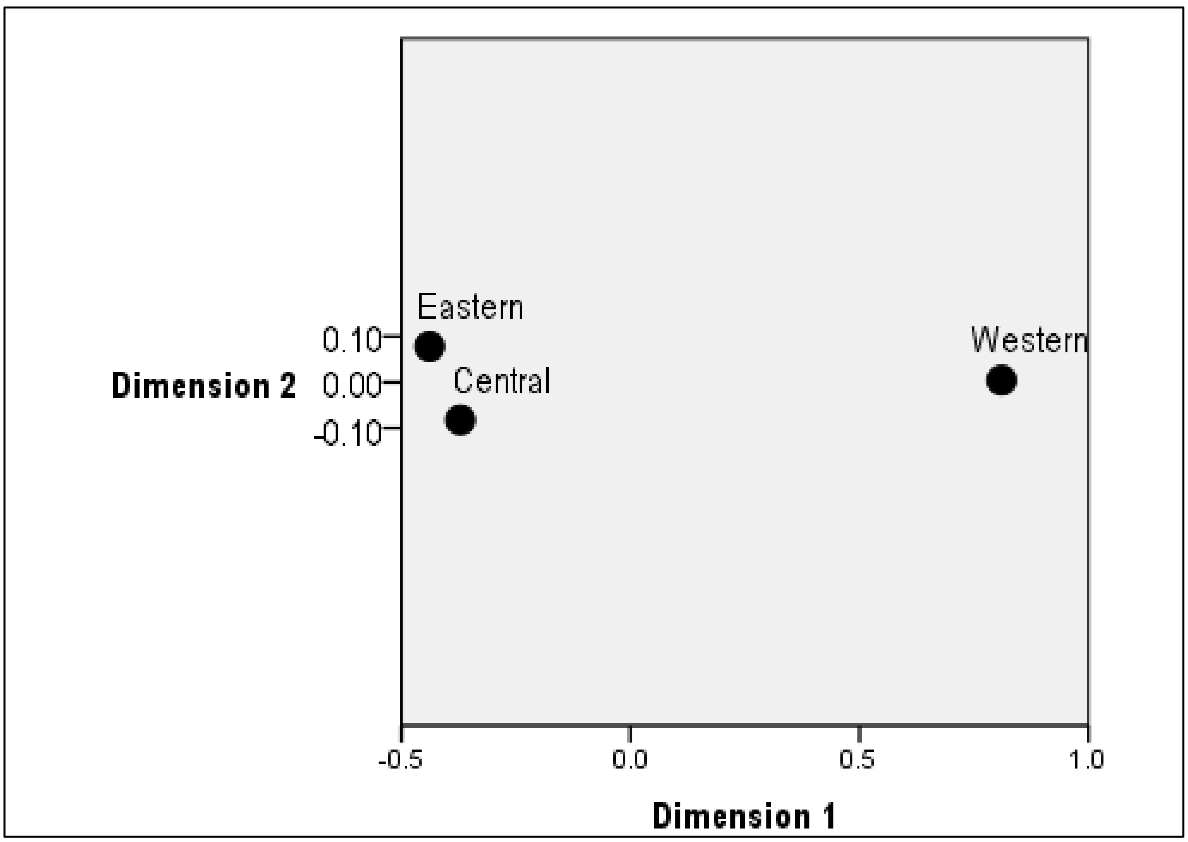


Figure 6.20 Multidimensional probability scaling scatterplot of physiographic regions

Based on the results of the MMD analysis, it is concluded that the Central Plains and Eastern Ridges and Lowlands physiographic regions present a close biological distance. However, there is a dramatic distance separating these two physiographic regions from the Western Uplands physiographic region.

6.6 Conclusion

The notable regularities and variations present among the mound groups and physiographic regions were reviewed. Research question #1 explored the frequency, co-variation of features and the vertical and horizontal position of various features. There were no notable differences among mound groups and physiographic regions in the frequency of the features. However, other than burials, some sites were almost completely devoid of features (Polander and Trowbridge). Most mound groups incorporated burials into at least half the excavated mounds. A notable exception was Kratz Creek, which had few mounds that included burial. In general, the presence of other features predicts the presence of burials. In other words, other than at Kratz Creek, non-burial features did not frequently occur unless at least one burial was also present. Finally, there was little variability in the horizontal position of burial in both geometric and effigy mound forms. In geometric mounds, burials (and other features) commonly were found in or near the center. In effigy mound forms, burials occurred most commonly in the heart position first, followed by other “anatomical regions”. The vertical position of burial was quite variable among mound groups and physiographic regions. Burials typically were preferred for one of the three or two of the three vertical locations in the mounds. This pattern also occurred for earthen fireplaces and stone altars.

Research question # 2 explored regularities and variation in postmortem treatment (burial disposition) among the mound groups and physiographic regions. In general, secondary burial is most frequent in geometric mounds. However, when the burial patterns were explored between effigy and geometric mound forms among mound groups and physiographic regions, there were important differences. When the burial disposition was explored only among the geometric mounds, there was a significant difference among mound groups. When differences in burial disposition for effigy forms were explored there was no important difference among the mound groups.

Research Question #3 explored patterns and variation for mound form selection along the lines of age and sex. There was no difference in access to effigy or geometric mound forms for males and females. When ages were collapsed into adult and juvenile categories, there were important differences between effigy and geometric mound forms in the frequency of adults and juveniles among the mound groups and physiographic regions. These findings were consistent with Lackey-Cornelison (2012) in her analyses across the entire effigy mound sample.

Research question #4 explored patterns of trait frequencies among mound groups and physiographic regions. On the level of the mound group there were 11 traits that were significantly different among the mound groups. On the level of the physiographic region there were 10 epigenetic traits that were significantly different among the physiographic regions.

Results of the biological distance analyses suggest that there was not much epigenetic variability among the Central Plains and Eastern Ridges and Lowland physiographic regions. The Western Upland groups exhibited a dramatic biological distance from the Central Plains and Eastern Ridges and Lowland physiographic regions. On the level of the mound group Nitschke was biologically similar to most other mound groups and Kletzien was biologically distinct from most other mound groups. Interestingly, the Raisbeck (Western Uplands) mound group shared a close phenetic relationship with Nitschke (Eastern Ridges and Lowlands) and McClaughry (Central Plains)

In conclusion, the patterns and variability presented in this chapter will be interpreted and discussed within a sociocultural context in Chapter 7.

Chapter 7: Interpretation of Effigy Mound Social Organization

7.1 Introduction

This chapter a) reviews the objectives of this research, b) places the Effigy Mound Manifestation in its broader geographic and temporal context, c) reviews the results of the analyses conducted on the archaeological materials and skeletal remains and, d) presents interpretations for the ritual and mortuary behaviors of Effigy Mound peoples, and by extension, the social organization of these Late Woodland groups in southern Wisconsin.

Most authors agree that characteristics of social organization for Effigy Mound peoples followed common Late Woodland patterns for groups living in the Eastern Woodlands at that time. This pattern included group dispersal into secondary and tertiary tributaries of major rivers and uplands which resulted in dramatic cultural variability and the creation of segmented societies (Milner 2004; McElrath et al 2000; Nassaney and Cobb 1991).

The Effigy Mound peoples have been characterized as egalitarian, taking advantage of hunting, gathering, and fishing (Birmingham and Eisenberg 2000). Other studies found that male and females were equally represented and all age groups were represented in the mounds (Birmingham and Eisenberg 2000; Ruth 1999; Lackey-Cornelison 2012). Grave goods were rare in the mounds, and when found, were generally locally procured utilitarian items such as celts, projectile points, and ceramic implements (Birmingham and Eisenberg 2000).

Archaeologically, not unlike other groups in this period, habitation sites are almost archaeologically invisible. What has been sampled and studied extensively are the mound groups, due to their high visibility on the landscape. Other than burials, internal mound features include earthen fireplaces, stone altars, ceramic vessels, and clay and pebble cists (Goldstein 1995).

Mallam (1976) and Goldstein (1995) began to question the cohesiveness of the Effigy Mound peoples through examination of one dimension of ritual; the preference of mound form among mound groups. Mallam and Goldstein both found that, although many different effigy mound forms may be represented in a group, there was usually a certain class of effigy mound form that dominated each group. Both argued that the mound groups were likely built and maintained by autonomous groups, possibly lineal groups. Later, Rosebrough (2010) deconstructed the idea that the Effigy Mound manifestation was a cohesive group with several shared traits. In her analysis of effigy mound styles and various attributes of ceramics, she found that every mound group was unique in and of itself.

7.2 Summary of the Research

This research explores patterns and variation in the ritual features within mounds belonging to the Effigy Mound manifestation. It has been demonstrated that the structure of the physical mortuary artifacts, features, and space can be a good predictor of the larger social organization (Saxe 1970; Binford 1971; Goldstein 1981). Using the theoretical framework developed by Saxe (1970), Binford (1971), and Goldstein (1980), this study focuses on the social organization of the Effigy Mound peoples through examination of the ritual and mortuary ritual domain. The general expectation is that systematic patterning across all mound groups would indicate large-scale cohesiveness among the entire Effigy Mound area. On the other hand, variability in the number, kind, and manner of internment among mound groups and physiographic regions may indicate smaller-scale local cohesive lineal groups that built and maintained specific mound groups.

Two broad data sets were used to investigate the ritual and social system of the Effigy Mound peoples. First, Research Questions 1 and 2 explored the material and spatial domain of features and burial disposition. Specifically, the analysis of patterning and variation, particularly of how ritual features were represented in the mounds, was used to examine group cohesiveness. Second, Research Questions 3 and 4 examined biological variables within the archaeological context. As has been mentioned elsewhere, not all individuals were granted burial in mounds (Goldstein 1995; Lackey-Cornelison 2012; Rosebrough 2010); therefore Question 3 focused on whether individuals may have been excluded by age or sex status. Question 4 examined the biological distance among mound groups and physiographic regions as another measure of group cohesiveness.

The theoretical framework for examining the results of this research draws on those studies and perspectives in archaeology that investigated patterning in the ritual mortuary program (Goldstein 1980 and 1995; Saxe 1970; Binford 1971). To interpret the results for patterning this study also draws on the bioarchaeological literature (Lackey-Cornelison 2012; Buikstra et al 2011; Knudson and Stojanowski 2009). Variability in the ritual and mortuary domain that may indicate maintenance of the mound groups by individual corporate groups are interpreted from an Agency Theory perspective (Morris 1992; Rakita and Buikstra 2005; Dornan 2002; Pollock 2011). Specifically, this study provides an example where the empirical rigor, as envisioned by Goldstein (2002), Binford (1971), and Mallam (1976), Tainter (1978), Brown (1971) can be applied to the ritual landscapes and paraphernalia of the Effigy Mound manifestation to uncover patterned regularities in the social organization of the larger sociocultural context. At the same time, this study uses an agency/practice approach as an interpretive device for explaining variability (Dorner 2002; Pollock 2011; Ortner 2001; Lesure 2005). This Agency approach bridges the gap between the patterns that early processual archaeologists focused on and attempts to interpret how structures of society are negotiated continuously within a social group. This chapter demonstrates that, although there are patterned regularities in the Effigy Mound manifestation, there is evidence indicating that the groups maintaining specific mound groups were a cohesive corporate unit. Further, the agent (ritual practitioner) was a tool for intentionally induced variation of the mound groups as a mechanism for asserting group identity through creative symbolizing (Pollock 2011). As will be shown in this chapter, this creative symbolizing is exhibited by different manners of mound construction, the incorporation of features in the mounds, differences in the co-variation of features in the mounds, and the spatial patterning of features in the mounds. This variation is demonstrated among the mound groups and among physiographic regions of southern Wisconsin.

7.3 A Place for Remembering: Effigy Mound Groups as Sacred Landscapes

It is important to view the Effigy Mound groups as sacred landscapes, a place for remembering the ancestors, a place for commemorating the corporate group, and as a mortuary ritual space (Cannon 2002; Ashmore and Geller 2005; Lackey-Cornelison

2012). While it is the case that these spaces had significant meaning to the participants, the mound groups also likely served as visible markers on the landscape of the corporate group by reference to the ancestors (Goldstein 1980; Winter-Livneh et al 2012; Robb 2007).

In his study of ancient monuments in Europe, Bradley (1993) made several observations that are pertinent to this study. Bradley noted that the same sacred sites were altered and reinterpreted continually through time. In southern Wisconsin we see the same monumental sites used through time and may even see transitional mounds that may not fit the definitions of a time period. This would indicate a deep connection with the ancestors and the power, both ritual and political, invoked by the relationship and control of the space.

Also, it is well documented that many of the mounds were added to or changed in later generations, possibly the result of changing meaning or the need to connect with the ancestors in a symbolic physical manner (Bradley 1993). The presence of Hopewell mounds alongside Effigy Mounds at the Trowbridge site (Trempeleau County) and Effigy Mounds associated with Aztalan (Jefferson County) are a testament to the potential adoption or reinterpretation of these mounds and the symbols associated with them (Birmingham and Eisenberg 2000; Lackey-Cornelison 2012).

Morris (1992) presented two methods for interpreting symbolism, the ‘direct’ and ‘linguistic’ approach. The ‘direct’ method implies that one can interpret the exact meaning of a particular symbol, even out of context. The second approach, ‘linguistic’, requires a more comprehensive understanding of a symbol within a larger body of evidence and context. Here the same symbol could mean a different thing in different contexts, times, and places. Alternately, different symbols could mean the same thing in different contexts, times and places.

This is an important concept since this research examined variation in the selection of ritual features in the mounds and the dispositions of those features. This is important on two levels. First, different groups may be symbolizing something different from those around them through the incorporation and position of various features in the mounds. Second, it may be that the mounds and mound groups themselves represented a “sacred landscape” (Rakita and Buikstra 2005) and a ritual system that was not primarily funerary. We see evidence that the mounds may not have been funerary in nature since many of the mounds that contained no burials contained other stone, fire, or pottery features that may have articulated to the rest of the community the same symbolism as a burial.

Interpretations for the social organization of Effigy Mound peoples and the meaning of the mounds and mound groups have been contemplated for some time. Some of the research on Effigy Mound monumentalism used ethnographic analogy, or some would argue ethnoarchaeological homology (Radin 1911). Referring to Winnebago (Ho-Chunk) customs Mallam (1976) and Benn (1979) suggested that the mound groups likely represented the products of different lineages within a larger society.

In a later study, Mallam (1984) argued that these Late Woodland groups practiced a hunting gathering lifeway, which recognized and celebrated the idea that nature and culture were intimately linked. The building of the mounds in the shape of animals solidified this link. Mallam argued that between the Middle Woodland and Late

Woodland there was a shift in the mortuary program from a focus on social differentiation to an emphasis on the link between nature and culture (Mallam 1984). Further, Mallam (1984) considered the mound groups to have been cosmological representations linking nature and culture to a physical sacred space that represented world renewal ritual. Using ethnohistoric information of the Winnebago, there were two worlds that could be represented by the effigy mounds, an upper world and a lower world (Birmingham and Eisenberg 2000). In this scenario the birds represented the upperworld and the water and land creatures belonged to the lowerworld. These two broad categories divided the world and lineages into two broad categories. In Mallam's (1976) study he found that, although some effigy mound forms dominated a mound group, there were still a minority of mounds that represented other lineages or the opposite world. This opposition has also been interpreted by Birmingham and Eisenberg (2000) as a balancing of the natural and supernatural world (Birmingham and Eisenberg 2000). Mallam (1976) argued that it is likely that each mound group was maintained by a lineage and this was reflected in the dominant effigy form of the mound group.

Later, Goldstein (1995) found a similar pattern in southern Wisconsin. She interpreted the mound groups in general to be markers of corporate identity and posited that the visibility of the mound groups may have communicated to outsiders a claim to resources in the area through reference to the ancestors. She further surmised that the mound groups may have served as some type of resource map.

Based on stylistic analysis of the mounds and ceramic vessels, Rosebrough (2010) proposed that these autonomous groups possessed a sub-group of individuals who were selected as ritual practitioners and who built and maintained the mound groups and likely inhabited the mound areas throughout the year. During the warmer months the larger lineal group would have migrated to their respective mound group areas for subsistence routines and ritual practices.

7.4 Theoretical Framework

This study was guided by the principle that the ritual and mortuary domain of a society is a reflection of the larger society (Saxe 1970; Binford 1971; Goldstein 1980). As such the structures and worldviews of the society were expected to be coded in the ritual behaviors and materials of the Effigy Mound peoples. Specifically, the internal mound features represented ritual paraphernalia with inscribed meaning for each. The specific ritual items that were used and how they were represented in space were described in Chapters 5 and 6.

Goldstein (1995) suggested that the mounds themselves should be treated as artifacts within a site. In this study the mounds are treated as artifacts that include attributes such as intended form and structure of various inclusions in the mounds. Chesson (2008) noted the regularity in which Early Bronze Age Dead Sea groups interred their dead in mapped out segmented patterns that resembled structured maps. This study argues that mound construction proceeded the same way with a plan, a ritual map if you will, strategically arranged by a spiritual practitioner(s). For Effigy Mound peoples this plan was likely dictated by both overarching ritual structures and agent driven interpretation of ritual and/or creative ritualization which resulted in both regularity and variability among mound groups. Further, if mound groups were built and maintained by lineal groups, one would expect variation among mound groups, possibly as a way to set them apart as a distinct lineage that may do things different.

Chesson (2008) described the results of many years of Bronze Age cemetery excavations and mortuary practices among peoples along the Dead Sea, Jordan. She made the observation that every time there was a population shift or shift in subsistence and settlement, there was an attendant shift in the mortuary program. Interestingly, in the early Bronze Age society, when populations were small and nomadic, secondary burials occurred under ground. Later, after the establishment of walled villages, the cemeteries were more visibly located above ground in rectangular charnel houses and/or body libraries, or on bluffs and cliffs overlooking the village. Chesson (2008) surmises that the high visibility of the cemeteries with increasing village size and sedentism likely represented territorial markers and assertions of entitlement to the land.

These same shifts in social organization likely occurred between the Middle and Late Woodland, resulting in changing mortuary ritual. As Mallam (1984) argued, the shift from Middle to Late Woodland was a shift from an emphasis on social status to an emphasis on the corporate group in the Late Woodland. However, examination of Effigy Mound ceremonialism may have retained some status roles as represented by differences in burial patterns between geometric and effigy mound forms (Lackey-Cornelison 2012).

7.5 Sampling Bias

It must be understood that the samples included in this study are biased on several different levels. Weiss-Krejci (2011) provides a nice summary of the formation processes resulting in the structure of archaeological sites. In order to understand the burial or final deposition context, it is important to understand how formation processes were determined largely by the beliefs and cultural perceptions of death, the body and what constitutes a proper burial (Weiss-Krejci 2011). Some of the biases inherent in this study are discussed so the reader can judge the interpretations presented in this chapter against a backdrop of research limitations.

As discussed by Weiss-Krejci (2011) there are many different avenues for artifacts of the mortuary program to be preserved or become archaeologically invisible based on cultural practices. It is the case that not all mound groups were equivalent in size and had differing numbers of geometric and effigy forms. This could have dramatically biased the results for the questions that incorporated mound form as a variable. Related to this, archaeologists made the decisions for what mounds to excavate, including how many geometric and effigy mound forms. Of course, many of the mounds had already been destroyed before the archaeologist conducted excavations.

Most of the mound groups in this study were excavated by W.C. McKern and the record is fairly complete for which mounds were excavated and what part of the mounds were excavated. Rarely were entire mounds excavated. Instead, McKern relied on previous patterns for feature locations in a given mound form. Effigy mound forms were typically excavated in the “heart” region and subsequently expanded if features were encountered. In most cases, effigy forms were exposed along the entire length of the body, wings, and legs while still maintaining the original outline of the effigy form. The conical mound forms were typically trenched from side to side, usually resulting in 50-

60% of the mound excavated. Linear and oval mounds were typically sampled along the entire longitudinal length of the mound. From most of the published trenching schematics it appears that bias would be most apparent in conical mound forms.

Another source of bias was related to archaeological nomenclature. Specifically, the term "burial" may have been applied differentially among mounds, mound groups, and among different investigators. For example, Barrett and Hawkes (1919) included the large burial in Mound 1 at Kratz Creek as a single burial. In fact, this "burial" was composed of approximately 45 bundle burials. This study relied on the archaeological designations of a burial. There was also the differential and inconsistent use of "altar" and "fireplace", especially between McKern's and Barrett and Hawkes definitions.

Probably the most prominent source of bias in this study was differential preservation of the burials. In general, the secondary burials presented the highest degree of friability and fragmentation. Most primary burials were in good condition for complete analysis. At Nitschke the preservation resulted in severe fragmentation and friable bone. Even though it is not considered in this study, there was much evidence of active excarnation and weathering of the skeletal elements that could have facilitated the decomposition of the bones. At Neale many burials were uncovered but most of the skeletal elements were so poorly preserved that, in many cases, burial disposition could not be determined. At Polander the skeletal sample available for study was very fragmentary because the burials were overlain with large boulders before the mound was completed. In general this affected the skeletal material that was analyzed. Notably, epigenetic trait selection was primarily determined by those bones that occurred most frequently. Sex and age determination was also difficult because the critical elements for sex and age estimation were eroded or missing. The two bones that were present in high frequencies were femora and mandibles.

