Temporary Territories and Persistent Places:

A Bioarchaeological Evaluation of the Association between Monumentality and Territoriality for Foraging Societies of the Prehistoric Ohio Valley

by

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ABSTRACT

Federal legislation prioritizes the repatriation of culturally unidentifiable human remains to federally-recognized Indian tribes that are linked geographically to the region from which the remains were removed. Such linkages are typically based on a Eurocentric notion of the exclusive use and occupancy of an area of land - a space-based approach to land use. Contemporary collaborations between anthropologists and indigenous communities suggest, however, that indigenous patterns of land use are better characterized as place-based and are therefore more complex and fluid than is reflected in current legislation. Despite these insights, space-based approaches remain common within archaeology. One example is the inference of territorial behavior from the presence of monuments within the archaeological record.

Drawing on osteological and mortuary data derived from a sample of Adena mounds located in northern Kentucky, this dissertation adopts a place-based approach in order to evaluate the archaeological association between monumentality and territoriality. The relative amounts of skeletal and phenotypic variability present at various spatial scales are quantified and compared and the degree to which mortuary and phenotypic data exhibit spatial structure consistent with the expectations of an isolation-by-distance model is assessed.

Results indicate that, while burial samples derived from some mounds exhibit amounts of phenotypic variability that are consistent with the expectations of a territorial model, data from other mounds suggest that multiple groups participated in their construction. Further, the general absence of spatial structure within the phenotypic data suggests that the individuals interred in these mounds are perhaps better characterized as representing an integrated regional population rather than localized groups. Untested archaeological inferences of territoriality may therefore mischaracterize regional population dynamics. In addition, these results suggest that the prioritization criteria for the repatriation of culturally unidentifiable human remains may merit revision.

DEDICATION

This is dedicated to my father. I wish you could have been here, Dad.

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CHAPTER 1

INTRODUCTION

Introduction and Motivation for the Current Research

As of April, 2019, there were 143,105 sets of Native American human remains that had