Finally, the curated remains in the MPM were curated differentially. Many times catalog numbers were assigned to burials and other times they were assigned to individual elements. Additionally, there were inconsistencies between what was logged in the catalogs and what was available for examination. To minimize these sources of bias painstaking review and recording of all available contextual information provided by published site reports, field notes, museum catalogs, and even newspaper articles, resulting in a more accurate understanding of Effigy Mound sites and materials.

7.6 Research Question #1: Summary of Results and Discussion

Research Question 1 considered two dimensions of the ritual and mortuary ritual program including patterns in the presence of specific features, co-occurrence, and the position of features in mounds among the mound groups and physiographic regions. In addition to summarizing results from Question 1, this section will argue that the evidence indicates that a) there were overarching ritual patterns, both in materials and context, across all mound groups, b) there was systematic variation in some materials and context, across most mound groups, c) specific mound groups were actively symbolizing their corporate identity through creative ritualizing, and d) the mound groups primarily functioned as a mortuary program through both the use of bodies and other features to signal corporate identity through reference to the ancestors.

To review, the goal of Research Question #1 was to identify whether corporate groups, particularly lineal groups, were building and maintaining specific mound groups. To do this, the question examined whether there were overarching patterns and/or differences among mound groups that could be recognized in the frequency of features, the co-variation of features, and the vertical and horizontal positioning of features in mounds. The results for Research Question 1 were presented in Chapter 6.

7.6.1 Presence and Co-variation of Features

The results for Research Question #1 are summarized as follows. Examination of the frequency of features resulted in no important differences in the number of features represented among the mound groups or physiographic regions. What is more important, and where differences were observed was found in the presence and co-variation of features in the mounds at each mound group. Table 7.1 presents the frequencies of features in mounds among the mound groups. To gain a visual appreciation for differences among the groups, consult Appendix C. Important observations for interpretation include: with the exception of Kratz Creek (Central Plains), a) the majority of mounds contained burial features; b) where other features were found there was usually a burial also present; c) earthen fireplaces and stone altars were the most common non-burial features across all mound groups and; d) many features such as clay and pebble cists or layering of colored soils were idiosyncratic features limited to specific mound groups.

Table 7.1 Summary table of frequency and approximate percentage of features occurring in mound groups. (PL=Polander, RB=Raisbeck, TB=Trowbridge, KZ=Kratz Creek, MC=McClaughry, NL=Neale, KL=Kletzien, KM=Kolterman, NK=Nitschke)

		PL	RB	TB	KZ	MC	NL	KL	KM	NK
Mounds with burial	n=	15 83%	18 90%	13 76%	8 22%	28 80%	11 46%	14 52%	4 100%	28 76%
Mounds with burials with any features	n=	2 13%	13 72%	1 8%	5 63%	16 57%	7 64%	8 57%	1 25%	6 21%
Mounds without burials	n=	3 17%	2 10%	4 24%	28 78%	7 20%	13 54%	13 48%	0 0%	9 24%
Mounds without burial that contain any features	n=	1 33%	1 50%	0 0%	4 14%	3 43%	6 46%	2 15%	0 0%	0 0%
Mounds with burials and cists	n=	0 0%	0 0%	0 0%	0 0%	6 21%	3 27%	0 0%	0 0%	0 0%
Mounds with burials and Earthen Fireplaces	n=	1 7%	5 28%	0 0%	4 50%	5 18%	4 36%	6 43%	1 25%	1 4%
Mounds with burials and stone altars	n=	1 7%	10 56%	0 0%	2 25%	9 32%	3 27%	0 0%	0 0%	3 11%
Mounds with burials and Ceramic Vessels	n=	0 0%	1 6%	1 8%	3 38%	4 14%	2 18%	2 14%	1 25%	3 11%
Mounds with burials and 2+ features	n=	0 0%	2 11%	0 0%	4 50%	7 25%	4 36%	0 0%	1 25%	1 4%
Total number of mounds excavated	n=	18	20	17	36	35	24	27	4	37

Part of this research asked whether there was co-variation of two or more features in the mound groups. Of course, the mound in and of itself was likely considered a ritual feature. However, this research when examining co-variation, asked what other *internal* features were present with and without burials. It is important to note that this research treats the burials as an object, not unlike other features.

In their discussion of materiality, Buikstra et al. (2011) stated, “According to the precepts of bioarchaeology, the study of human remains requires placing archaeological bodies within a larger body of archaeological data, which provide context – spatial, historical, and social – for more holistic interpretation.” Additionally it is the absence and/or interaction of these features that can yield an understanding of the social organization of the group. This research found there was significant association between the horizontal placement of burials and other ritual paraphernalia across locations in both effigy and geometric mound forms. This suggests that ritual and its associated symbolism is of equal prominence as the human remains themselves. As Buikstra et al. (2011:17) stated, “A joint consideration shows that both the human and material worlds create and shape each other, that both body and material artifacts have active and affective ‘social lives’.” It may be that the collective identity of the group was expressed materially through corpses or other material objects. The use of surrogate bodies is not a foreign concept in various mortuary programs around the world. In fact it has been documented that:

> In a variety of societies (ancient Egypt, Ostyak of Siberia, some aristocratic houses of Europe, Toda of India, etc.) surrogate bodies represent the deceased’s corpse until the funerary cycle is completed. These transitional bodies look very different and may include figurines, dolls, effigies, masks, hair locks, bone splinters, and empty coffins (Weiss-Krejci 2011: 72).

It has also been well documented that memorials and cenotaphs or other material artifacts for remembering have been placed in the mortuary context to represent the corporate group or identities of the deceased (Robb 2008).

Another example of surrogate bodies (or surrogate representations of the community) comes from Pearson (2002). Pearson (2002) argued that the sites of Stonehenge, Avebury, Woodhenge, and Durrington Walls of southern Britain were part of a ritual complex that involved a multi-stage process of reintegration of the dead into the ancestors. Pearson interprets the monuments as representation of the ancestors and argues that the henge monuments represented the ancestors in the same way the body did in the past. The placement of these objects in the mounds, absent a body, does not remove what is most important, the ritual.

Among mound groups earthen fireplaces, stone altars, and ceramic vessels are commonly linked to the presence of burial in the same mounds. A possible interpretation is that these non-burial features symbolized the same thing that bodies did, quite possibly the corporate group.

This study proposes the following possibilities for the use of features in the mound. The absence of a burial may be interpreted as a product of no one dying that year but the ritual must be performed, thus requiring a surrogate. Perhaps, as Mallam (1984) suggested, Effigy Mound ceremonialism may have been part of a preplanned ritual program that was linked to world renewal ceremonies (Pearson 2002; Mallam 1984). Also, since it is generally agreed that not all individuals were interred in the mounds, it may be that the absence of burial might mean that the timing for the mortuary ritual was not appropriate for that season. For example, the Huron of Ontario culminated their burial rituals every 10-12 years with group wide ossuary secondary burial (Benn 2008). More importantly, but less accessible archaeologically, is to contextualize the entire ritual and what the meaning of death is in a given culture. Since we can only partially examine this through the material remains, it is plausible that Effigy Mound mortuary practices were a multistage process in which sometimes whole bodies or parts of bodies, as evidenced by primary and secondary burials were interred while at other times memorials (non-burial features) were used as a way to commemorate an individual, a ritual office (see Lackey-Cornelison 2012) or the corporate group.

To summarize what has been covered thus far, the general pattern for Effigy Mound mortuary practices were as follows. First, there is little evidence for visible occupation directly associated with the sites. Second, burials were included in the majority of mounds among the mound groups. Third, burials and other features occur in predictable anatomical regions of the mounds. Fourth, the presence of other features, including earthen fireplaces, stone altars, and ceramic vessels, seem to predict the presence of burial(s). Therefore, it is plausible that the non-burial features were ritually linked to burial features. Further, referring to Pearson's (2002) and Weiss-Krejci's (2011) research, it is also plausible that, when no burials were included in the mound and other features were present, these other features may have symbolized surrogates for the body. Here the body may not have symbolized the corporeal physical body of an individual but may have been a representation of the corporate body.

According to Pearson, "Many monuments and buildings have a funerary or mortuary purpose even though they contain no human bones or bodies – cenotaphs, war memorials, and ancestor shrines are examples (Pearson 2002:145)." It is suggested here that the Effigy Mound groups were likely a space or sacred landscape where ritual was performed and where sometimes the dead were buried. This could likely serve as a location where the corporate group asserted its right to critical resources through reference to the ancestors (Goldstein 1981).   The mounds themselves, similar to the stone monuments of Madagascar representing the ancestors (Pearson 2002), serve as a permanent and unyielding reminder to those from inside and outside the group that this area and its resources have rights of access by the decedents of the ancestors interred or represented in the mounds.

7.6.2 Feature Variability Among the Mound Groups

Effigy Mound groups exhibited a degree of patterned regularity across all mound groups but also important is the variability among the mound groups and physiographic regions. Referring back to Table 7.1, it can be seen that the majority of mounds in all three mound groups in the Western Uplands physiographic region (Trowbridge, Polander, and Raisbeck) contain burials (ranging from 76% - 90%). Further, other than Raisbeck, there were few non-burial features. This may be indicative of a greater emphasis on the incorporation of the body into the ritual. As a side note, Polander and Trowbridge were also the only groups that systematically interred their recent dead in the extended burial position. Polander was unique in that many of the burials either were enclosed in stone vaults or overlain with a plat of large stones.

Kratz Creek exhibits a pattern much different than any other groups where few of the mounds contained burials. Again, the mounds that did not contain burials generally did not contain other features. There are three notable observations to be made about Kratz Creek. First, Mound 1 (conical mound) contained at least 111 individuals in one large communal secondary burial. Second, there were multiple stone altars and earthen fireplaces associated with this large burial. Third, many of the mounds were constructed of alternating layers of light and dark sand and layers of fire, which was unique to this mound group.

The pattern at McClaughry, Nitschke, and Polander is similar, with a high frequency of burial features as well as the incorporation of other features in the same mounds with burials. It is quite possible that the similarities of these three mound groups could indicate contemporaneous groups in southern Wisconsin. Clay and pebble cists are a feature that only appears in the McClaughry and Neale mound groups. At McClaughry they tended to co-occur with mounds that contained burials, while at Neale these features were more often observed in mounds that did not contain burials.

Mound groups in the Eastern Ridges and Lowlands (Kletzien, Kolterman, Nitschke) contained a higher proportion of mounds with burials. Also, non-burial features tended to co-vary with mounds that also included burials. Of special note, Kletzien was composed of many intaglios prior to mound construction and in some of the intaglios a thin layer of sand was laid down prior to mound construction.

In general, there is an overall patterning of burials in mounds where other features are common and seem to be symbolic representations of the mortuary ritual or the features were associated with the mortuary ritual. However, there are striking differences in the use of ritual paraphernalia both in presence and in association with burials among mound groups and physiographic regions. Important differences are also found in the construction of mounds and in some materials incorporated into the mounds. This can be interpreted as the maintenance of mound groups by a single corporate or lineal group. The creative use of ritual paraphernalia may represent one way that ritual practitioners asserted the uniqueness of their role and their group's role in the region (Pollock 2012). It could further indicate that the structure of the ritual domain was secretive and was only shared among a subset of the group (Howey and O'Shea 2006), allowing for creative ways to elevate sacred positions through variable methods of ritualizing (Pollock 2012).

7.6.3 Spatial Pattern and Variability: Vertical and Horizontal Positions of Features

Finally, the spatial dimension must be considered. Goldstein (1980), Ashmore and Geller (2005) argue that the one dimension of the mortuary program that should not be ignored at any scale, whether considering a single internment, or across the burial site, is the dimension of space. The use of space and how space is used relative to other mortuary deposits in is one way in which societies symbolize their worldview (Ashmore and Geller 2005). One aspect of space is the location of burial and the symbolism that it may entail (Ashmore and Geller 2005).

In this study space is defined by the burial position in the mound. Burial position was divided between horizontal and vertical mound positions. Horizontal positions were categorized into “anatomic” locations for effigy mound forms and center and far from center in geometric mound forms. Vertical position was classified the same for geometric and effigy mound forms as: above the mound floor, on the mound floor, and below the mound floor.

An important pattern was found in the horizontal positioning of all features in both geometric and effigy mound forms. If the feature occurred in an effigy mound form, the most frequent location was found in the “heart position” of the effigy form. If there were multiples of the same feature they would secondarily be located in the “head”, “stomach”, and sometimes “hip”, “leg”, or “wing” of the effigy form. In geometric mounds most depositions of a feature were in or near the center of the mound. This was likely an overarching ritual feature that united the groups across the region. This could possibly mean that there was symbolic meaning for “heart” in effigy mound forms or center in geometric mounds that was significant enough that the structure seems to be shared among all mound groups. Most likely, these anatomic positions carried specific symbolism which may have been generalized or interpreted differently among mound groups.

Although the general pattern was for a heart preference in effigy mound forms, some important observations and deviations from this pattern were observed among the mound groups and physiographic regions (Appendix B). In the Central Plains, Kratz Creek and McClaughry contained one burial located solely in the stomach position of one Panther mound. Also notable, there were three burials at different depths in Panther mounds at both McClaughry and Kratz Creek. The position of these shared features in the same mound forms certainly must have been an important ritual feature to those people and may suggest a close relationship between the two groups. Interestingly, at Neale the stomach location seemed to be a preferred position, where burials were found in the stomach position of four Bear effigy mounds. In a Panther mound two burials were found in the hip and stomach positions.

Among the Eastern Ridges and Lowlands mound groups there appears to be a different kind of pattern that emerges. Although most of the burials were found in the heart position with additional burials occurring elsewhere in the effigy mound forms, at Kletzien one deer effigy form contained a burial in the stomach position, and at Kolterman two effigy forms (one indeterminate and one otter) contained burials in the stomach position. At both Kletzien and Kolterman two burials were found at differing depths in the heart positions of a Deer and Otter mound respectively. At Nitschke a pattern unlike any other mound group emerges. Although most effigy mound forms contained burial in the heart position, two mounds contained three different burials in different horizontal positions including: the heart, hip, and head positions of a Bison mound and in the heart, head, and between the rear legs of a Turtle mound.

For vertical position there was great variability in the placement of features. The patterned regularities that were observed included a modal preference for burial below the mound floor among all mound groups and physiographic regions. The variability among the mound groups appears to center on burial preference directly upon or above the mound floor. For the Western Upland groups, with the exception of Polander which exhibited three burials on or above the mound floor, Raisbeck and Trowbridge exhibited a greater number of burials above the mound floor. For the Central Plains mound groups, burial position was variable. At Kratz Creek most (n = 8/12) of the burials were interred above the mound floor. At McClaughry there was a fairly uniform pattern of burials in all three vertical positions. Of the 12 burials at Neale 11 were interred below the mound floor. However, the Eastern Ridges and Lowlands mound groups had a preference for burial on the mound floor.

Two other features that demonstrated differences in vertical position among the mound groups and physiographic regions were earthen fireplaces and stone altars. The patterned regularity observed for both earthen fireplaces and stone altars was a preference for directly on or above the mound floor. However, mound groups in each physiographic region exhibited certain preferences for vertical placement in the mounds. In the Western Uplands earthen fireplaces were found more often above the mound floor. In the Eastern Ridges and Lowlands earthen fireplaces were found most frequently on the mound floor. In the Western Uplands stone altars occurred most often above the mound floor but were generally represented in all three locations. In the Central Plains stone altars occurred most frequently on the mound floor.

The shared effigy forms and burial dispositions among the Kratz Creek and McClaughry groups bears witness to the fact that these groups likely had a close relationship, which included sharing aspects of ritual and possibly represented related lineages. Also, although different effigy forms were represented among the Kletzien and Kolterman groups, sometimes the preferred location for burial was in the stomach and hip of the effigy forms. Variation in observed patterns was also observed at Nitschke with two mounds containing three burials in distinct anatomical positions in effigy mound forms.

To summarize, there appears to be a pattern in the mode of deposition of features in the vertical and horizontal dimension in mounds. Although there seems to be a preference for burial in the heart position, there is considerable variation among mound groups for burial in other primary locations. This variation among the mound groups could represent ritual leaders creatively ritualizing as a mechanism to set themselves apart as representing a distinct lineage (Pollock 2011).

In the vertical dimension burials were generally found in the greatest numbers below the mound floor. Earthen fireplaces and stone altars were found on or above the mound floor. However, there were site specific preferences or signatures for the two non-modal vertical positions for burial among mound groups. Since space is seen to represent structures of the larger society, it would make sense that the variation could be accounted for by demarcating the corporate or lineal group in the mortuary ritual domain.

7.7 Research Question #2: Summary of Results and Discussion

This question considered burial disposition from three different perspectives including: the disposition of all burials in a mound, the disposition of the combined burial dispositions in a mound, and whether burial disposition was different between effigy mound forms and geometric mound forms among mound groups and physiographic regions. This question stems from the evidence that the social organization, the ritual or ceremonial realm, and cosmology/worldview is most clearly seen in mortuary sites, particularly in the processing of human remains, bodily disposition, and the manipulation and alteration of the human remains (Carr 1995; Buikstra and Scott 2009). As evidenced by Saxe (1970), Binford (1971), and Goldstein (1981), it is well accepted that social organization may be understood by examination of the differential treatment of the remains. Before introducing the results and a discussion of the possible interpretations, the significant findings are outlined.

Before interpreting the results it is important to consider the inherent sampling bias in this study. In general, not all mounds were excavated in a mound group. Further, the geometric and effigy mound forms were not excavated in the same proportions at each mound group. Despite these biases, the associations related to burial disposition and mound form may have an overt bias. Nevertheless, it is concluded that the mound groups in the Eastern Ridges and Lowlands diverged dramatically from the groups in the other two physiographic regions. This is also reflected in the mound forms that dominated each group. Conversely, it may be the result of bias through oversampling of effigy versus geometric mound forms in this region.

Research on mortuary programs that exhibit secondary burial and multiple individuals interred together are suggestive of a lineal social organization (Cannon 2002; Chesson 2007; Goldstein 2002; Robb 2007; Winter-Livneh, et al. 2012). Chesson (2007: 115) asserted that secondary body treatment is a transformative ritual in which the body is contextually placed “in collective contexts represent[ing] the process of transforming a social person into something else through carefully orchestrated and sanctioned acts of remembering and forgetting”. This is an important principle since, in the Effigy Mound sample secondary burials most often represent multiple individuals and occurred more frequently in geometric mound forms. This suggests the ritual domain may have been divided by mound form, the effigy mound forms being accessible to a narrow range of the population, while geometric mound forms included access to a larger segment of the population (Lackey-Cornelison 2012).

As stated by several authors secondary treatment conveys symbolic ritual meaning (Goldstein 1995, 2008; Kuijt 1996, 2008; Chesson 2007; Hertz 1907). According to Weiss-Krejci (2011:71) “in the case of cremation, the treatment of the corpse serves as the rite of separation whereas the collection of burned remains from a pyre and deposition in a grave play a role in rites of transition or re-integration”. Active excarnation, passive excarnation, and cremation were all performed by Effigy Mound peoples, likely for specific ritual purposes that carried symbolic meaning.

Based on ethnographic data, Chesson (2007:120) argued that secondary burial is also a way to “reassert, and renegotiate their identities, commemorate their dead, and to reassert their visions for the future of the community”. This renegotiation of identities and commemoration of the dead did not just take place the season of mound construction, but is inculcated in the memories of the participants and future generations, especially given that these were likely community wide projects. Bradley (1993) noted that the collective memory is created and recreated from the act of constructing an earthwork but also the remembering of the symbolism of the earthwork.

7.7.1 Discussion and Interpretation of Burial Disposition Results

When individual burials and mound level burial disposition were analyzed it was found that secondary burials were the dominant form of burial in the Western Uplands and Central Plains. When the mound groups were analyzed by examining the frequency of primary and secondary burial in geometric and effigy mound forms, the same pattern emerged. However, although some mound groups may have included more primary burials, these were generally limited to effigy mound forms. Table 7.2 presents the frequency of burial disposition in geometric mound groups. In her analysis of Wisconsin Effigy Mound groups Lackey-Cornelison (2012) found that secondary burial occurred more frequently in geometric mound forms and primary burial was the modal pattern for effigy mound forms. As can be seen in Table 7.2 the pattern is reversed for the Eastern Ridges and Lowlands mound groups with primary burials occurring more frequently in geometric mound forms.

Table 7.2 Frequency of Primary and Secondary burials in geometric mound forms among physiographic regions

Physiographic Region		Burial Disposition/Geometric Mounds		Total
		Primary	Secondary	
Western Upland	Observed	12.0	31.0	43.0
	Expected	13.4	29.6	43.0
Central Plain	Observed	8.0	26.0	34.0
	Expected	10.6	23.4	34.0
Eastern Ridges and Lowlands	Observed	9.0	7.0	16.0
	Expected	5.0	11.0	16.0
Total		29.0	64.0	93.0

At this juncture it is important to review the general mound distribution patterns across the samples. The Western Upland mound groups do not include many effigy mound forms. Polander contained no effigy mound forms, two effigy mound forms were excavated at Trowbridge, and approximately 25% of the group at Raisbeck was composed of effigy mound forms, however only four were excavated. Moving to the Central Plains there is a shift to approximately half the mounds taking an effigy form. In the Eastern Ridges and Uplands, mound groups are primarily composed of effigy mound forms and consequently these constituted most of the excavated mounds. However, even with this bias, there were still more primary burials in geometric mounds in the Eastern Ridges and Lowlands. This could indicate a real difference in this dimension of the mortuary program.

Again, there are patterned regularities across the mound groups in the ritual program as represented by modal burial dispositions in the mounds. Lackey-Cornelison (2012) suggested that the geometric mounds likely included members of the larger community and were interpreted as representing the corporate group. Effigy mound forms may have been reserved for ritual practitioners who planned, built and maintained the mound groups, but more importantly may have been responsible for the ritual practices (Rosebrough 2010; Lackey-Cornelison). However, we also see that some groups, especially those in the Eastern Ridges and Lowlands depart from the secondary burial modal preference for burial. This is also reflected in the dominance of effigy mound forms compared to geometric forms. When the composition of the Kletzien mound group is examined, with the exception of two burials that contained a mix of primary and secondary burial dispositions, even the secondary burials contained only one individual. This is very different than what we see in other mound groups. If it is the case that secondary burial and multiple individual burials are reflective of a lineal group social organization, it could be that these sites, especially Kletzien, were not as focused on the corporate group, but on specific identities, rituals, or ritual positions. Diachronic differences could also explain this variation. If Nitschke and Kletzien were not contemporaneous with other Effigy Mound groups, this could reflect a change in ritual, from a focus on the corporate group to a more specialized focus on individual identities or identities associated more closely with the ritual domain.

7.8 Research Question #3: Summary of Results and Discussion

This question addresses how the sex and age status of the individual may have determined whether they were interred in a mound and whether differences in the demographies of included individuals existed among mound groups and physiographic regions. It is generally accepted that only a certain proportion of the population was selected for burial in the mounds (Birmingham and Eisenberg 2000; Goldstein 1995).

Ultimately, it may never be known what cultural variable determined inclusion in the mounds but it may be possible to determine who may have been excluded.

Individual and corporate identity is informed by many dimensions including: economic, political, religious, ethnic, nationalist, tribal, linguistic, sex, gender, and social and biological age status (Knudson and Stojanowski 2009). Ethnographic research has indicated that for many cultures age is best understood as the accomplishment of various social roles, rather than simply by the passage of time (Gowland 2006). It is for this reason that studies of prehistoric societies should reevaluate the age categories that are established for analysis. Perhaps instead of using age categories that are structured by biological age, the context of internments should also inform the designation of age categories to better reflect potential social statuses of individuals (Gowland 2006). Therefore, the goal of contextual bioarchaeology is to attempt to understand what age meant socially using a feedback loop between what the biological age is and what the embodiment of age was in a given prehistoric society. This is not to say that there will not be variability in the social construction in a given society, possibly determined by individual personality or specific talents and strengths that are valued by society.

Available to the researcher are biological and contextual data for understanding how a person's status was valued. Buikstra and Scott (2009) argued that mortuary context is particularly significant for religious identity and status distinction. For Effigy Mound peoples three basic elements are available for study including; mound form, the biological status (age and sex), and the genetic constitution of interred individuals.

Here age and sex were examined to evaluate whether biological status could have been a limiting factor for mound burial. Considering the Effigy Mound sample from seven mound groups housed at the MPM, Lackey-Cornelison (2012) found there to be no statistically significant difference in the frequency of males and females in both effigy and geometric mound forms. However, she did find that children occurred at a low frequency in effigy mound forms compared to geometric mound forms. She interpreted the geometric mounds as symbolizing the corporate group by referencing the large number of secondary burials, multiple individual burials, and many conical mounds composing large numbers of burials. Lackey-Cornelison (2012) also interpreted the effigy mound forms as mounds that were restricted to a subset of the population, possibly for the ritual practitioners.

7.8.1 Summary of Sex Results and Discussion

Table 7.3 presents the frequency of males and females in geometric and effigy mound forms among the mound groups. Immediately apparent is that both biological sexes had equal access to burial. This is a consistent pattern among all mound groups. Therefore, the overarching ritual system did not limit the internment of males and females all mound groups.

Also apparent are general biases in the sample. In the Western Upland mound groups few effigy mound forms were present compared to the other regions. As a consequence few effigy mound forms were excavated. At Polander no effigy mound forms were found at the site and at Trowbridge only two effigy mound forms were present and both were excavated. At the Neale mound group nine geometric mound forms were excavated, two of which contained burials.

Table 7.3 Frequency of sex in geometric and effigy mound forms among mound groups (X = no effigy or geometric mound form excavated at site)

Mound Group	Geometric Mound Forms		Effigy Mound Forms		Total
	Male	Female	Male	Female	
Polander	16	15	X	X	31
Raisbeck	18	17	1	0	36
Trowbridge	7	11	0	1	19
Kratz Creek	31	36	2	1	70
McClaughry	17	22	2	6	47
Neale	X	X	1	2	3
Big Bend	7	4	X	X	11
Kletzien	2	2	4	3	11
Nitschke	5	8	6	4	23
Total	103	115	16	17	251

7.8.2 Summary of Age Results and Discussion

Table 7.4 presents the frequency of juveniles and adults among the mound groups. Based on low sample size in certain age categories and because many individuals could only be determined to be juvenile or adult, age categories were recoded as juvenile (0-15 years) or adult (16+ years)(see Chapter 4). The general pattern observed among the Effigy Mound groups is that juveniles (0-15 years) were generally underrepresented. Exceptions to this were found at Raisbeck, Kratz Creek, McClaughry, Big Bend, and Nitschke. Striking variability occurs at Trowbridge and Kletzien where only one juvenile was interred in excavated mounds. In most other mound groups, juvenile burial was common among the multiple individual burials. However, Trowbridge and Kletzien did not contain juveniles in multiple individual burials.

Table 7.4 Frequency of Juveniles and Adults among the mound groups

Mound Group	Age Juvenile and Adult		Total
	Juvenile	Adult	
Polander	12	62	74
Raisbeck	15	42	57
Trowbridge	1	53	54
Kratz Creek	35	85	120
McClaughry	20	78	98
Neale	2	6	8
Big Bend	11	14	25
Kletzien	1	13	14
Nitschke	19	47	66
Total	116	400	516

At Trowbridge and Kletzien something very different was being symbolized. For some reason people building and maintaining mounds at Trowbridge and Kletzien were excluding children to a greater degree than other groups. The general overall numbers of primary internments at both Kletzien and Trowbridge and the absence of juveniles may be indicative of less emphasis on corporate identity with a greater focus on the ritual program. It may also be that these individuals were excluded based on cultural parameters for what would have constituted a proper burial as defined by the cultural expectations for age related roles in the society (Gowland 2006). Alternately, it may be that the variability among the mound groups is one way ritual practitioners were actively re-interpreting the ritual program. It has also been argued by Lackey-Cornelison (2012) that the Trowbridge mound groups may have had a temporal connection to the Middle Woodland Hopewell. It may be that the ritual connection with the Middle Woodland is demonstrated within this group by a greater emphasis on status rather than corporate group identity. The mound group certainly had a spatial connection because it is located in close proximity to the Middle Woodland mounded sites of Shrake I and Shrake II. In fact, similar to Shrake I and II, most of the mounds were conical and only two effigy mound forms were present.

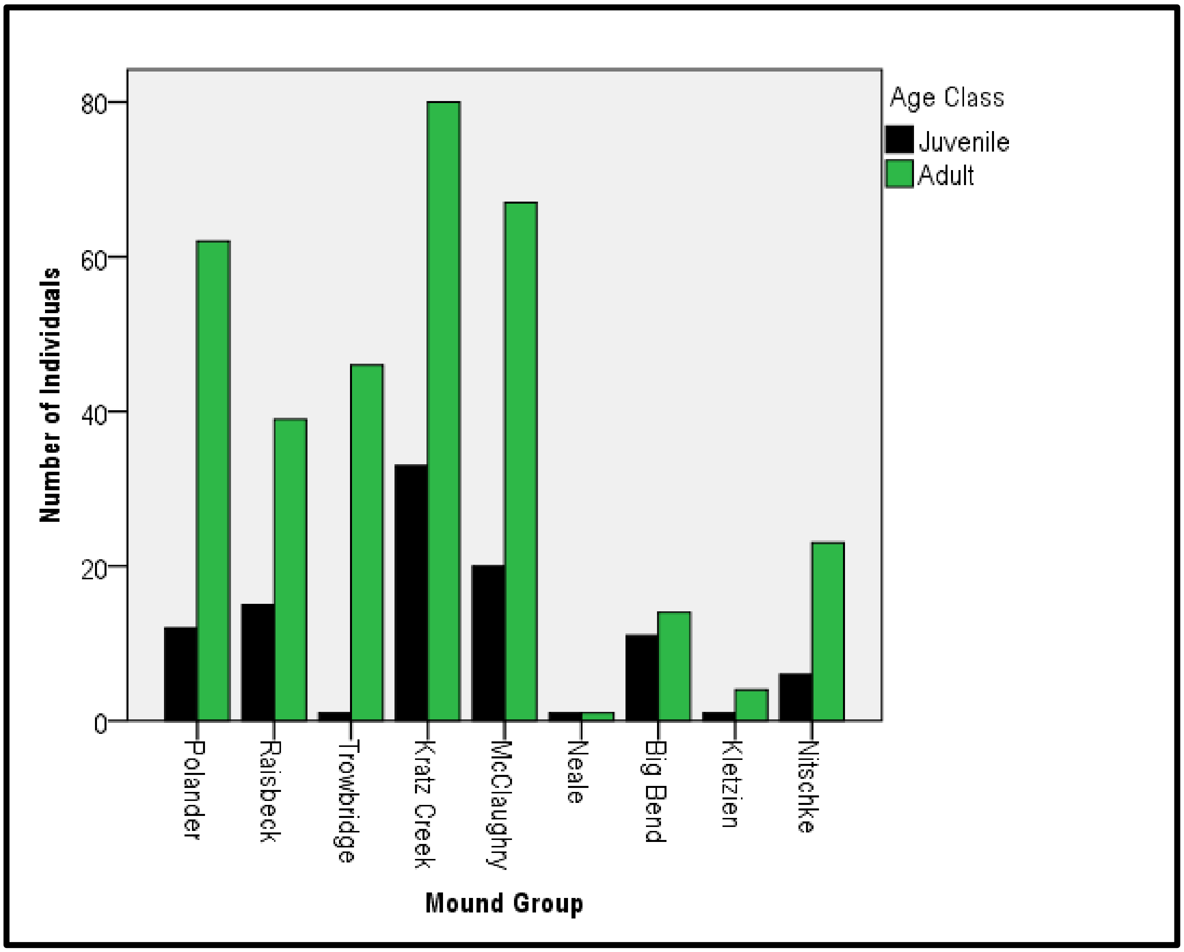


Figure 7.1 Frequency of juveniles and adults in geometric mound forms among the mound groups

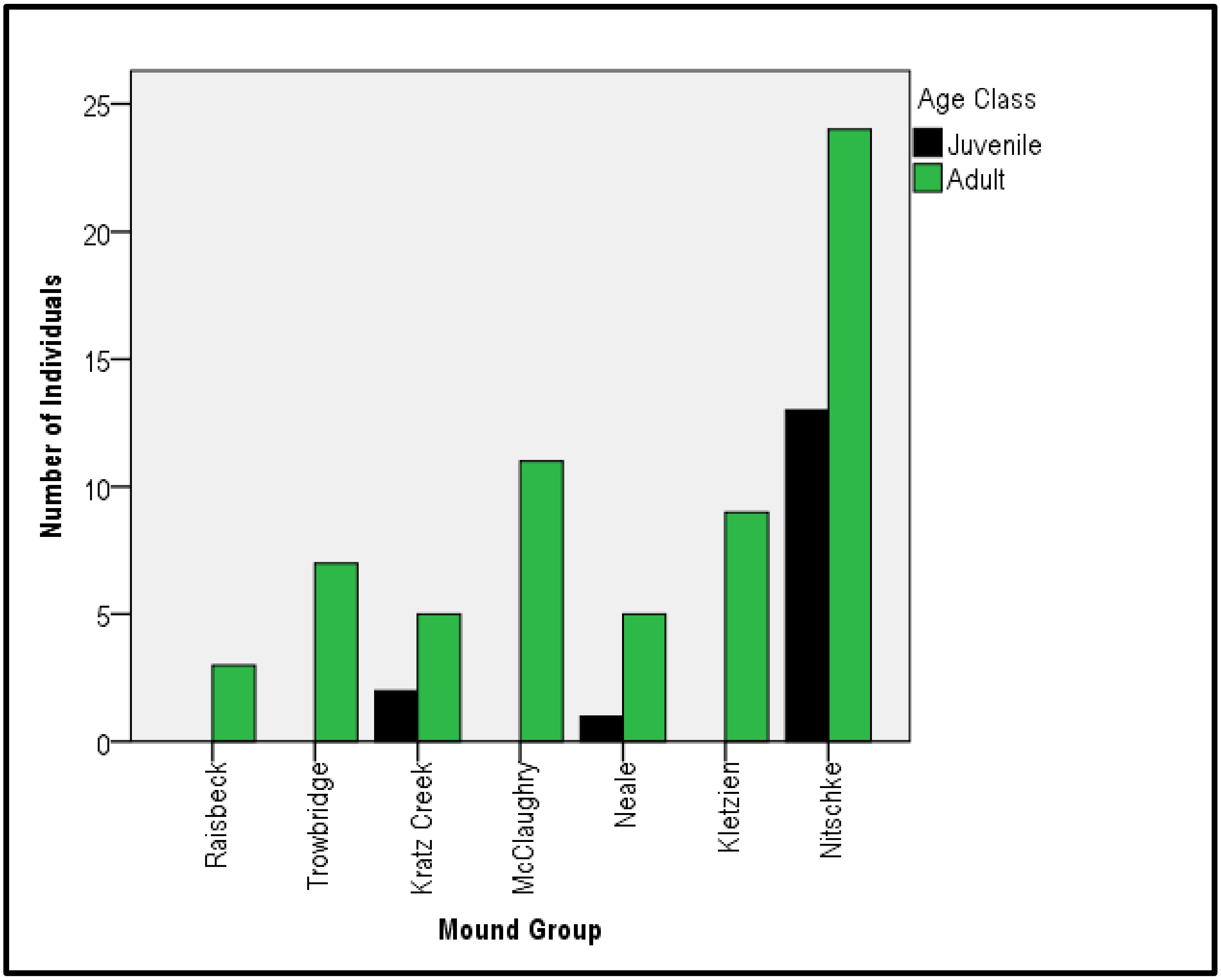


Figure 7.2 Frequency of juveniles and adults in effigy mound forms among mound groups

Figure 7.2 presents some interesting patterns and variability in which individuals were interred in effigy mound forms. In general, juveniles were excluded from burial in effigy mound forms. This pattern is consistent with Lackey-Cornelison's (2012) results from her assessment of seven mound groups in southern Wisconsin. Lackey-Cornelison (2012) argued that this may have reflected more restricted access and held a different symbolic meaning. For example, Lackey-Cornelison suggested that internment in the effigy mound forms may have been reserved for individuals closely associated with Effigy Mound ceremonialism. Two notable exceptions are found among the mound groups, at Nitschke and Kratz Creek, where a proportionally larger number of children were found in effigy mound forms. This same pattern was also reflected in the geometric mound forms, suggesting that some children held a different status among these communities. In fact, at Nitschke there were over half as many juveniles in effigy mound forms and the result of the logistic regression analysis indicated that children were nine times more likely to be buried in an effigy mound form at Nitschke.

In general, the symbolism represented in the overarching ritual system included access to males and female, however limited access to juveniles. Obviously, if Lackey-Cornelison’s (2012) interpretation is correct, and those interred in effigy mound forms were spiritual practitioners, it would make sense that juveniles were excluded. In many societies, protégés were trained for a period of time before they could fulfill the responsibilities as ritual practitioners (Pollock 2011). If this training did not begin until one was considered old enough to perform and participate in ritual and if the effigy mound forms restricted access to ritual leaders it would make sense that children were excluded.

At Nitschke, however, over 40% of those interred were juvenile. This could be explained in a couple different ways. Potentially, the symbolism of the effigy mound forms was different among the peoples maintaining the Nitschke mounds. It could be possible that this corporate group saw the effigy mound forms as a corporate symbol no different than the other mound forms. Another possibility is that Nitschke represents a later episode in mound construction (AD 1040 +/- 55 years; Bender et al. 1967), where symbolism was changing over time. It is possible that ritual practitioners continued to be buried in the mounds, but access was reinterpreted to include subadult family members of the ritual practitioners. Rosebrough (2010) argued that the mound groups were built and maintained by a subset of the population who lived continuously at or near the site. It may be that this segment of the population later included individuals of all ages contributing to mound building, maintenance, and performing ritual. Of course, another possibility was that ritual practitioners at Nitschke were reinterpreting the symbolism to set themselves apart as a distinct lineage with access to critical resources in the area (Pollock 2011).

Results from the analysis of age and mound burial suggest there was regularity in the overarching ritual system for exclusion of children in the effigy mound forms. The differential inclusion of juveniles by mound form suggests effigy mound forms were symbolizing something different than the geometric mound forms. As argued by Lackey-Cornelison (2012) and supported by the results of this study, the large number of multiple secondary burials and the internment of a wide age range of individuals is consistent with a corporate group symbolism. This dissertation extends Lackey-Cornelison's assertion by suggesting that the geometric mound forms were the lineal group's way of communicating access to the sacred landscape and to the resources within its vicinity. Further, the above burial patterns are indicative of a lineal form of social organization. Finally, differences in the presence of children may be one way of portraying and asserting the corporate groups identity as distinct from others.

7.9 Research Question #4: Summary of Results and Discussion

Based on contextual and biological data it has been established that a) there is both patterned regularities and variability among the mound groups in frequency and co-variation of burial features with other features, and regularities and variation in the vertical and horizontal positioning of features, b) there are patterned regularities and also is variability in burial disposition, c) there are patterned regularities of sex, d) there is variability in the age representation among the mound groups and; e) there is variability in the age representation between effigy and geometric mound forms. Further, it has been established that there was an overarching ritual system in place that was shared across southern Wisconsin. These regularities suggest a lineal based land tenure form of social organization among the mound groups. However, based on variability among the mound groups it is also clear that each group was maintained by a specific corporate group. This is represented primarily in the contextual domain where different features occur and co-occur in the mound groups and the varied ways they were represented in space. This is likely the result of ritual agents creatively ritualizing to distinguish their lineage from other groups in the region.

This section addresses patterned regularities and/or variability in the phenotypic structure of those interred in the mound groups. Before proceeding with the discussion of the results in this section, it is once again important to note that sampling and preservation bias have likely contributed to some of the variation observed on epigenetic traits. In fact, the selection of epigenetic traits in this study was determined solely on the basis of the most frequently occurring bones in the MPM collection.

Every study of biological distance is guided by the principle that populations that exchange mates will be more phenotypically similar than those that do not exchange mates (Stojanowski and Schillaci 2006). It is assumed that other microevolutionary processes effect the phenotypic structuring of a population. In this study, the focus of analysis is on inter- mound group variability. The expectation is that if specific lineages were building and maintaining single mound groups, the biological structuring of the burial population should be more homogeneous within the mound group. Conversely, if single lineages were building and maintaining mound groups, greater heterogeneity among different mound groups is expected.

Table 7.5 and 7.6 and Figure 7.3 illustrate the biological distance for each mound group relative to the other mound groups.   First, the Western Uplands groups are phenetically similar with Trowbridge and Polander the most similar. Second, the Central Plains and Eastern Ridges and Lowlands groups share a close phenetic relationship. Third, Kletzien is biologically distant from all groups except Kratz Creek. Fourth, Nitschke is not significantly different from all mound groups except Polander and Kletzien. With the exception of Nitschke, these trends appear to suggest an association of biological distance and geographic distance. However, the Raisbeck mound group (Western Uplands) is phenotypically similar to Nitschke (Eastern Ridges and Lowlands). This may be indicative of Raisbeck being contemporaneous with some groups in the Central Plains and Eastern Ridges and Lowlands. The potential affinity between Nitschke and Raisbeck was noted previously in this chapter based on similarities in burial disposition, inclusion of non-burial features, and in burial position for these groups. Possible explanations include mate exchange between these two groups or the burial patterning represents contemporaneous occupations and temporal trends. This would also suggest that these Late Woodland groups did not recognize physiographic regions as geologic features that inhibited interaction between groups.

Table 7.5 Mean Measure of Divergence Matrix (values above the diagonal are the MMD values; values below the diagonal are the Standard deviations; bolded values represent statistical significance at the 95% C.I)

	Polander	Raisbeck	Trowbridge	Kratz	McClaugh.	BigBend	Kletzien	Nitschke
Polander		0.3340	-0.0479	**0.3663**	**0.6462**	**0.5788**	**1.2528**	**0.4278**
Raisbeck	0.0942		0.1038	**0.2110**	**0.1972**	**0.2883**	**0.7446**	0.0948
Trowbridge	0.2226	0.1954		**0.3673**	0.3127	**0.6107**	**1.2854**	0.3699
Kratz	0.0798	0.0499	0.1833		**0.0975**	0.0224	**0.2668**	-0.0034
McClaugh.	0.0877	0.0594	0.1927	0.0444		**0.2184**	0.2268	0.0782
BigBend	0.1400	0.1132	0.2369	0.0985	0.1081		0.2300	-0.1029
Kletzien	0.1449	0.1178	0.2507	0.1049	0.1162	0.1675		**0.4124**
Nitschke	0.1008	0.0730	0.2027	0.0578	0.0686	0.1224	0.1286	

Table 7.6 Biological distance among mound groups from MMD

Increasing Biodistance →							
Polander	Trow	Raisbeck	Kratz	Nitschke	Big Bend	Mclaugh	Kletzien
Raisbeck	Nitschke	Trow	McClaugh	Kratz	Big Bend	Polander	Kletzien
Trow	Polander	Raisbeck	McClaugh	Kratz	Nitschke	Big Bend	Kletzien
Kratz	Nitschke	Big Bend	McClaugh	Raisbeck	Kletzien	Polander	Trow
McClaugh	Nitschke	Kratz	Raisbeck	Big Bend	Kletzien	Trow	Polander
Big Bend	Nitschke	Kratz	McClaugh	Kletzien	Raisbeck	Polander	Trow
Kletzien	McClaugh	Big Bend	Kratz	Nitschke	Raisbeck	Polander	Trow
Nitschke	Big Bend	Kratz	McClaugh	Raisbeck	Trow	Kletzien	Polander

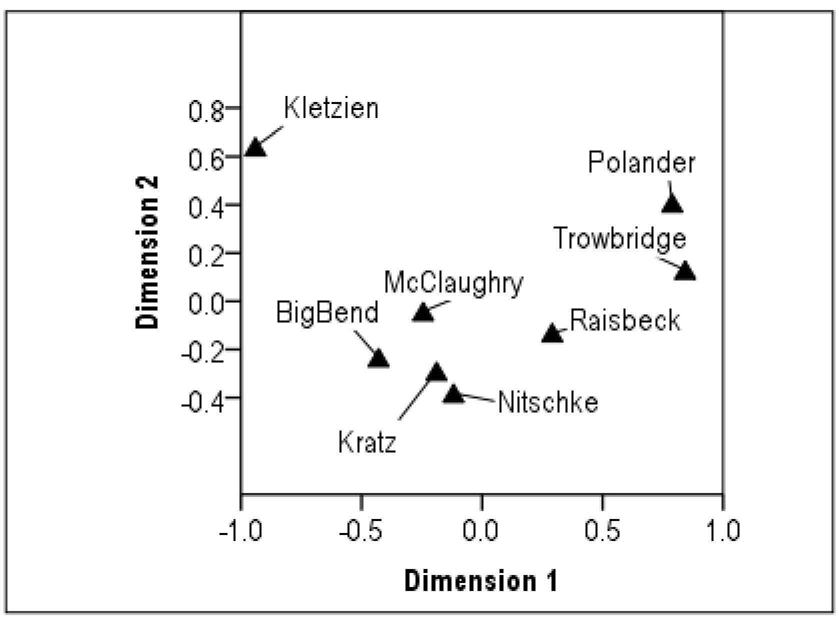


Figure 7.3 Multidimensional Probability Scaling (PROSCAL) scatterplot of the MMD among eight mound groups

The biological distance between the Western Uplands groups and the Central Plains and Eastern Ridges and Lowlands is dramatically illustrated in Figure 7.4, where there is a clear east-west separation. Other studies have noted that temporal differences can account for much of the biological distance within the same site or among archaeological sites (Konigsberg 1990; Connor 1990). Unfortunately, since few dates exist for the mound groups, it cannot be certain if phenetic clustering is temporal instead of geographic.

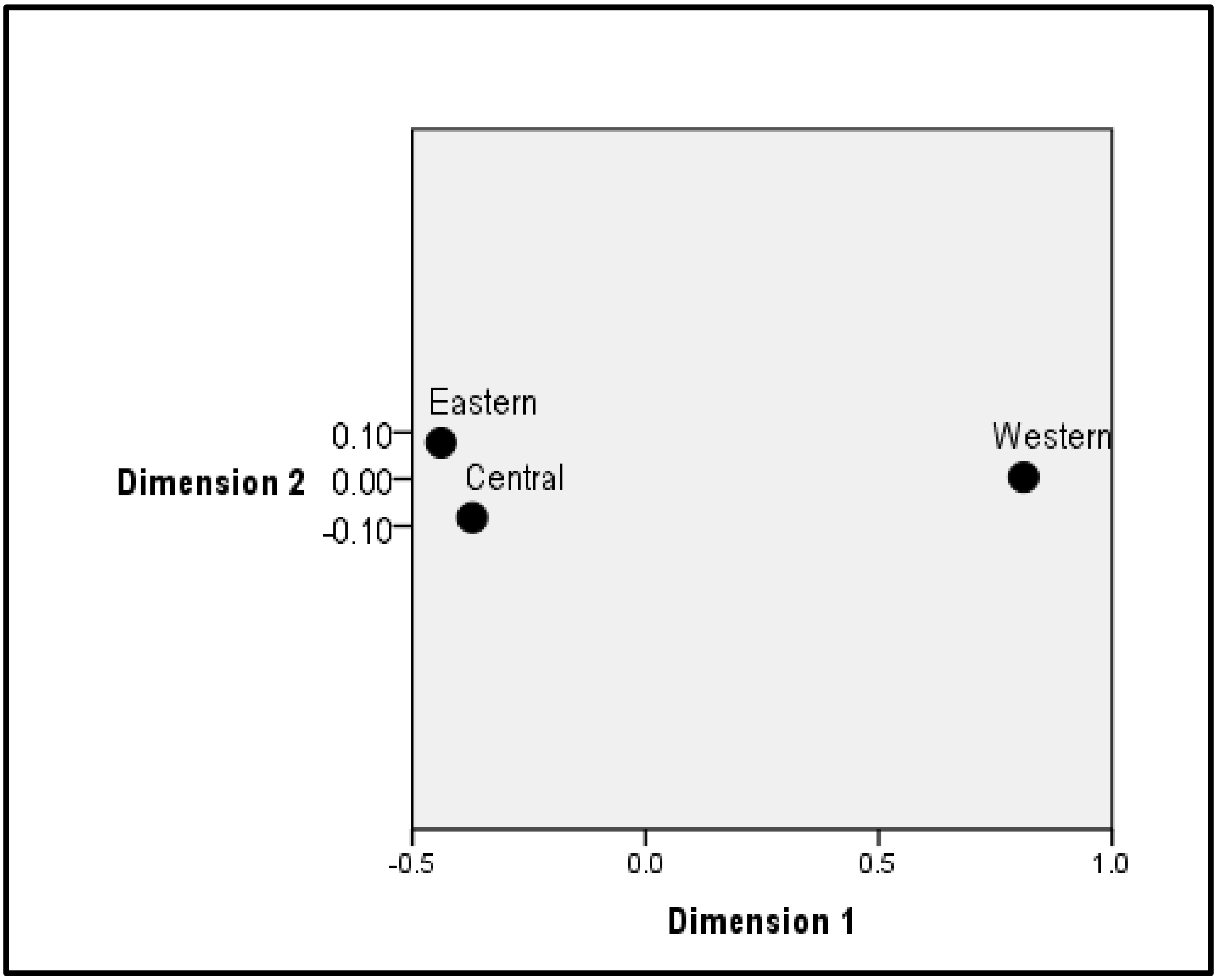


Figure 7.4. Multidimensional probability scaling scatterplot of physiographic regions

As has been previously demonstrated, the Kletzien mound group seems to be an idiosyncratic group of all the mound groups. The Kletzien mound group was primarily composed of effigy mound forms (deer), its people seem to have excluded children from the effigy mounds, most burials in mounds were primary burials, and most of the burials included the remains of one individual. The epigenetic evidence further supports the contention that there was something uniquely different with the social organization of this group. The ritual domain, especially the lack of juveniles at this site, the overwhelming presence of effigy mound forms, and the prevalence of primary and single burials suggest that possibly the group did not emphasize the corporate group, but instead emphasized specific identities, rituals, or ritual positions. The biological evidence for lack of interaction with other groups in the region argues that either Kletzien was temporally distinct or that the group was in competition with other groups in the region, to such an extent that there was no mate exchange. Also possible is that if those included for burial came from a subset of a population(s) (e.g. ritual practitioners), then it might be expected that there would be a unique epigenetic structure associated with that group.

An important contribution of this study is that it illustrates how epigenetic analyses can inform the social organization of the Effigy Mound peoples. The general pattern suggests homogeneity within the Western Uplands and homogeneity among the Central Plains and Eastern Ridges and Lowlands. In her analyses of mound form, Rosebrough (2010) found a similar pattern with the groups in southeast Wisconsin being very different from the Western Uplands groups. The results of the biological distance analyses correspond to this pattern of isolation by distance between western and southeastern Wisconsin. Clauter (2012) found this same pattern in her ceramic analysis. Clauter also found that there was great variability in interaction among different Effigy Mound sites. This is best exemplified in this study by the close phenetic relationship between Raisbeck, Nitschke, and McClaughry and a close phenetic relationship between Trowbridge and McClaughry.

These apparent east-west interactions can be explained in the following ways. First, it is possible Nitschke, McClaughry and Raisbeck were contemporaneous and shared a common recent ancestry. Second, Raisbeck may have interacted (exchanged mates) with both the two other Western Uplands groups *and* the peoples maintaining the Nitschke and McClaughry mound groups. Geographically, even though the distances are great all of these sites are connected by two large primary tributaries, the Wisconsin river (flowing west) and the Mississippi River flowing south along the western border of Wisconsin (Figure 7.5). It is clear from Figure 7.5 that the Central Plains mound groups and the Nitschke mound group are on waterways that would allow convenient travel to the Mississippi River and, by extension, the peoples occupying the river.

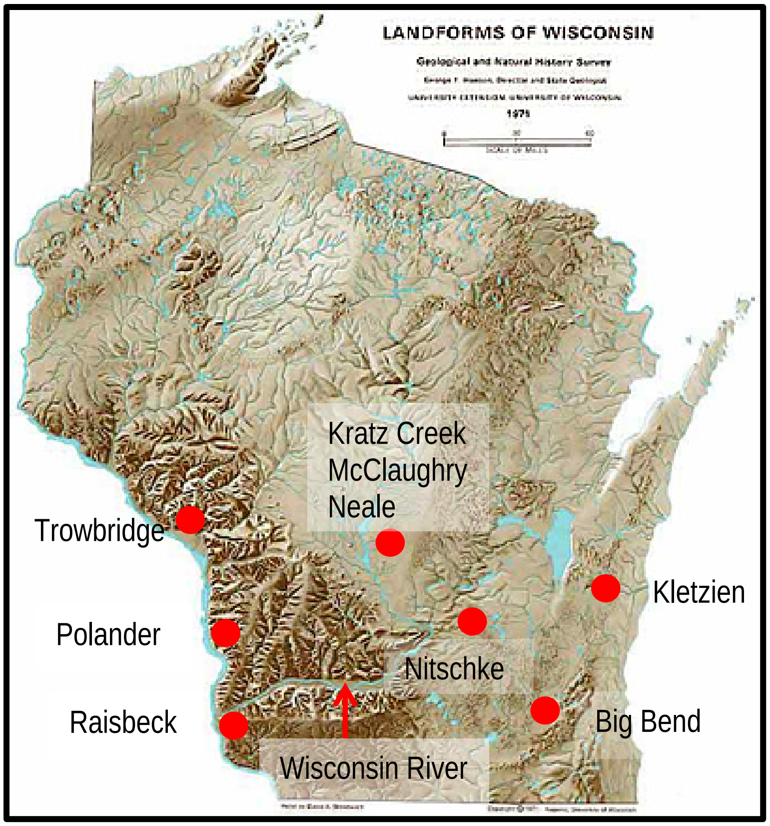


Figure 7.5 Map of Wisconsin indicating mound group locations and tributaries. Map modified from Wisconsin Geological Survey - wisconsingeologicalsurvey.org/lnfm.htm.

Although the peoples maintaining the mound groups may have had a lineage based form of social organization, there was also likely interaction among the regions which probably involved mate exchange. Unfortunately, the sample size is too small to investigate issues of post-marital residence for whether males tended to join female groups or vice versa. Referring back to Table 7.4, there was a significant number of group pairings that were significantly different for 16 of the 29 possible paired comparisons between each group. Interestingly, 12 of these differences occurred in the Western Uplands. This is largely reflective of a correlation between phenotypic distance and geographic distance.

The strongest patterned evidence for a lineal based social organization is found in the practice of secondary burial and the internment of multiple individuals in burials. Further, group identity was asserted through variation in the mortuary program including a) differential mound construction; b) unique ways of incorporating features in the mounds, both in kind and in space; c) idiosyncratic uses of features; d) differences in the interment of different age classes in effigy mound forms; and e) differential burial dispositions among mound groups in both geometric and effigy mound forms. Therefore, while there seems to be a lineal form of social organization that carries its own unique identity, the archaeological and epigenetic evidence suggests some degree of social interaction across southern Wisconsin. However, the Western Uplands group interactions were more restricted to the west side of the state.

The MMD analysis provides some useful insights into the possible interaction spheres during the Late Woodland in southern Wisconsin. As stated earlier, the findings here are similar to those found by Rosebrough (2010) and Clauter (2012). The MMD also provided information about the Kletzien mound group, whose peoples may not have interacted with other groups at all. On the other hand Kletzien may have been a site of ritual significance that excluded a large portion of the population. Nitschke, could be viewed as a mound group which may have functioned as a regional center for other groups, as evidenced by the close phonetic affinity with most other mound groups. However, the MMD analysis provided little information about whether the mound groups were built and maintained by corporate lineal groups.

7.10 Interpretation of Effigy Mound Manifestation

As stated in chapter 1, the goal of this research was to further elucidate the Effigy Mound manifestation by providing the biological and contextual framework available and associating that to the social organization of the Late Woodland Effigy Mound peoples in southern Wisconsin.

Before summarizing the interpretations in this study, it is important to return to the larger picture of Late Woodland social context. At this time, there was population growth (Buikstra et al. 1986), movement of groups away from primary tributaries into secondary tributaries and the uplands and the dispersal of groups across the landscape (Asch et al. 1979; Milner 2004; McElrath et al 2000; Nassaney and Cobb 1991). This shift in mobility, settlement pattern, and social organization seems to be consistent with the Effigy Mound peoples. Known habitation sites are few and not visible on the landscape. The ritual landscapes are visible, however, and were the focus of this study. In this study it has been argued that if groups were dispersed on the landscape, and subsistence was more focused near sites (Conner 1990), the expectation would be variability in the ritual domain. Further, if societies were organized into lineages that visibly marked a territory with earthworks, then we would also expect variability in the mortuary ritual domain.

The research questions in this study were devised to test for the presence of patterned regularities and variability in ritual symbolism among mound groups attributed to the Effigy Mound manifestation. Specifically, it was the goal of this study to investigate variation in the ritual and mortuary program through examination of mound form, burial disposition and position, disposition and position of other ritual features, the co-variation of features in mounds, age and sex patterns of individuals interred in effigy and geometric mound forms, and the biological distance among mound groups and physiographic regions. Since it is generally accepted by mortuary archaeologists that the context of mound construction and burial can be used as a conduit for understanding the social organization of a group; variation in mound group location, the mortuary program among mound groups, and mound group regions may be suggestive of a land-tenure and lineage based social organization.

At this juncture it is important to return to one of the central goals of this study; to evaluate whether Goldstein's (1981) Hypothesis 8 can be used to determine whether Effigy Mound Peoples organized by a lineal land tenure society. This will be examined within the context of Goldstein's (1981) revision of Saxe's (1970) Hypothesis 8. Goldstein's (1981:61) Hypothesis 8 stated:

D. To the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by lineal descent from the dead (i.e. lineal ties to ancestors), such groups will, by the popular religion and its ritualization, regularly reaffirm the lineal corporate group and its rights. One means of ritualization is the maintenance of a permanent, specialized, bounded area for the exclusive disposal of their dead.
E. If a permanent, specialized, bounded area for the exclusive disposal of a group's dead exists, then it is likely that this represents a corporate group that has rights over the use and/or control of crucial but restricted resources. This corporate control is most likely to be attained and/or legitimized by means of lineal descent from the dead, either in terms of an actual lineage or in the form of a strong, established tradition of the critical resource passing from parent to offspring.
F. The more structured and formal the disposal area, the fewer alternative explanations of social organization apply, and conversely.

The first part of Hypothesis 8 states that one way (not the only way) corporate groups assert their rights over critical resources through ritual practices is through "the maintenance of a permanent, specialized, bounded area for the exclusive disposal of their dead" (Goldstein 1981:61). Several lines of evidence suggest that, on some level, the mound groups represent a cemetery. First, the mound groups appear to be bounded to some extent in that they are not randomly placed across the landscape, but instead seem to be grouped together so that most observers have referred to them as groups (Mallam 1976; Goldstein 1995). Second, the majority of the mounds in most of the mound groups contained burials, likely symbolizing an emphasis on burial of the dead in a cemetery. Third, other features tended to co-occur with mounds that contained burial. Due to this, it is suggested that these items are linked to the funerary rituals. Another possibility is that these other features symbolized the same thing a body symbolized; the assertion of rights to critical resources through reference to the ancestors.

Since the evidence seems to support the mound groups as bounded cemeteries, the second part of Goldstein's (1981:61) Hypothesis 8 is addressed. If there is a bounded cemetery "corporate control is most likely to be attained and/or legitimized by means of lineal descent from the dead, either in terms of an actual lineage or in the form of a strong, established tradition of the critical resource passing from parent to offspring." The evidence for a lineal form of social organization is summarized as follows for the Effigy Mound peoples. Each group signified its identity in several different ways through idiosyncratic methods of mound construction, idiosyncratic inclusion of unique features in mounds associated with a specific mound group(s), the differential use of mound features, positioning of features within the mounds, differences in the burial disposition of the deceased, and the differential inclusion of children in effigy mound forms.

The third component of Goldstein's (1981:61) Hypothesis 8 states, "The more structured and formal the disposal area, the fewer alternative explanations of social organization apply, and conversely". This part of the hypothesis is more difficult to address. Internally, there is variation in many of the mound groups for materially representing different features in space. For example, while there appeared to be systemic variation for preference of vertical positioning of features among mound groups, it was found that all three positions were used in almost all the mound groups for almost all the features. Here, an agency approach best addresses this issue. Pollock (2011) discusses ways that ritual practitioners introduce variation. Many societies have secret ritual societies in which ritual is passed down from mentor to protégé. Two things can happen in this scenario including: reinterpretation or improvisation of rituals rarely performed and creative ritualization for the purpose of elevating ones position among the group. In addition, because a small segment of the group holds ritual knowledge, the structure likely allows for more fluidity and may also encourage creativity. That said, there does appear to be some degree in material structure; however the lack of spatial structuring among mounds and lack of burial in some mounds makes it unclear whether the mound groups were more structured and formal to a great degree.

Turning to the meaning of the mounds and the mound contents, it is important to put the observed patterns and inter-mound group variability into a landscape perspective. Bradley (1993) asserted that there was meaning imbued in earthen monuments, not just the mound itself but also relative to the setting of the mound in the mound group. Although no one has yet to find an ordered pattern to mound groups (Goldstein 1995), there most assuredly was intentional planning of the space, relative to the landscape and other monuments. This patterning likely venerated the ancestors, sacred offices, and may have told a story. As Bradley (1993) notes, the mound groups were meant to be experienced in a certain order. The ritual function of the mounds may be linked to cosmology, a link to the ancestors, or both. There may not be a pattern that modern day archaeologists can recognize but there likely was a pattern known only to the participants of the rituals. Also, it is clear that the mound groups primarily functioned as sacred landscapes, sacred landscapes that were ritualized and where ritual was practiced. Likely, even in the absence of the builders, other related groups may have understood the symbolism and stories associated with the mound group.

The data from the mound groups is ritual data, and as such, the mounds and the features within the mounds were imbued with meaning. As Morris (1992) asserted, there are two different ways to interpret the meaning; by ‘direct’ observation and the ‘linguistic’ approach. The linguistic approach necessitates that other information must be known before the symbolism can be understood. In this study the symbols include burials, earthen fireplaces, stone fireplaces, clay and pebble cists, and ceramic vessels. Other than possibly using ethnographic analogy, we will never know the meaning of these objects. A feature that seemed to be universal among these mound groups was the use of fire. The important element here is that, while the features were almost universal among mound groups, they were used in different ways including, associations with mounds that contained burials, and the choice for the horizontal and vertical dimension varied among the mound groups. Based on Morris' (1992) premise the evidence from this research points to three different possibilities. First, the same objects were used to symbolize the same thing among mound groups, but used in different ways. Second, the same objects symbolized something different between groups. Third, different features symbolized the same things among mound groups. For example, the use of clay and pebble cists likely carried the same symbolism as another feature in another mound group.

Rosebrough's deconstructs the idea that there was an Effigy Mound tradition in southern Wisconsin. She lists five common traits that identify the effigy mound groups as belonging to a cohesive group. In her analyses she was unable to support any of these identifiers. Of critical importance is that some variables do not exist for more than one mound group and as such, are not practical to test. At Kratz Creek, most of the mounds, especially those that seemed to be pointing to Mound 1, contained a complexity of stratigraphic sand and fire layers (Barrett and Hawkes 1919). A couple of mounds in the Kletzien mound group contained a layer of sand spread across the floor of the mound followed by the deposition of features on or above this layer. But one item that stands out for the Kletzien group if the use of deer for most of the effigy forms at the site. At the Neale and McClaughry clay and pebble cists were found in the mounds, usually in pairs and usually associated with a burial. No other sites contained these cists. At the Polander Mound Group, large boulders were used to cover burials in the large mass burial mound. Large stones and flat sandstones were also used at Polander to construct tomb like structures around burials (Thomas 1884).

These idiosyncratic phenomena indicate that the people that built and maintained specific mound groups distinguished themselves as a distinct group from their neighbors. Although there may have been an overarching ritual system uniting the groups, each group may have articulated and practiced their own brand of ritual in sharp contrast to others.

What is clear is that there are some generalizations that can be made that culturally linked Effigy Mound peoples. First, the use of sacred landscapes associated with resource rich areas. Second, earthen fireplaces and stone altars were used as ritual symbols among most of the groups. Third, the mound groups primarily functioned as cemeteries that likely honored the ancestors. This was determined by the overwhelming presence of multiple secondary burials. Finally, non-burial features likely were used as surrogate burials to honor the ancestors and/or ritual offices.

The biological distance analysis demonstrated different levels of intergroup interaction within among mound groups and physiographic regions. In the Western Uplands evidence suggest mate exchange among these groups; however there may have been gene flow between Raisbeck, McClaughry and the Nitschke group. The Central Plains and Eastern Ridges and Lowland groups did not adhere to borders imposed by geologists. The epigenetic evidence suggests gene flow among most of the groups in this region. However, the Kletzien mound group seems to have been genetically isolated. This could have been due to differential access to burial by a subset of that population that did not share a close affinity with other groups in the region, it may have not been contemporaneous with the other groups in the region, it may have been actively disengaged from interaction with other groups in the region, or it could have been ritually subverting those surrounding the mound group.

7.11 Conclusion

This study addressed two main issues regarding the Effigy Mound manifestation. First, the Effigy Mound manifestation has been characterized by a suite of characteristics that define them culturally. It has been demonstrated that some of these features were not universal (e.g. clay and pebble cists). However, the use of mounds, particularly for the burial of decedents, the co-variation of earthen fireplaces, stone altars, and ceramic vessels with burials certainly suggests an overarching ritual system. Further, the overwhelming presence of multiple individuals in single burials and the prevalence of secondary burial could also be viewed as characteristics of the overarching ritual system.

The second important finding in this study was the determination that the Effigy Mound manifestation was composed of multiple societies organized along lineal lines. Also important is the biological distance evidence for variable and differential intergroup interaction in this Late Woodland period. The evidence also indicates intraregional homogeneity, intraregional gene flow. This pattern is consistent with other areas of the Upper Midwest in the Late Woodland. The evidence for a lineal oriented social organization was found in the differential postmortem treatment and internal structuring of the mounds among mound groups. Particularly important are the variables that cannot be analyzed statistically due to their idiosyncratic nature. Examples of this included the use of stone plats and stone tombs at Polander, the extended burials of Polander and Trowbridge, the prevalence of single individual burials at Kletzien, burial in three distinct locations in effigy mound forms at Nitschke, the organized stratigraphic layering of light and dark sands and fire layers at Kratz Creek, and the inclusion of clay and pebble cists at McClaughry and Neale. It is believed that the idiosyncratic context and the systematic variation in the use of symbols (both of human and non-human sources) were badges for identity that were specific to each lineal group.

Finally, two distinct corporate identities are interpreted from the results of this research: 1) an overarching identity incorporating similar ritual paraphernalia in the mortuary program across southern Wisconsin and marked by epigenetic structuring and 2) a localized corporate lineage based identity. Local identity was marked by a combination of differential burial dispositions, internal structuring of mound features, exclusion of age classes, and epigenetic structuring among mound groups.

7.12 Future Research

There are many questions that can be explored in the data that was collected for this study. In addition, with supplementary data many of the ideas considered in this study could be further elucidated. For example, one of the confounding variables in this study, which could account for variability, is the lack of chronological control. Many of the interpretations in this chapter could be further explored if multiple dates could be provided from each mound group.

In addition, it would be useful interesting to investigate changing identities with the transition of period distinction recognized by archaeologists in Eastern Woodland prehistory. While this study may have found evidence of ethnicity represented by mound group and regional variation in the internal structuring of mounds, it would be interesting to investigate biological structuring between the Wisconsin Middle

Woodland, Late Woodland, and Mississippian periods, specifically regarding issues of invasive causes for ethnogenesis or whether *in situ* ethnogenesis occurred through agent driven mechanisms.

This study demonstrated that there was intra-regional patterning that was primarily reflected by an east and west division. It would be fruitful to expand this research into other areas such as eastern Iowa and southeastern Minnesota mound groups. Although no skeletal material is available for study from these areas there are site reports that exist that could inform the context of the internal mound contents. For example, a larger sample that includes other mound groups of Wisconsin, Iowa, and Minnesota it would be interesting to investigate the vertical and horizontal positioning of features. Specifically, the symbolism for the anatomical placement of burials and other features may be linked to the mound form. Further, this potential association could be linked to cosmological associations with the upperworld, world, and underworld.

Other observations were noted relating to variable postmortem treatment of bodies. For example, some groups exhibited evidence of active excarnation. Many of the skeletal elements exhibited cutmarks near joint surfaces, indicative of active defleshing. At other sites there was a lot of evidence of passive excarnation through above ground exposure, exhibited by weathering, cracked bone, and rodent and carnivore toothmarks on the bones. Therefore, it would be fruitful to examine variation in the methods of postmortem treatment as another source of group identity.

Finally, a genetic analysis of the remains could address issues of homogeneity among and within mound groups. For example, it would be interesting to examine whether individuals interred in effigy mound forms diverge from individuals interred in geometric mounds. If this were the case it would support the Lackey-Cornelison's (2012) contention that the effigy mounds were symbolic of distinct social positions, possibly ritual practitioners (and potentially their families). Other issues regarding the relationship of these Late Woodland groups could be compared to Oneota and Hopewell samples to understand the genesis and interaction sphere of the Effigy Mound peoples.

APPENDICES

Appendix A

Non-Metric Trait Recording Form

Non-Metric Traits Recording Form
Site Name/Number ________________________ Observer ______________________
Feature/Burial Number ______________________ Date _________________________
Specimen Number ___________________________ Location of Collection _________

L M R

1. Metopic Suture
   - 0 = absent
   - 1 = partial ___
   - 2 = complete
   - 9 = unobservable

2. Supraorbital Structures
   a. Supraorbital notch: ___ ___
   - 0 = absent
   - 1 = present, <1/2 occluded
   - 2 = present, >1/2 occluded
   - 3 = present, degree of occlusion unknown
   - 4 = multiple notches
   - 9 = unobservable

   b. Supraorbital foramen: ___ ___
   - 0 = absent
   - 1 = present
   - 2 = multiple foramina
   - 9 = unobservable

3. Infraorbital Suture: ___ ___
   - 0 = absent
   - 1 = partial
   - 2 = complete
   - 9 = unobservable

4. Multiple infraorbital foramina: ___ ___
   - 0 = absent
   - 1 = internal division only
   - 2 = two distinct foramina
   - 3 = more than two foramina
   - 9 = unobservable

L M R

5. Zygomatico-facial foramina: ___ ___
   - 0 = absent
   - 1 = 1 large
   - 2 = 1 large plus smaller f.
   - 3 = 2 large
   - 4 = 2 large plus smaller f.
   - 5 = 1 small
   - 6 = multiple small
   - 9 = unobservable

6. Parietal foramen: ___ ___
   - 0 = absent
   - 1 = present, on parietal
   - 2 = present, sutural
   - 9 = unobservable

7. Sutural Bones:
   - 0 = absent
   - 1 = present
   - 9 = unobservable

   a. epipteric bone: ___ ___
   b. coronal ossicle: ___ ___
   c. bregmatic bone: ___
   d. sagittal ossicle: ___
   e. apical bone: ___
   f. lambdoid ossicle: ___ ___
   g. asterionic ossicle: ___ ___
   h. ossicle in occipito-mastoid suture ___ ___
   i. parietal notch bone: ___ ___

L M R

8. Inca bone ___
   - 0 = absent
   - 1 = complete, single bone
   - 2 = bipartite
   - 3 = tripartite
   - 4 = partial
   - 9 = unobservable

9. Condylar canal: ___ ___
   - 0 = not parent
   - 1 = patent
   - 9 = unobservable

10. Divided Hypoglossal Canal:

    ___ ___
   - 0 = absent
   - 1 = partial, internal surface
   - 2 = partial within canal
   - 3 = complete, internal surface
   - 4 = complete, within canal
   - 9 = unobservable

11. Flexture of Superior Sagittal Sulcus

    ___
   - 1 = Right
   - 2 = Left
   - 3 = Bifurcate
   - 9 = unobservable

12. Foramen Ovale Incomplete:

    ___ ___
   - 0 = absent
   - 1 = partial formation
   - 2 = no definition of foramen
   - 9 = unobservable

13. Foramen Spinosum Incomplete:

    ___ ___
   - 0 = absent
   - 1 = partial formation
   - 2 = no definition of foramen
   - 3 = unobservable

L M R

14. Tympanic Dihiscence:

    ___ ___
   - 0 = absent
   - 1 = formaen only
   - 2 = full defect presence
   - 9 = unobservable

15. Auditory Exostosis

    ___ ___
   - 0 = absent
   - 1 = <1/3 canal occluded
   - 2 = >1/3 canal occluded
   - 3 = >2/3 canal occluded
   - 9 = unobservable

16. Mastoid foramen
   a. Location: ___ ___
      - 0 = absent
      - 1 = temporal
      - 2 = sutural
      - 3 = occipital
      - 4 = both sutural and temporal
      - 5 = both occipital and temporal
      - 9 = unobservable

   b. Number: ___ ___
      - 0 = absent
      - 1 = 1
      - 2 = 2
      - 3 = more than 2
      - 9 = unobservable

17. Mental Foramen:___ ___
   - 0 = absent
   - 1 = 1
   - 2 = 2
   - 3 = more than 2
   - 9 = unobservable

L M R

18. Mandibular Torus: ___ ___

0 = absent
1 = trace
2 = moderate: 2-5 mm.
3 = marked: greater than 5 mm.
9 = unobservable

19. Mylohyoid Bridge

a. Location: ___ ___

0 = absent
1 = near mandibular foramen
2 = center of groove
3 = both bridges described in 1) and 2), with hiatus
4 = both bridges described in 1) and 2), no hiatus
9 = unobservable

b. Degree: ___ ___

0 = absent
1 = partial
2 = complete
9 = unobservable

20. Septal Aperture (humerus): ___ ___

0 = absent
1 = small foramen (pinhole)
2 = true perforation
9 = unobservable

21. Supratrochlear spur (humerus) ___ ___

0 = absent
1 = present
9 = unobservable

22. Trochlear form (ulna) ___ ___

1 = single continuous facet
1 = 2 discrete facets
9 = unobservable

Adapted from Buikstra and Ubelaker (1994)

L R

23. Third trochanter (femur) ___ ___

0 = absent
1 = present
9 = unobservable

24. Poirier's facet (femur) ___ ___

0 = absent
1 = present
9 = unobservable

25. Squatting facet anterior distal tibia ___ ___

0 = absent
1 = present
9 = unobservable

26. Squatting facet lateral distal ___ ___

0 = absent
1 = present
9 = unobservable

Appendix B

Description of Mound Contents

Table B.1 Trowbridge Mound Group description of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
56	1	Conical	H – Near Center V – 1.82' above mound floor	2^0 Bundle	None	Potsherds Chert Implement	1
	2	Conical	H – Northwest of center V – .84' above mound floor	2^0 Bundle	None	Potsherds	1
	3	Conical	H – 5.5' south of mound center V – 2.06' above mound floor	2^0 Bundle	None	Potsherds	1
57	1	Conical	H – Near center V – 1.71' subfloor pit	2^0 Bundle	None	2 copper celts 2' above burial	1
58	1	Conical	H – 5' Southwest of center V – 1.99' above floor	2^0	2 copper celts 1 bone bead	None	1
	2	Conical	H – 5' West of center V – 1.77' subfloor pit	2^0	Ungulate long bone	None	1
62	1	Conical	H – Near center V – Mound floor	Indeterminate	None	Chert implement, piece of stone, potsherds	1
	2	Conical	H – Near center V – Subfloor pit	Indeterminate	2 Projectile points	Chert implement, piece of stone, potsherds	1
67	1	Conical	H – Near center V – Above Burial 2, MD floor	Indeterminate	None	Potsherds	1
	2	Conical	H – Near Center V – 2.03' subfloor pit	1^0 Flexed	None	Potsherds	1
69	1	Conical	H – Near center V – .95' above mound floor	2^0 Bundle	Projectile Point Carbonized wood 4 copper frags.	None	1
	2	Conical	H – Near Center V – 1.22' subfloor pit	Compound 1^0 and 2^0	None	None	6
70	1	Conical	H – Near Center V – 1.63 above floor	2^0	None	None	3

Table B.1 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
70	2	Conical	H – West of center V – Subfloor pit	No skeletal elements remain	None	None	0
	3	Conical	H – Center V – Directly below Burial 1	Compound 1^0 and 2^0	Potsherd Quartzite tool	None	5
76	--	Conical	No burial	No burial	None	None	0
79	1	Oval	H – Southeast of center V – Large subfloor pit	8- 1^0 extended 2- 2^0 bundle 1-Indeterminate	Potsherds	Hammerstone, quartzite implement, 2 quartzite proj. points, piece of hematite, chert projectile point, potsherds	11
80	1	Conical	H – Center V – 1.62' subfloor pit	2^0	None	None	11
81	1	Canine (Fox)	H – Heart position V – .47 subfloor pit	1^0 flexed	None	Copper awl in mound fill Pit of probable burial Bed of clam shells	2
82	1	Canine (Fox)	H – Heart position V - .78 above mound floor	Indeterminate	Stone spud celt	Chert projectile point Pit below burial 1 Pit below hip position	5
83	1	Conical	H – Center V – Mound floor	1^0 flexed	None	None	1
84	1	Conical	H – Center V – Mound floor	2^0 bundle	2 potsherds	Potsherds	2

Table B.2 Raisbeck Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
1	1	Conical	H – Center V – Above mound floor	2^0 bundle	None	4 stone fireplaces (altars) -pink sandstone Altar 3–potsherds (1 pot)	4
2	1	Conical	H – Center V – Small subfloor pit	1^0 flexed	None	Stone fireplace altar – 3.5' southeast of burial	4
3	1	Conical	H – Near center V – Subfloor pit	2^0 bundle	None	Stone fireplace altar – mound floor	3
4	1	Conical	H – Near center V – Subfloor pit	1^0 flexed	None	Earthen fireplace above burial, 2 stone fireplaces Broken pottery vessel	1
7	1	Linear	H – Center V – Subfloor pit	Indeterminate Decomposed	Cluster of limestone over burial	None	1
8	1	Conical	H – Near center V – Above mound floor	1^0 flexed	None	Stone altar above floor east of burial	2
10	1	Bird	H – Heart position V – Subfloor pit	Indeterminate Decomposed	None	Stone altar on mound floor- 15, from burial	1
11	1	Canine	H – Heart position V – Subfloor pit	Indeterminate Decomposed	None	Unburned stones scattered throughout fill	1
	2		H – Center of head V – Subfloor pit	Indeterminate Decomposed	None	Unburned stones scattered throughout fill	1
18	1	Linear	H – South end V – Subfloor pit	1^0 flexed	None	Unburned stones scattered throughout fill	1
23	1	Bird	H – Heart V – Subfloor pit	2^0 bundle	None	Earthen fireplace above mound floor	1
24	1	Conical	H – Center V – Mound floor	2^0 bundle	Group of limestone rocks over burial	None	4
31	1	Bird	H – Heart position V – Subfloor pit	2^0 bundle	None	Earthen fireplace Stone fireplace (altar)	2

Table B.2 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
38	1	Conical	H – Center V – Above mound floor	2^0 bundle	None	Earthen fireplace – 13' north of Burial1	1
38	2	Conical	H – Center V – Not reported	Indeterminate	None	Earthen fireplace – 13' north of Burial 1	1
39	1	Conical	H – Near center V – Above mound floor	2^0 bundle	None	2 Earthen fireplaces near mound center	1
40	1	Conical	H – Near center V – Above mound floor	2^0 bundle	None	Scattered stones in mound fill	
42	--	Conical	No burial	No burial	None	Irregular dome of burned red clay 7' X 8' -round cross sections indicate poles used Layer of limestone under above feature Charcoal and animal bones	0
55	--	Oval	No burial	No burial	None	Central subfloor pit contained charcoal & organic matter	0
64	1	Conical	H – Center V – Above mound floor	2^0 bundle	Limestone fragments scattered around BR	None	5
65	1	Conical	H – Center V – Mound floor	2^0 bundles	Stemmed end-scraper	Dog skeleton on mound floor Stone altar above mound floor	7
66	1	Conical	H – Near Center V – Few inches above mound floor	2^0 bundle (Multiple)	2 pottery pipes Squared turtle plastron-mesh spreader	None	30
	2		H – Near Center V – Subfloor pit	2^0 bundle Partial cremation	None	None	1

Table B.3 Polander Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
1	--	Conical	No burial	No burial	None	None	0
3	1	Conical	H – Center V – Subfloor pit	2^0 bundle	None	Hardened clay layer overlying burial pit	12
4 (Thomas)	1	Conical	H – Center V – Subfloor pit	1^0 flexed	None	Stone lined vault covered with flat limestones	1
4 (Mckern)	2	Conical	H – Unknown V – Unknown	1^0 extended	Unknown	Unknown	1
6	1	Conical	H – Center V – Subfloor pit	2^0 bundle	None	Stone lined pit with overlying layer of stones	6
7	1	Oval	H – Near center V – Above mound floor	1^0 flexed 2^0 bundle	None	Overlain by layer of stones	3
	2	Oval	H – Near Center V – Subfloor pit	1^0 extended	Potsherds,elk bone tubes, two worked bone fragments, unio shells, celt fragments, 20 ellipsoidal copper beads	Overlain by a layer of large stones	31
8	1	Conical	H – Center V – Unknown	2^0 bundle	None	Two stone lined burials overlain by sandstone	5
9	1	Conical	H – Center V – Subfloor pit	2^0 bundle	None	None	2
11	1	Conical	H – Center V – Mound floor	1^0 flexed	None	4 large flat stones forming a square around burial	1
12	1	Conical	H – Center V – Unknown	1^0 extended	None	Stone lined vault with stone covering	1
16	1	Conical	H – Center V – Subfloor pit	1^0 extended	Discoidal stone near right hip	Stone lined vault with one end incomplete	1

Table B.3 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
17	1	Conical	H – Unknown V – Unknown	2^0 bundle	None	None	3
18	1	Conical	H – Unknown V – Unknown	Unknown	Unknown	Unknown	4
19	1	Conical	H – Unknown V – Unknown	Unknown	Unknown	Unknown	4
29	--	Conical	No burial	No burial	None	Pile of stones tapering to a point facing ground – copper drill and projectile point	0
30	--	Conical	No burial	No burial	None	Unio shells near mound floor	0

Table B.4 Kratz Creek Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
1	1	Conical	H – Center V – Mound fill-see features	46 - 2^0 bundles (Each bundle has burial #) 2 – 1^0 flexed Cremation	Rough fragments of stone, 2 projectile points, potsherds with Burial 4 Shell in crematory altar 7 – also contained subadult mandible	-Pit below burials 3' deep -Pit cont. three sand strata: yellow, red, yellow sand, and then burials placed - 5 rock altars - 2 crematory altars -all the altars surround central burial -Alternating layers of yellow sand (3) and charcoal (4) overlain by loam - 3 fireplaces above burial in first stratum - the 2 1^0 burials in layer above bundle burials	125
2	--	Conical	No burial	No burial	None	None	0
3	1	Panther	H – Heart position V – Mound fill-see features -placed about 1.5 below burials 2 and 3	1^0 flexed	None	-Intaglio of mound -Alternating layer of sands -Burial Placed on these -Alternating layers of sand, earth, clay, and charcoal similar to MD 1 -Fireplaces in hind foot -Crematory altar with human bones - 2 pottery vessels -Near mound top – Circle of fireplaces	1

Table B.4 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
3	2	Panther	H – Heart position -5'SW of Burial 1 V – 1.65' above Burial 1	1^0 flexed	Burial embedded in matrix of hard red clay	See description of Burial 1 above	1
	3		H – Heart position – 5' SE of Burial 1 V – 1.71' above Burial 1	1^0 flexed	Burial embedded in brown-streaked, grayish earth	See description of Burial 1 above	1
4	--	Bear (?)	No burial	No burial	None	- Alternating strata of yellow, white, golden sands and red sandy clay - 3 fires along body near top	0
5	1	Panther	H – Center of body V – Mound fill on stratified sands	1^0 – 2 infants laid in each other's arms	Charcoal streaks and evidence of burning in burial pit	-Intaglio of Bear effigy underlying Panther mound -Alternating strata of dark yellow, whitish, red, and mixed yellow and white sands	2
6	--	Conical	No burials	No burials	None	Alternating strata of sands similar to tail MD5	0
7	--	Conical	No burials	No burials	None	- Alternating strata of dark yellow sand, light yellow sand, and whitish sand -Animal "sacrifice" encased in charcoal earths below mound top – similar to Mounds 13,14,31	0
8	1	Conical	H – Center V – 2'	1^0 flexed (without head)	Large pottery vessel at feet of skeleton	Burial placed on layer of yellow sand and layer of charcoal with lake clams embedded	1

Table B.4 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
9	1	Rabbit	H – Hip position V – Subfloor pit	Cremation	None	-Intaglio -Burials placed in hard-packed stratified sands - Fireplaces, over burials, and evidence of burning in pit accompany each burial - Alternating strata of sands for mound construction	1
	2		H – Heart position V – Subfloor pit	Cremation	None	See above description of Burial 1	1
10	--	Linear	No burial	No burial	None	Mound const. -yellow sand and overlying loam	0
12	--	Conical ended Linear	No burial	No burial		-Intaglio of conical parts -Alternating strata of fire and yellow, whitish, and red sands	0
13	--	Conical	No burial Disturbed	No burial	None	-Alternating strata of fire, loam and sand layers - Animal "sacrifice" placed in crescent-shaped packet of gold sand in subfloor pit	0
14	--	Conical	No burial Disturbed	No burial	None	-Alternating strata of fire, loam and sand layers - Animal "sacrifice" placed in crescent-shaped packet of gray ash in subfloor pit	0
15	--	Conical	No burial	No burial	None	Strata data not collected	0

Table B.4 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
16	--	Conical	No burial	No burial	None	Strata of dark yellow sand overlain by loam	0
17	--	Conical	No burial	No burial	None	Alternating strata as surface, loam, fireplace, gray sand, and red sand, mound bottom	0
18	--	Panther	Probable burial	Indeterminate	None	No data –when cellar dug a skeleton was dug up	0
19	--	Linear	No burial	No burial	None	Alternating strata of loam, brown sand, yellow-brown sand, mound bottom	0
21	--	Conical	No burial	No burial	None	No stratification	0
22	--	Conical	No burial	No burial	None	No stratification	0
23	--	Unclass. Effigy	No burial	No burial	None	No stratification & Projectile point .5' above mound floor	0
24	--	Unclass. Effigy	No burial	No burial	None	No stratification	0
25	--	Bear	No burial	No burial	None	No stratification	0
26	--	Conical	No burial	No burial	None	No stratification	0
27	--	Conical	No burial	No burial	None	Fire stratum 4' thick overlain by loam, base layers of yellow, and 4 pairs of red sandy clay and golden sand -shell deposit SE mound	0
31	--	Conical	No burial	No burial	None	- 15 alternating sand, fire & clay strata -Animal "sacrifice" embedded in charcoal mass	0
32	--	Conical	No burial	No burial	None	- 7 alternating sand, fire & clay strata	0

Table B.4 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
33	--	Conical	No burial	No burial	None	- 6 alternating sand, fire, & clay stratum - Stone fireplace on fire stratum	0
34	--	Bear	No burial	No burial	None	Strata included surface, fireplace, yellow sand	0
37	--	Lizard	No burial	No burial	None	Fire stratum 2' thick	0
38	--	Panther	No burial	No burial	None	- Alternating strata of sands and fire strata (3) - Shell altar in head - Surface of mound burned upon completion	0
39	--	Bird	No burial	No burial	None	- Alternating strata of sands - Surface of mound burned upon completion	0
40	1	Panther	No burial	No burial	None	- Alternating strata of sands - Surface of mound burned upon completion	0
41	--	Panther	H – Heart position V – Subfloor pit	1^0	None	-No special stratification	1
50	--	Conical	H – Center V – On top of fire layer above mound floor	Indeterminate	Pottery vessel next to skull	- Alternating strata of surface loam, burial, fire remains, yellow sand - Stone altar and projectile points on mound floor	1

Table B.5 McClaughry Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
3	1	Conical	H – Near Center -3' NE V – .71'deep subfloor pit	Cremation and 2^0	Burned fish and other animal bones, smooth & square stone, chert projectile point, stone scraper, red mineral pigment	-7' east - Canid skull -4' east - earthen fireplace with 3 potsherds below mound floor - Loose in mound fill – 12 potsherds (1 vessel), projectile point	4
	2		H – Near Center -3'South of Burial 1 V – .65' mound top	2^0 bundle	None	See above for Burial 1	1
4	1	Conical	H – Near Center V – Mound floor	Cremation and 2^0 Bundle	Beaver teeth, deer antler, fish skull bones	5' north -Earthen fireplace, pottery vessel broken into 100+ pieces 1.87' empty subfloor pit	8
5	1	Conical	H – Near Center V – 1.56 above floor	2^0 bundle	Bed of black sand	2 clay and pebble cysts North of burial 1	2
	2		H – 7' West of BL 1 V – 1.02' above floor	2^0 bundle Some burned bone	Bed of black sand	2 clay and pebble cysts North of burial 1	1
6	1	Conical	H – Near Center V – Mound floor	2^0 bundle	Bed of black sand	None	1
8	1	Biconical	H – Periphery- SW end V – 1.22'deep subfloor pit	1^0 flexed	None	-Stone altar 1 (fireplace) 2.5' NW of Burial 2 -Stone altar 2 (plat of fire blackened stones -Group of 30 potsherds next to 2^{nd} stone altar -25 potsherds 5' west of Burial 4 -Loose in mound- 1 proj. point & 1 potsherd	1

Table B.5 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
8	2	Biconical	H – Near center V – Mound floor	2^0 bundle	Projectile point Knife or scraper	See above description for Burial 1	2
	3		H – Near Center V – .72' subfloor pit	2^0 bundle	None	See above description for Burial 1	2
	4		H – Periphery- NE end V – .89' subfloor pit	Indeterminate Disturbed	None	See above description for Burial 1	1
9	1	Conical	H – Near center V – .8' deep subfloor pit	2^0 bundle Cremation	Animal bones with cremation	Potsherd Chert projectile point	3
11	1	Conical	H – Center V – Mound floor	2^0 bundle Some burned bone	None	2' deep pit west of burial 3 chert projectile points & 2 potsherds in mound fill	4
13	1	Skunk or Squirrel	H – Center of tail V – 1.59' below mound top	2^0 Single humerus	None	Inaglio Altars in center of body- -Fire blackened stones -Earthen fireplace -Fire blackened stones associated with animal bones and charcoal -Fire blackened stones 200 potsherds associated with altars Projectile point in fill	1
	2		H – Center of tail V – 1.94' subfloor pit	2^0 Fragment of long bone	None	See above description for Burial 1	1
	3		H – Hip position V – 1.29' below mound top	2^0 Human leg	None	See above description for Burial 1	1

Table B.5 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
15	1	Conical	H – 3' south of center V – .43' above mound floor	2^0 bundle Disturbed	None	Earthen fireplace 2 projectile points & 11 potsherds in mound fill	1
15	2	Conical	H – 3' South of center V - .94' below mound floor – under BR 1	2^0 bundle	None	See above description for Burial 1	1
16	--	Conical	No burial	No burial	None	2 ceramic pipes in center 2 quartzite proj. points	0
19	1	Conical	H – Center V – .67' above floor	2^0 bundle Cremations (2)	Charred animal bones	Pit below burial Chert projectile point 2 potsherds	1
20	--	Biconical	No burial	No burial	None	2 potsherds	0
21	--	Biconical	No burial	No burial	None	3 potsherds 3 stone scrapers 1 chert projectile point	0
23	1	Conical	H – Near center V – Mound floor	2^0 bundle	None	1 chert projectile point 10 potsherds	1
24	1	Biconical	H – Center of north end V –.73' subfloor pit	2^0 bundle Cremation	Charred animal bones	Plat of stones in subfloor pit	1
25	1	Conical	H – 3' west of center V – Mound floor	1^0 flexed	None	Earthen fireplace 7' south Burial 1, Earthen fireplace 6' north Burial 1	1
28	1	Egg-shape	H – Near Center V – .86 below mound top – above BR 2&3	1^0 flexed 2^0	None	Stratified burial layers, alternating yellow and black sand layers 2 chert projectile points 14 potsherds	3
	2		H – Near Center V – 1.87'- 2.8' Below mound top – mound fill	3-1^0 flexed 2^0 bundles	Float copper Copper chisel	See above for Burial 1 Above pit Burial 3 and below Burial 1	13

Table B.5 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
28	3		H – Near Center V – 3.79' subfloor pit	2^0 bundle	Canid skull	See above for Burial 1 Below Burials 1 & 2	11
32	1	Panther	H – Stomach position V – Mound floor	1^0 flexed	None	1 stone and 1 earthen altar 2 chert projectile points	1
	2	Panther	H – Heart position V – 1.07" subfloor pit	1^0 flexed	None	1 stone rock altar 1 Earthen fireplace 2 chert projectile points Potsherds in mound fill	1
37	1	Conical	H – Center V – .61' subfloor pit	1^0 flexed	None	25 potsherds	1
38	1	Conical	H – Center V – .42' subfloor pit	2^0 bundle Cremation	Potsherds	None	1
39	1	Conical	H – Center V – .52' subfloor pit	Indeterminate Disturbed	None	None	1
40	1	Conical	H – Center V – 1.8' subfloor pit	Indeterminate	None	None	1
	2		H – 5' SW of Burial 1 V – .57' subfloor pit	2^0 bundle	None	None	1
41	1	Conical	H – Center V – .4' subfloor pit	2^0 bundle	None	6 potsherds in fill	4
42	--	Conical	No burial	No burial	None	Potsherds on center floor	0
43	--	Conical	No burial	No burial	None	2 potsherds in mound fill	0
45	1	Conical	H – Center V – Mound floor	2^0 bundle	None	2 clay and pebble cysts north of burial 1 stone fireplace south of Burial -1 large potsherd	2
46	1	Conical	H – Center V – .85' subfloor pit	1^0 bundle	None	Chert projectile point in fill	7

Table B.5 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
47	1	Conical	H – 5' south of center V – 1.18' subfloor pit	1^0 (partial) Leg and pelvis	None	2 clay and pebble cysts NE of Burial 1	1
49	1	Fish	H – Heart position V – Mound floor	1^0 flexed	Fine red sandstone w/ curved incised lines	-Large sandstone with small stones surrounding -Clay and pebble cyst near Burial 4	1
	2	Fish	H – Center of head V – Mound floor	2^0 bundle	Point of copper awl	See description above for Burial 1	2
	3		H – Center of head V – Mound floor	2^0 bundle	Point of copper awl	See description above for Burial 1	3
	4		H – Center of tail V – Mound floor	2^0 bundle	None	See description above for Burial 1	3
51	1	Oval	H – Near Center V – Mound floor	2^0 bundle	None	Clay and pebble cyst above Burial 1	1
	2		H – SW of Burial 1 V – Mound floor	2^0 bundle	Potter pipe with stem inserted in bowl	Clay and pebble cyst above Burial 2	3
52	--	Bear	No burial	No burial	None	3 stone altars (fireplaces) -1 near nose position -2 in heart position	0
53	1	Conical	H – Center V – .8' subfloor pit	1^0 flexed 2^0 bundle	2 projectile points	None	2
55	1	Bird	H – Heart position V – 1.3' above floor	2^0 bundle	None	Clay and Pebble cist next to Burial 1 Empty 3.5' pit E of burial	1

Table B.5 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
57	1	Linear	H – Near end of mound V – Mound floor	2^0 bundle	None	Skull of canid, earthen fireplace with potsherds, plat of red clay below fireplace, cluster of potsherds, 2 granite stones, 2 stone altars, circular subfloor pit	2
57	2		H – Center V – Mound floor	1^0 flexed	None	See description for Burial 1 above	2
59	1	Conical	H – Center V – 1' subfloor pit	Indeterminate Only bits of bone	None	Earthen fireplace east of burial on mound floor	1

Table B.6 Neale Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
1	1	Beaver	H – Heart position V – 2.2' subfloor pit	1^0 flexed	Perforated conch shell	-Trench dug for outline filled with light sand -Stratum of dark organic matter over mound floor -2 other possible burials in pits in head position	1
2	1	Panther	H – Hip position V – 2.25' subfloor pit	Indeterminate Possible burial	None	None	1?
	2		H – Stomach position (center) V – 2.7' subfloor pit	Indeterminate Possible burial	None	None	1?
3	--	Conical	No burial	No burial	None	None	0
4	1	Bird	H – Heart position V – 2.2' subfloor pit	Indeterminate Decomposed	None	Earthen fireplace 15' N of burial (center of body)	1
5	1	Bear	H – Center of body (stomach) V – 2.57' subfloor pit	Indeterminate Decomposed	None	None	1
6	1	Bird	H – Heart position V –2.79' subfloor pit	2^0 bundle	4 large stones on edge of burial pit	None	1
	2		H – Right shoulder V – 1.5' subfloor pit	1^0 flexed	None	None	1
7	1	Panther	H – Heart position V – 2.18' subfloor pit	1^0 flexed	None	None	1
8	--	Bear	No burial	No burial	None	5 granite stones & 1 red sandstone – Ear and nose	0
10	1	Bear	H – Center of body (stomach) V – 1.81' subfloor pit	Indeterminate Decomposed	None	Scattered charcoal Dark organic substance heart position, MD floor	1
11	1	Bear	H – Center of body (stomach) V – .74' subfloor pit	1^0 flexed	Small pieces of limestone	Earthen fireplace in head Earthen fireplace in body -potsherd near fireplace	1
12	--	Panther	No burial	No burial	None	Loose potsherds	0

Table B.6 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
17	--	Unclass.	No burial	No burial	None	None	0
18	--	Panther	No burial	No burial	None	Tail crosscuts MD 17	0
19	1	Bear	H – Center of body (stomach) V – 1.48 subfloor pit	2^0 bundle	None	2 Clay-pebble cists – 1 in heart & 1 in head 2 Earthen fireplaces – 1 near hip & 1 in hip	2
20	--	Unclass.	No burial	No burial	None	None	0
22	--	Conical	No burial	No burial	None	Oblong slate – serrated	0
34	--	Conical	No burial	No burial	None	Clay-pebble cist – center	0
39	--	Conical	No burial	No burial	None	2 clay-pebble cists -near center, mound fill	0
40	--	Conical	No burial	No burial	None	3 clay-pebble cists -SE edge, mound fill	0
41	--	Conical	No burial	No burial	None	-Possible burial pit near center in pit 3 clay-pebble cists -center, mound fill	0
42	1	Conical	H – Near center V – .34 above MD floor	Cremation	Cremation in Stone fireplace – charred bone fragments, mandible, teeth	Earthen fireplace – SE Stone fireplace 2 clay-pebble cists 1 subfloor & 1 fill	1
47	1	Moccasin	H – Center of sole V – .37' subfloor pit	Indeterminate Decomposed	None	2 stone fireplace & clay-pebble cist – center heal	1
50	--	Conical	No burial	No burial	None	Stone fireplace-center Stone slab- mound fill Earthen fireplace-floor Clay-pebble cist, stone celt 2 stone artifacts-serrated	0
64	1	Conical	H – Not reported V – Subfloor pit	1^0 flexed Disturbed	None	None	1

Table B.7 Kletzien Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
1	--	Deer	No Burial	No Burial	None	None	0
2	1	Panther	H – Heart Position V – 1.5' deep subfloor pit	1^0 flexed	None	See Below for Burial 2	1
	2		H – Hip position V – 2.4' deep subfloor pit	1^0 flexed	None	-Red colored oval area North of Burial 2, -Earthen Fireplace 6.5' NE of Burial 2	1
3	1	Panther	H – Heart position V – .7' deep subfloor pit	2^0 bundle	2 Antler bone pressure flakers	Earthen fireplace 8' SW of Burial 1	1
4	1	Probable Oval	H – Center V – Mound floor	Indeterminate Disturbed	None	Earthen fireplace 6' SW of Burial 1	1
6	1	Deer	H – Heart position V – Stratum of gray sand (1'thick) on mound floor	1^0 flexed	None	None	1
	2		H – Heart position (3' West of Burial 1) V – .6' deep subfloor pit	Cremation	None	None	1
7	--	Panther	No burial	No burial	None	Mound floor - .2'-.3' thick layer of gray sand Overlying - .1'-.3' thick layer of charcoal layer	0
8	1	Linear	H – Center V – Mound floor	2^0 bundle	Small cluster of potsherds	None	1
9	1	Unclass. Effigy	H – Center V – Mound floor	Indeterminate Disturbed	None	None	1
10	1	Deer	H – Stomach (Center of body) V – .5' deep subfloor pit	1^0 flexed	None	None	1
12	--	Linear	No burial	No burial	None	None	0
13	--	Deer	No burial	No burial	None	None	0
14	--	Deer	No burial	No burial	None	None	0

Table B.7 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
15	--	Indet.	No burial	No burial	None	None	0
16	--	Probable Effigy	No burial	No burial	None	None	0
17	--	Probable Effigy	No burial	No burial	None	None	0
18	1	Probable Effigy	H – Center V – Shallow subfloor pit	Indeterminate Disturbed	None	Earthen fireplace 12.7' North of Burial 1	1
19	1	Oval	H – Near center V – 2.2' deep subfloor pit	1^0 flexed	None	None	3
21	1	Conical	H – Center V – Indeterminate	Indeterminate Disturbed	None	None	1
23	--	Linear	No burial	No burial	None	Earthen fireplace in center on mound floor	1
24	1	Unclass. Effigy	H – Equidistant between sides and 10' from SE end of mound V – Subfloor pit	Indeterminate Disturbed	Large limestone in pit	Earthen fireplace on mound floor 11' NW of Burial 1	1
25	1	Oval	H – Near center V – Subfloor pit	Indeterminate Disturbed	None	2 artificial strata – Fire-Blackened & gray sand	1
26	--	Unclass. Effigy	No burial	No burial	None	Earthen fireplace between hip and stomach	0
27	1	Deer	H – Heart position V – 1.3' subfloor pit	1^0 flexed 2^0 bundle	3 fragments of burnt limestone	Earthen fireplace in mound center with flat piece of sandstone	2
29	--	Unclass. Effigy	No burial	No burial	None	None	0
30	--	Panther Intaglio	No burial	No burial	None	Lined with artificial stratum of gray sand	0
33	--	Linear	No burial	No burial	None	None	0
34	1	Conical	H – Center V – 2.2' deep subfloor pit	Probable 1^0 flexed	None	None	1

Table B.8 Kolterman Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and Unassoc. Artifacts	MNI
15	1	Otter	H – Center of body (stomach) V – Subfloor pit	Indeterminate Bulldozed	Chert flakes Hammerstone frags Potsherds	Large glacial boulder	1
16	1	Unclass. Effigy	H – Center of body (stomach) V – Subfloor pit	Indeterminate Bulldozed	Chert flakes Hammerstone frags Potsherds	Large glacial boulder	1
17	1	Otter	H – Heart position V – 1.2' subfloor pit	1^0 flexed	Elbow pottery pipe	None	1
	2		H – Heart position V – .5'-.8' subfloor pit	Cremation	None	None	1
18	1	Otter	H – Heart position V – .9'-1.1' subfloor pit	Cremation	Crushed pottery vessel & 2 projectile points	Earthen fireplace in hip position Glacial boulder in head	1
20	--	Conical	No burial	No burial	None	None	0

Table B.9 Nitschke Mound Group tabulation of mound contents

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. artifacts	MNI
3	1	Conical	H – Near Center V – Unknown	Indeterminate	Yellow limestone fragments	None	4
	2		H – 10' South of center V – Mound floor	1^0 Flexed	Yellow limestone fragments	None	1
4	1	Conical	H – Near center V - Above mound floor	2^0 bundle	None	None	1
	2		H – Near Center V – Mound floor	2^0 bundle	None	None	1
5	--	Panther	No burial	No burial	None	Projectile point	0
6	--	Conical	No burial	No burial	None	None	0
9	1	Bison	H – Hip position V – 2.4 subfloor pit	1^0 flexed	2 Stone proj. points, 2 bone scrapers, bone awl, deer calcaneum	None	4
	2		H – Heart position V – Mound floor	1^0	2 fawn leg bones Bone lime and ash	None	1
	3		H – Center of head V – Mound floor	2^0 bundle	Stone fireplace and charcoal .8' above burial	None	1
10	1	Turtle	H – Between rear legs V – 1.4' subfloor pit	2^0 bundle	Bone awl Bone awl fragments	5 superimposed conical mounds over tail (MDs 15, 16, 17, 18, 19)	8
	2		H – Between front legs - heart V – 1.8’ subfloor pit	2^0 bundle	Bone harpoon point with 4 unilateral barbs, 2 ellipsoid shell beads, gastropod shells	Same as above	7
	3		H – Center of head V – Mound floor	2^0 bundle	Stone fireplace (altar) .8’above burial	Same as above	1
14	1	Panther	H – Shoulder V – Mound floor	1^0 flexed	None	Rim of medium sized pot, some side portion	1

Table B.9 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
15	1	Conical	H – Center V – 1' subfloor pit	2^0 bundle	None	None	1
16	1	Conical	H – Center V – Mound floor	Indeterminate	None	None	1
17	1	Conical	H – Center V – Mound floor	1^0 flexed 2^0 bundle	None	None	2
18	1	Conical	H – Center V – Mound floor	2^0 bundle	None	None	1
19	1	Conical	H – Center V – 1.7' subfloor pit	2^0 bundle	None	None	1
20	1	Gourd-like	H – Near Center V – Mound floor	Indeterminate Disturbed	None	None	1
	2		H – Near Center V – 1.8' subfloor pit	2^0 bundle	Bone harpoon point Large boulders	None	6
21	1	Panther	H – Heart position V – .6' subfloor pit	2^0 bundle	Potsherds from 1 pot 3 Projectile points Skull of dog	Stone fireplace altar above Burial 1, 1 Projectile point in altar	3
22	--	Canine	No burial	No burial	None	None	0
23	--	Linear	No burial	No burial	None	None	0
31	1	Indet. Effigy	H – Central in curve V – Mound floor	2^0 bundle	None	None	1
	2		H – Central in curve V – Mound floor	1^0 flexed	None	None	2
33	1	Linear	H – Near Center (south) V – Mound floor	1^0 flexed	None	None	1

Table B.9 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
33	2		H – 40' North of Burial 1 V – Mound floor	1^0 flexed	Circular plat of animal bones, clay pipe, projectile point above Burial 2	2 granite boulders in clay mound floor	1
	3	Linear	H – 11' North of Burial 2 V – Mound floor	1^0 flexed	None	Contiguous pieces of ceramic vessel above Burial 3	1
35	--	Oval	No burial	No burial	None	None	0
36	1	Panther	H – Heart position V – Mound floor	1^0 flexed	None	None	1
37	1	Deer	H – Heart position V – Mound floor	1^0 flexed	None	None	1
38	--	Canine	No burial	No burial	None	None	0
39	1	Panther	H – Heart position V – Mound floor	1^0 flexed	None	None	1
40	1	Bird	H – Heart position V – Mound floor	1^0 flexed	None	None	1
42	1	Deer	H – Unknown V – Mound floor	Indeterminate Disturbed	None	None	1
43	1	Conical	H – Near Center V – Indeterminate	Indeterminate Disturbed	None	None	1
	2		H – 5' southwest of Burial 1 V - .5' Above mound floor	2^0 bundle	None	None	1
44	1	Oval	H – Center V – 2.8' subfloor pit	1^0 flexed Probable 2^0	None	None	3
45	1	Unclass. Effigy	H – Center V – 1.5' subfloor pit	1^0 flexed	None	None	2
49	1	Linear	H – 11' Northwest of Center V – .9' subfloor pit	1^0 flexed	None	None	2
50	1	Turtle	H – Heart position V – 1.4' subfloor pit	Indeterminate	None	None	1

Table B.9 (cont'd)

MD #	BL #	MD Form	Burial Disposition	Burial Type	Associated Artifacts	Features and unassoc. Artifacts	MNI
50	2		H – 5' North of burial 1 V – 1.3' subfloor pit	Indeterminate	None	Earthen Fireplace adjoining Burial 2	1
51	--	Conical	No Burial	No burial	None	None	0
52	1	Unclass. Effigy	H – Heart position V – Mound floor	1^0 flexed	None	None	2
	2		H – Stomach of Effigy V – Mound floor	1^0 flexed	Small pottery vessel Mussel shell	None	1
54	1	Conical	H – Center V – .4' subfloor pit	1^0 flexed	None	None	1
56	1	Bird	H – Heart position V – Mound floor	Indeterminate	None	None	1
57	--	Conical	No burial	No burial	None	None	0
58	--	Bird	No burial	No burial	None	None	0
62	--	Unclass. Effigy	No burial	No burial	None	None	0

Appendix C

Presence of Mound Features in Mound Groups

Table C.1 Polander presence (X) of mound features and mound forms

Mound Number	Burials	C&P Cists	Earthen Fireplace	Stone Altar	Ceramic Vessel	Mound Form
1				X		GEO
29						GEO
30						GEO
4	X					GEO
7	X					GEO
18	X					GEO
19	X					GEO
3	X					GEO
4	X					GEO
6	X					GEO
8	X					GEO
9	X					GEO
11	X			X		GEO
12	X					GEO
16	X					GEO
17	X					GEO
42	X					GEO
55	X		X			GEO

Table C.2 Raisbeck presence (X) of mound features and mound forms

Mound number	Burials	C&P Cists	Earthen Fireplace	Stone Altar	Ceramic Vessel	Mound Form
42						GEO
55			X			GEO
1	X			X		GEO
2	X			X		GEO
3	X			X		GEO
4	X		X	X	X	GEO
7	X			X		GEO
8	X			X		GEO
10	X			X		EFFIGY
11	X					EFFIGY
18	X					GEO
23	X		X			EFFIGY
24	X			X		GEO
31	X		X	X		EFFIGY
38	X		X			GEO
39	X		X			GEO
40	X					GEO
64	X					GEO
65	X			X		GEO
66	X					GEO

Table C.3 Trowbridge presence (X) of mound features and mound forms

Mound Number	Burials	Cists	Earthen Fireplace	Stone Altar	Ceramic Vessel	Mound Form
76						GEO
85						GEO
86						GEO
87						GEO
56	X					GEO
57	X					GEO
58	X					GEO
62	X					GEO
67	X					GEO
69	X					GEO
70	X					GEO
79	X				X	GEO
80	X					GEO
81	X					EFFIGY
82	X					EFFIGY
83	X					GEO
84	X					GEO

Table C.4 Kratz Creek presence (X) of mound features and mound form

Mound Number	Burials	Cists	Earthen Fireplace	Stone Altar	Pot	Mound Form
2						GEO
4			X			EFFIGY
6						GEO
7						GEO
10						GEO
11						GEO
12						EFFIGY
13						GEO
14						GEO
15						GEO
16						GEO
17			X			GEO
19						GEO
21						GEO
22						GEO
23						EFFIGY
24						EFFIGY
25						EFFIGY
26						GEO
27						GEO
31						GEO
32				X		GEO
33						GEO
34			X			EFFIGY
37						EFFIGY
38						EFFIGY
39						EFFIGY
40						EFFIGY
1	X		X	X		GEO
3	X		X		X	EFFIGY
5	X					EFFIGY
8	X		X		X	GEO
9	X		X			EFFIGY
18	X					GEO
41	X					EFFIGY
50	X			X	X	GEO

Table C.5 McClaughry presence (X) of mound features and mound form

Mound Number	Burials	Cists	Earthen Fireplace	Stone Altar	Pot	Mound Form
16						GEO
20						GEO
21						GEO
42					X	GEO
43						GEO
52				X		EFFIGY
54			X			GEO
3	X		X			GEO
4	X			X	X	GEO
5	X	X				GEO
6	X					GEO
8	X			X	X	GEO
9	X					GEO
11	X					GEO
13	X			X	X	EFFIGY
15	X		X			EFFIGY
19	X					GEO
23	X					GEO
24	X			X		GEO
25	X			X		GEO
28	X					GEO
32	X		X	X		EFFIGY
37	X					GEO
38	X					GEO
40	X					GEO
41	X					GEO
45	X	X		X		GEO
46	X					GEO
47	X	X				GEO
49	X	X		X		EFFIGY
51	X	X				GEO
53	X					GEO
55	X	X				EFFIGY
57	X		X	X	X	GEO
59	X		X			GEO

Table C.6 Neale presence (X) of mound features and mound form

Mound Number	Burials	C&P Cists	Earthen Fireplace	Altar	Ceramic Vessel	Mound Form
2						EFFIGY
3						GEO
8				X		EFFIGY
12						EFFIGY
17						EFFIGY
18						EFFIGY
20						EFFIGY
22						GEO
34		X				GEO
39		X				GEO
40		X				GEO
41		X				GEO
50		X	X	X		GEO
1	X					EFFIGY
4	X		X			EFFIGY
5	X					EFFIGY
6	X			X		EFFIGY
7	X					EFFIGY
10	X		X			EFFIGY
11	X		X		X	EFFIGY
19	X	X	X		X	EFFIGY
42	X	X	X	X		GEO
47	X	X		X		EFFIGY
64	X					GEO

Table C.7 Kletzien presence (X) of mound features and mound forms

Mound Number	Burials	Cists	Earthen Fireplace	Altar	Ceramic Vessel	Mound Form
1						EFFIGY
7						EFFIGY
12						GEO
13						EFFIGY
14						EFFIGY
15						EFFIGY
16						EFFIGY
17						EFFIGY
23			X			GEO
26			X			EFFIGY
29						EFFIGY
30						EFFIGY
33						GEO
2	X		X			EFFIGY
3	X		X			EFFIGY
4	X		X			INDET
6	X					EFFIGY
8	X				X	GEO
9	X					INDET
10	X					EFFIGY
18	X		X			EFFIGY
19	X					1GEO
21	X				X	GEO
24	X		X			EFFIGY
25	X					GEO
27	X		X			EFFIGY
34	X					GEO

Table C.8 Kolterman presence (X) of mound features and mound forms

Mound Number	Burials	Cists	Earthen Fireplace	Stone Altar	Pot	Mound Form
15	X					EFFIGY
16	X					EFFIGY
17	X					EFFIGY
18	X		X		X	EFFIGY

Table C.9 Nitschke presence (X) of mound features and mound forms

Mound Number	Burials	Cists	Earthen Fireplaces	Stone Altar	Ceramic Vessel	Mound Form
5						EFFIGY
6						GEO
22						EFFIGY
30						GEO
35						GEO
38						EFFIGY
57						GEO
58						EFFIGY
62						EFFIGY
3	X					GEO
4	X					GEO
9	X			X		EFFIGY
10	X					EFFIGY
14	X				X	EFFIGY
15	X					GEO
16	X					GEO
17	X					GEO
18	X					GEO
19	X					GEO
20	X					EFFIGY
21	X			X	X	EFFIGY
31	X					EFFIGY
33	X			X		GEO
36	X					EFFIGY
37	X					EFFIGY
39	X					EFFIGY
40	X					EFFIGY
42	X					EFFIGY
43	X					GEO
44	X					GEO
45	X					GEO
49	X					GEO
50	X		X			EFFIGY
51	X					GEO
52	X				X	EFFIGY
54	X					GEO
56	X					EFFIGY

Appendix D

Epigenetic Trait Contingency Tables

Table D.1 Frequency of left supraorbital foramen among mound groups

Mound Group		Left Supraorbital Foramen		Total
		Absent	Present	
Polander	Observed	9.0	0.0	9.0
	Expected	4.8	4.2	9.0
Raisbeck	Observed	5.0	7.0	12.0
	Expected	6.4	5.6	12.0
Trowbridge	Observed	2.0	3.0	5.0
	Expected	2.7	2.3	5.0
Kratz Creek	Observed	15.0	13.0	28.0
	Expected	14.9	13.1	28.0
McClaughry	Observed	9.0	9.0	18.0
	Expected	9.6	8.4	18.0
Big Bend	Observed	2.0	3.0	5.0
	Expected	2.7	2.3	5.0
Kletzien	Observed	3.0	2.0	5.0
	Expected	2.7	2.3	5.0
Nitschke	Observed	6.0	8.0	14.0
	Expected	7.4	6.6	14.0
Total		51.0	45.0	96.0

Table D.2 Frequency of right supraorbital foramen among mound groups

Mound Group		Right Supraorbital foramen		Total
		Absent	Present	
Polander	Observed	6.0	2.0	8.0
	Expected	3.1	4.9	8.0
Raisbeck	Observed	5.0	7.0	12.0
	Expected	4.7	7.3	12.0
Trowbridge	Observed	2.0	0.0	2.0
	Expected	0.8	1.2	2.0
Kratz Creek	Observed	10.0	21.0	31.0
	Expected	12.1	18.9	31.0
McClaughry	Observed	7.0	11.0	18.0
	Expected	7.0	11.0	18.0
Big Bend	Observed	2.0	3.0	5.0
	Expected	2.0	3.0	5.0
Kletzien	Observed	2.0	2.0	4.0
	Expected	1.6	2.4	4.0
Nitschke	Observed	2.0	10.0	12.0
	Expected	4.7	7.3	12.0
Total		36.0	56.0	92.0

Table D.3 Frequency of left supraorbital notch among mound groups

Mound Group		New Left Suproaorbital Notch		Total
		Absent	Present	
Polander	Observed	2.0	8.0	10.0
	Expected	3.2	6.8	10.0
Raisbeck	Observed	6.0	5.0	11.0
	Expected	3.5	7.5	11.0
Trowbridge	Observed	2.0	3.0	5.0
	Expected	1.6	3.4	5.0
Kratz Creek	Observed	6.0	23.0	29.0
	Expected	9.2	19.8	29.0
McClaughry	Observed	6.0	13.0	19.0
	Expected	6.0	13.0	19.0
Big Bend	Observed	1.0	4.0	5.0
	Expected	1.6	3.4	5.0
Kletzien	Observed	2.0	3.0	5.0
	Expected	1.6	3.4	5.0
Nitschke	Observed	6.0	8.0	14.0
	Expected	4.4	9.6	14.0
Total		31.0	67.0	98.0

Table D.4 Frequency of right supraorbital notch among mound groups

Mound Group		Right Supraorbital Notch		Total
		Absent	Present	
Polander	Observed	2.0	7.0	9.0
	Expected	2.8	6.2	9.0
Raisbeck	Observed	5.0	7.0	12.0
	Expected	3.7	8.3	12.0
Trowbridge	Observed	0.0	2.0	2.0
	Expected	0.6	1.4	2.0
Kratz Creek	Observed	10.0	19.0	29.0
	Expected	9.0	20.0	29.0
McClaughry	Observed	5.0	13.0	18.0
	Expected	5.6	12.4	18.0
Big Bend	Observed	2.0	3.0	5.0
	Expected	1.6	3.4	5.0
Kletzien	Observed	1.0	4.0	5.0
	Expected	1.6	3.4	5.0
Nitschke	Observed	3.0	7.0	10.0
	Expected	3.1	6.9	10.0
Total		28.0	62.0	90.0

Table D.5 Frequency of left parietal foramina among mound groups

Mound Group		Left Parietal Foramen		Total
		Absent	Present	
Polander	Observed	5.0	2.0	7.0
	Expected	4.0	3.0	7.0
Raisbeck	Observed	9.0	4.0	13.0
	Expected	7.4	5.6	13.0
Trowbridge	Observed	2.0	0.0	2.0
	Expected	1.1	0.9	2.0
Kratz Creek	Observed	7.0	8.0	15.0
	Expected	8.5	6.5	15.0
McClaughry	Observed	10.0	6.0	16.0
	Expected	9.1	6.9	16.0
Big Bend	Observed	2.0	3.0	5.0
	Expected	2.8	2.2	5.0
Kletzien	Observed	0.0	6.0	6.0
	Expected	3.4	2.6	6.0
Nitschke	Observed	8.0	4.0	12.0
	Expected	6.8	5.2	12.0
Total		43.0	33.0	76.0

Table D.6 Frequency of right parietal foramina among mound groups

Mound Group		Right Parietal Foramen		Total
		Absent	Present	
Polander	Observed	4.0	3.0	7.0
	Expected Count	3.6	3.4	7.0
Raisbeck	Observed	11.0	3.0	14.0
	Expected	7.3	6.7	14.0
Trowbridge	Observed	2.0	0.0	2.0
	Expected	1.0	1.0	2.0
Kratz Creek	Observed	6.0	9.0	15.0
	Expected	7.8	7.2	15.0
McClaughry	Observed	11.0	5.0	16.0
	Expected	8.3	7.7	16.0
Big Bend	Observed	1.0	4.0	5.0
	Expected	2.6	2.4	5.0
Kletzien	Observed	0.0	5.0	5.0
	Expected	2.6	2.4	5.0
Nitschke	Observed	5.0	8.0	13.0
	Expected	6.8	6.2	13.0
Total		40.0	37.0	77.0

Table D.7 Frequency of left tympanic dehiscence among mound groups

Mound Group		Left Tympanic Dehiscence		Total
		Absent	Present	
Polander	Observed	6.0	2.0	8.0
	Expected	6.4	1.6	8.0
Raisbeck	Observed	11.0	2.0	13.0
	Expected	10.5	2.5	13.0
Trowbridge	Observed	6.0	0.0	6.0
	Expected	4.8	1.2	6.0
Kratz	Observed	27.0	3.0	30.0
	Expected	24.1	5.9	30.0
McClaughry	Observed	19.0	5.0	24.0
	Expected	19.3	4.7	24.0
Big Bend	Observed	2.0	2.0	4.0
	Expected	3.2	0.8	4.0
Kletzien	Observed	5.0	2.0	7.0
	Expected	5.6	1.4	7.0
Nitschke	Observed	6.0	4.0	10.0
	Expected	8.0	2.0	10.0
Total		82.0	20.0	102.0

Table D.8 Frequency of right tympanic dehiscence among mound groups

Mound Group		Right Tympanic Dehiscence		Total
		Absent	Present	
Polander	Observed	4.0	2.0	6.0
	Expected	4.3	1.7	6.0
Raisbeck	Observed	9.0	3.0	12.0
	Expected	8.5	3.5	12.0
Trowbridge	Observed	4.0	1.0	5.0
	Expected	3.5	1.5	5.0
Kratz Creek	Observed	28.0	7.0	35.0
	Expected	24.8	10.2	35.0
McClaughry	Observed	8.0	5.0	13.0
	Expected	9.2	3.8	13.0
Big Bend	Observed	4.0	2.0	6.0
	Expected	4.3	1.7	6.0
Kletzien	Observed	4.0	2.0	6.0
	Expected	4.3	1.7	6.0
Nitschke	Observed	5.0	5.0	10.0
	Expected	7.1	2.9	10.0
Total		66.0	27.0	93.0

Table D.9 Frequency of left mastoid foramen among mound groups

Mound Group		Left Mastoid Foramen		Total
		Absent	Present	
Polander	Observed	7.0	0.0	7.0
	Expected	3.2	3.8	7.0
Raisbeck	Observed	5.0	5.0	10.0
	Expected	4.5	5.5	10.0
Trowbridge	Observed	3.0	2.0	5.0
	Expected	2.3	2.7	5.0
Kratz Creek	Observed	11.0	13.0	24.0
	Expected	10.9	13.1	24.0
McClaughry	Observed	8.0	14.0	22.0
	Expected	10.0	12.0	22.0
Big Bend	Observed	1.0	3.0	4.0
	Expected	1.8	2.2	4.0
Kletzien	Observed	1.0	6.0	7.0
	Expected	3.2	3.8	7.0
Nitschke	Observed	4.0	5.0	9.0
	Expected	4.1	4.9	9.0
Total		40.0	48.0	88.0

Table D.10 Frequency of right mastoid foramen among mound groups

Mound Group		Right Mastoid Foramen		Total
		Absent	Present	
Polander	Observed	5.0	2.0	7.0
	Expected	2.6	4.4	7.0
Raisbeck	Observed	4.0	3.0	7.0
	Expected	2.6	4.4	7.0
Trowbridge	Observed	3.0	1.0	4.0
	Expected	1.5	2.5	4.0
Kratz Creek	Observed	10.0	16.0	26.0
	Expected	9.8	16.3	26.0
McClaughry	Observed	1.0	8.0	9.0
	Expected	3.4	5.6	9.0
Big Bend	Observed	2.0	3.0	5.0
	Expected	1.9	3.1	5.0
Kletzien	Observed	0.0	7.0	7.0
	Expected	2.6	4.4	7.0
Nitschke	Observed	2.0	5.0	7.0
	Expected	2.6	4.4	7.0
Total		27.0	45.0	72.0

Table D.11 Frequency of right mastoid foramen number among mound groups

Mound Group		Right Mastoid Foramen Number			Total
		Absent	One Foramen	Multiple	
Polander	Observed	5.0	2.0	0.0	7.0
	Expected	2.6	2.8	1.6	7.0
Raisbeck	Observed	4.0	3.0	0.0	7.0
	Expected	2.6	2.8	1.6	7.0
Trowbridge	Observed	3.0	1.0	0.0	4.0
	Expected	1.5	1.6	0.9	4.0
Kratz Creek	Observed	10.0	12.0	4.0	26.0
	Expected	9.8	10.5	5.8	26.0
McClaughry	Observed	1.0	5.0	3.0	9.0
	Expected	3.4	3.6	2.0	9.0
Big Bend	Observed	2.0	0.0	3.0	5.0
	Expected	1.9	2.0	1.1	5.0
Kletzien	Observed	0.0	4.0	3.0	7.0
	Expected	2.6	2.8	1.6	7.0
Nitschke	Observed	2.0	2.0	3.0	7.0
	Expected	2.6	2.8	1.6	7.0
Total		27.0	29.0	16.0	72.0

Table D.12 Frequency of left mandibular torus among mound groups

Mound Group		Left Mandibular Torus		Total
		Absent	Present	
Polander	Observed	18.0	3.0	21.0
	Expected	18.3	2.7	21.0
Raisbeck	Observed	20.0	11.0	31.0
	Expected	27.0	4.0	31.0
Trowbridge	Observed	7.0	0.0	7.0
	Expected	6.1	0.9	7.0
Kratz Creek	Observed	44.0	2.0	46.0
	Expected	40.1	5.9	46.0
McClaughry	Observed	18.0	0.0	18.0
	Expected	15.7	2.3	18.0
Big Bend	Observed	4.0	1.0	5.0
	Expected	4.4	0.6	5.0
Kletzien	Observed	5.0	0.0	5.0
	Expected	4.4	0.6	5.0
Nitschke	Observed	7.0	1.0	8.0
	Expected	7.0	1.0	8.0
Total		123.0	18.0	141.0

Table D.13 Frequency of right mandibular torus among mound groups

Mound Group		Right Mandibular Torus		Total
		Absent	Present	
Polander	Observed	17.0	4.0	21.0
	Expected	16.5	4.5	21.0
Raisbeck	Observed	20.0	13.0	33.0
	Expected	26.0	7.0	33.0
Trowbridge	Observed	5.0	0.0	5.0
	Expected	3.9	1.1	5.0
Kratz Creek	Observed	30.0	9.0	39.0
	Expected	30.7	8.3	39.0
McClaughry	Observed	16.0	0.0	16.0
	Expected	12.6	3.4	16.0
Big Bend	Observed	5.0	1.0	6.0
	Expected	4.7	1.3	6.0
Kletzien	Observed	4.0	0.0	4.0
	Expected	3.1	0.9	4.0
Nitschke	Observed	10.0	2.0	12.0
	Expected	9.4	2.6	12.0
Total		107.0	29.0	136.0

Table D.14 Frequency of left mylohyoid bridge among mound groups

Mound Group		Left Mylohyoid Bridge		Total
		Absent	Present	
Polander	Observed	12.0	1.0	13.0
	Expected	10.9	2.1	13.0
Raisbeck	Observed	29.0	1.0	30.0
	Expected	25.2	4.8	30.0
Trowbridge	Observed	4.0	1.0	5.0
	Expected	4.2	0.8	5.0
Kratz Creek	Observed	23.0	11.0	34.0
	Expected	28.6	5.4	34.0
McClaughry	Observed	9.0	2.0	11.0
	Expected	9.3	1.7	11.0
Big Bend	Observed	3.0	1.0	4.0
	Expected	3.4	0.6	4.0
Kletzien	Observed	4.0	0.0	4.0
	Expected	3.4	0.6	4.0
Nitschke	Observed	6.0	0.0	6.0
	Expected	5.0	1.0	6.0
Total		90.0	17.0	107.0

Table D.15 Frequency of right mylohyoid bridge among mound groups

Mound Group		Right Mylohyoid Bridge		Total
		Absent	Present	
Polander	Observed	12.0	2.0	14.0
	Expected	11.6	2.4	14.0
Raisbeck	Observed	30.0	0.0	30.0
	Expected	24.9	5.1	30.0
Trowbridge	Observed	5.0	0.0	5.0
	Expected	4.1	0.9	5.0
Kratz Creek	Observed	16.0	12.0	28.0
	Expected	23.2	4.8	28.0
McClaughry	Observed	10.0	1.0	11.0
	Expected	9.1	1.9	11.0
Big Bend	Observed	4.0	1.0	5.0
	Expected	4.1	0.9	5.0
Kletzien	Observed	2.0	1.0	3.0
	Expected	2.5	0.5	3.0
Nitschke	Observed	8.0	1.0	9.0
	Expected	7.5	1.5	9.0
Total		87.0	18.0	105.0

Table D.16 Frequency of left lambdoid ossicles among mound groups

Mound Group		Left Lambdoid Ossicle		Total
		Absent	Present	
Polander	Observed	2.0	1.0	3.0
	Expected	1.7	1.3	3.0
Raisbeck	Observed	8.0	2.0	10.0
	Expected	5.8	4.2	10.0
Trowbridge	Observed	4.0	1.0	5.0
	Expected	2.9	2.1	5.0
Kratz Creek	Observed	7.0	8.0	15.0
	Expected	8.6	6.4	15.0
McClaughry	Observed	12.0	6.0	18.0
	Expected	10.4	7.6	18.0
Big Bend	Observed	0.0	5.0	5.0
	Expected	2.9	2.1	5.0
Kletzien	Observed	5.0	2.0	7.0
	Expected	4.0	3.0	7.0
Nitschke	Observed	4.0	6.0	10.0
	Expected	5.8	4.2	10.0
Total		42.0	31.0	73.0

Table D.17 Frequency of superior sagittal sulcus flexure among mound groups

Mound Group		Flexure of Superior Sagittal Sulcus			Total
		Right	Left	Bifurcate	
Polander	Observed	1.0	0.0	2.0	3.0
	Expected	1.8	0.8	0.4	3.0
Raisbeck	Observed	10.0	4.0	2.0	16.0
	Expected	9.8	4.2	2.0	16.0
Trowbridge	Observed	1.0	3.0	0.0	4.0
	Expected	2.4	1.1	0.5	4.0
Kratz Creek	Observed	25.0	2.0	1.0	28.0
	Expected	17.1	7.4	3.4	28.0
McClaughry	Observed	9.0	6.0	5.0	20.0
	Expected	12.2	5.3	2.4	20.0
Big Bend	Observed	4.0	1.0	1.0	6.0
	Expected	3.7	1.6	0.7	6.0
Kletzien	Observed	6.0	2.0	0.0	8.0
	Expected	4.9	2.1	1.0	8.0
Nitschke	Observed	4.0	8.0	1.0	13.0
	Expected	8.0	3.4	1.6	13.0
Total	Count	60.0	26.0	12.0	98.0

Table D.18 Frequency of left third trochanter among mound groups

Mound Group		Left Third Trochanter		Total
		Absent	Present	
Polander	Observed	5.0	0.0	5.0
	Expected	2.8	2.2	5.0
Raisbeck	Observed	7.0	8.0	15.0
	Expected	8.5	6.5	15.0
Trowbridge	Observed	1.0	0.0	1.0
	Expected	0.6	0.4	1.0
Kratz Creek	Observed	23.0	16.0	39.0
	Expected	22.0	17.0	39.0
McClaughry	Observed	4.0	8.0	12.0
	Expected	6.8	5.2	12.0
Big Bend	Observed	4.0	3.0	7.0
	Expected	4.0	3.0	7.0
Kletzien	Observed	0.0	3.0	3.0
	Expected	1.7	1.3	3.0
Nitschke	Observed	8.0	2.0	10.0
	Expected	5.7	4.3	10.0
Total		52.0	40.0	92.0

Table D.19 Frequency of right third trochanter among mound groups

Mound Group		Right Third Trochanter		Total
		Absent	Present	
Polander	Observed	5.0	1.0	6.0
	Expected	3.6	2.4	6.0
Raisbeck	Observed	6.0	8.0	14.0
	Expected	8.3	5.7	14.0
Trowbridge	Observed	1.0	0.0	1.0
	Expected	0.6	0.4	1.0
Kratz Creek	Observed	29.0	15.0	44.0
	Expected	26.2	17.8	44.0
McClaughry	Observed	4.0	5.0	9.0
	Expected	5.4	3.6	9.0
Big Bend	Observed	5.0	3.0	8.0
	Expected	4.8	3.2	8.0
Kletzien	Observed	1.0	1.0	2.0
	Expected	1.2	0.8	2.0
Nitschke	Observed	2.0	3.0	5.0
	Expected	3.0	2.0	5.0
Total		53.0	36.0	89.0

Table D.20 Frequency of left supraorbital foramen among physiographic regions

Physiographic Region		Left Supraorbital Foramen		Total
		Absent	Present	
Western Upland	Observed	16.0	10.0	26.0
	Expected	13.8	12.2	26.0
Central Plain	Observed	24.0	22.0	46.0
	Expected	24.4	21.6	46.0
Eastern Ridges and Lowlands	Observed	11.0	13.0	24.0
	Expected	12.8	11.3	24.0
Total		51.0	45.0	96.0

Table D.21 Frequency of right supraorbital foramen among physiographic regions

Physiographic Region		Right Supraorbital foramen		Total
		Absent	Present	
Western Upland	Observed	13.0	9.0	22.0
	Expected	8.6	13.4	22.0
Central Plain	Observed	17.0	32.0	49.0
	Expected	19.2	29.8	49.0
Eastern Ridges and Lowlands	Observed	6.0	15.0	21.0
	Expected	8.2	12.8	21.0
Total		36.0	56.0	92.0

Table D.22 Frequency of left supraorbital notch among physiographic regions

Physiographic Region		Left Suproaorbital Notch		Total
		Absent	Present	
Western Upland	Observed	10.0	16.0	26.0
	Expected	8.2	17.8	26.0
Central Plain	Observed	12.0	36.0	48.0
	Expected	15.2	32.8	48.0
Eastern Ridges and Lowlands	Observed	9.0	15.0	24.0
	Expected	7.6	16.4	24.0
Total		31.0	67.0	98.0

Table D.23 Frequency of right supraorbital notch among physiographic regions

Physiographic Region		Right Supraorbital Notch		Total
		Absent	Present	
Western Upland	Observed	7.0	16.0	23.0
	Expected	7.2	15.8	23.0
Central Plain	Observed	15.0	32.0	47.0
	Expected	14.6	32.4	47.0
Eastern Ridges and Lowlands	Observed	6.0	14.0	20.0
	Expected	6.2	13.8	20.0
Total		28.0	62.0	90.0

Table D.24 Frequency of left parietal foramina among physiographic regions

Physiographic Region		Left Parietal Foramen		Total
		Absent	Present	
Western Upland	Observed	16.0	6.0	22.0
	Expected	12.4	9.6	22.0
Central Plain	Observed	17.0	14.0	31.0
	Expected	17.5	13.5	31.0
Eastern Ridges and Lowlands	Observed	10.0	13.0	23.0
	Expected	13.0	10.0	23.0
Total		43.0	33.0	76.0

Table D.25 Frequency of right parietal foramina among physiographic regions

Physiographic Region		Right Parietal Foramen		Total
		Absent	Present	
Western Upland	Observed	17.0	6.0	23.0
	Expected	11.9	11.1	23.0
Central Plain	Observed	17.0	14.0	31.0
	Expected	16.1	14.9	31.0
Eastern Ridges and Lowlands	Observed	6.0	17.0	23.0
	Expected	11.9	11.1	23.0
Total		40.0	37.0	77.0

Table D.26 Frequency of left tympanic dehiscence among physiographic regions

Physiographic Region		Left Tympanic Dehiscence		Total
		Absent	Present	
Western Upland	Observed	23.0	4.0	27.0
	Expected	21.7	5.3	27.0
Central Plain	Observed	46.0	8.0	54.0
	Expected	43.4	10.6	54.0
Eastern Ridges and Lowlands	Observed	13.0	8.0	21.0
	Expected	16.9	4.1	21.0
Total		82.0	20.0	102.0

Table D.27 Frequency of right tympanic dehiscence among physiographic regions

Physiographic Region		Right Tympanic Dehiscence		Total
		Absent	Present	
Western Upland	Observed	17.0	6.0	23.0
	Expected	16.3	6.7	23.0
Central Plain	Observed	36.0	12.0	48.0
	Expected	34.1	13.9	48.0
Eastern Ridges and Lowlands	Observed	13.0	9.0	22.0
	Expected	15.6	6.4	22.0
Total		66.0	27.0	93.0

Table D.28 Frequency of left mastoid foramen among physiographic regions

Physiographic Region		Left Mastoid Foramen		Total
		Absent	Present	
Western Upland	Observed	15.0	7.0	22.0
	Expected	10.0	12.0	22.0
Central Plain	Observed	19.0	27.0	46.0
	Expected	20.9	25.1	46.0
Eastern Ridges and Lowlands	Observed	6.0	14.0	20.0
	Expected	9.1	10.9	20.0
Total		40.0	48.0	88.0

Table D.29 Frequency of right mastoid foramina among physiographic regions

Physiographic Region		Right Mastoid Foramen		Total
		Absent	Present	
Western Upland	Observed	12.0	6.0	18.0
	Expected	6.8	11.3	18.0
Central Plain	Observed	11.0	24.0	35.0
	Expected	13.1	21.9	35.0
Eastern Ridges and Lowlands	Observed	4.0	15.0	19.0
	Expected	7.1	11.9	19.0
Total		27.0	45.0	72.0

Table D.30 Frequency of left mastoid foramen among physiographic regions

Physiographic Region		Left Mastoid Foramen Number			Total
		None	1 Foramen	Multiple	
Western Upland	Observed	15.0	7.0	0.0	22.0
	Expected	10.0	8.3	3.8	22.0
Central Plain	Observed	19.0	16.0	11.0	46.0
	Expected	20.9	17.3	7.8	46.0
Eastern Ridges and Lowlands	Observed	6.0	10.0	4.0	20.0
	Expected	9.1	7.5	3.4	20.0
Total		40.0	33.0	15.0	88.0

Table D.31 Frequency of right mastoid foramen among physiographic regions

Physiographic Region		Right Mastoid Foramen Number			Total
		None	1 Foramen	Multiple	
Western Upland	Observed	12.0	6.0	0.0	18.0
	Expected	6.8	7.3	4.0	18.0
Central Plain	Observed	11.0	17.0	7.0	35.0
	Expected	13.1	14.1	7.8	35.0
Eastern Ridges and Lowlands	Observed	4.0	6.0	9.0	19.0
	Expected	7.1	7.7	4.2	19.0
Total		27.0	29.0	16.0	72.0

Table D.32 Frequency of left mandibular torus among physiographic regions

Physiographic Region		Left Mandibular Torus		Total
		Absent	Present	
Western Upland	Observed	45.0	14.0	59.0
	Expected	51.5	7.5	59.0
Central Plain	Observed	62.0	2.0	64.0
	Expected	55.8	8.2	64.0
Eastern Ridges and Lowlands	Observed	16.0	2.0	18.0
	Expected	15.7	2.3	18.0
Total		123.0	18.0	141.0

Table D.33 Frequency of right mandibular torus among physiographic regions

Physiographic Region		Right Mandibular Torus		Total
		Absent	Present	
Western Upland	Observed	42.0	17.0	59.0
	Expected	46.4	12.6	59.0
Central Plain	Observed	46.0	9.0	55.0
	Expected	43.3	11.7	55.0
Eastern Ridges and Lowlands	Observed	19.0	3.0	22.0
	Expected	17.3	4.7	22.0
Total		107.0	29.0	136.0

Table D.34 Frequency of left mylohyoid bridge among physiographic regions

Physiographic Region		Left Mylohyoid Bridge		Total
		Absent	Present	
Western Upland	Observed	45.0	3.0	48.0
	Expected	40.4	7.6	48.0
Central Plain	Observed	32.0	13.0	45.0
	Expected	37.9	7.1	45.0
Eastern Ridges and Lowlands	Observed	13.0	1.0	14.0
	Expected	11.8	2.2	14.0
Total		90.0	17.0	107.0

Table D.35 Frequency of right mylohyoid bridge among physiographic regions

Physiographic Region		Right Mylohyoid Bridge		Total
		Absent	Present	
Western Upland	Observed	47.0	2.0	49.0
	Expected	40.6	8.4	49.0
Central Plain	Observed	26.0	13.0	39.0
	Expected	32.3	6.7	39.0
Eastern Ridges and Lowlands	Observed	14.0	3.0	17.0
	Expected	14.1	2.9	17.0
Total		87.0	18.0	105.0

Table D.36 Frequency of left lambdoid ossicle among physiographic regions

Physiographic Region		Left Lambdoid Ossicle		Total
		Absent	Present	
Western Upland	Observed	14.0	4.0	18.0
	Expected	10.4	7.6	18.0
Central Plain	Observed	19.0	14.0	33.0
	Expected	19.0	14.0	33.0
Eastern Ridges and Lowlands	Observed	9.0	13.0	22.0
	Expected	12.7	9.3	22.0
Total		42.0	31.0	73.0

Table D.37 Frequency of left third trochanter among physiographic regions

Physiographic Region		Left Third Trochanter		Total
		Absent	Present	
Western Upland	Observed	13.0	8.0	21.0
	Expected	11.9	9.1	21.0
Central Plain	Observed	27.0	24.0	51.0
	Expected	28.8	22.2	51.0
Eastern Ridges and Lowlands	Observed	12.0	8.0	20.0
	Expected	11.3	8.7	20.0
Total		52.0	40.0	92.0

Table D.38 Frequency of right third trochanters among physiographic regions

Physiographic Region		Right Third Trochanter		Total
		Absent	Present	
Western Upland	Observed	12.0	9.0	21.0
	Expected	12.5	8.5	21.0
Central Plain	Observed	33.0	20.0	53.0
	Expected	31.6	21.4	53.0
Eastern Ridges and Lowlands	Observed	8.0	7.0	15.0
	Expected	8.9	6.1	15.0
Total		53.0	36.0	89.0

Appendix E

Frequency and Proportion of Trait Presence

Table E.1. Number of all trait observations among mound groups

Site	LSF	RSF	LSN	RSN	LPF	RPF	LTD	RTD	LMF	RMF	LMT	RMT	LMB	RMB	LLO	L3T	R3T
Polander	9	8	10	9	7	7	8	6	7	7	21	21	13	14	3	5	6
Raisbeck	12	12	11	12	13	14	13	12	10	7	31	33	30	30	10	15	14
Trowbridge	5	2	5	2	2	2	6	5	5	4	7	5	5	5	5	1	1
Kratz	28	31	29	29	15	15	30	35	24	26	46	39	34	28	15	39	44
McClaughry	18	18	19	18	16	16	24	13	22	9	17	16	11	11	18	12	9
BigBend	5	5	5	5	5	6	4	6	4	5	5	6	4	5	5	7	8
Kletzien	5	4	5	5	6	5	7	6	7	7	5	4	4	3	7	3	2
Nitschke	14	12	14	10	12	13	10	10	9	7	8	12	6	9	10	10	5

Table E.2. Percentages of trait presence among mound groups

Site	LSF	RSF	LSN	RSN	LPF	RPF	LTD	RTD	LMF	RMF	LMT	RMT	LMB	RMB	LLO	L3T	R3T
Polander	0	25	80	78	29	43	0	33	25	0	14	19	14	14	33	0	17
Raisbeck	58	58	45	58	31	21	15	25	50	43	35	43	35	0	20	47	57
Trowbridge	60	0	60	100	0	0	0	20	40	0	0	0	0	0	20	0	0
Kratz	46	68	79	65	53	60	10	20	54	62	4	23	4	43	53	41	34
McClaughry	50	61	68	72	38	31	21	38	64	89	0	0	0	9	33	67	56
BigBend	60	60	80	60	60	83	50	33	75	60	20	17	20	20	100	43	38
Kletzien	40	50	60	80	100	100	29	33	86	100	0	0	0	33	29	100	50
Nitschke	57	83	57	70	33	62	40	50	56	71	13	17	13	11	60	20	60

Table E.3. Number of all trait observations among the physiographic regions

Site	LSF	RSF	LSN	RSN	LPF	RPF	LTD	RTD	LMF	RMF	LMT	RMT	LMB	RMB	LLO	L3T	R3T
Western	26	22	26	23	22	31	27	23	22	18	59	59	48	49	18	21	21
Central	46	49	48	47	31	23	54	48	46	35	64	55	45	39	33	51	53
Eastern	24	21	24	20	23	23	21	22	20	19	18	22	14	17	22	20	15

Table E.4. Percentages of trait presence among physiographic regions

Site	LSF	RSF	LSN	RSN	LPF	RPF	LTD	RTD	LMF	RMF	LMT	RMT	LMB	RMB	LLO	L3T	R3T
Western	38	41	62	70	27	26	15	26	32	33	24	29	6	4	22	38	43
Central	48	65	75	68	45	45	15	25	59	69	3	16	29	33	42	47	38
Eastern	54	71	63	70	57	55	38	41	70	80	11	14	7	18	59	40	47

Appendix F

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Figure 1 Plan of the Kratz Creek Mound Group (no page number associated with fold out map)

McKern, W.C. (1928) The Neal and McClaughry Mound Groups. *Bulletin of the Public Museum of the City of Milwaukee* Vol.3 No.3. Aetna Press, Milwaukee Wisconsin.

Map 1 Plan of the Neale Mound Group (no page number associated with fold out map)

Map 2 Plan of the McClaughry Mound Group (pg. 230)

McKern, W.C. (1930) The Kletzien and Nitschke Mound Groups. *Bulletin of the Public Museum of the City of Milwaukee* Vol.3 No4. Aetna Press, Milwaukee Wisconsin.

Map 4 Plan of the Kletzien Mound Group

Map 5 Plan of the Nitschke Mound Group (no page number associated with fold out map)

McKern, W.C. (1931) A Wisconsin Variant of the Hopewell Culture*. Bulletin of the Public Museum of the City of Milwaukee* Vol.10. No2. Aetna Press, Milwaukee Wisconsin

Map 3 Trempealeau Bay Mound Groups (no page number associated with map insert)

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Plate 2 Kolterman Mound Group map (p. 185)

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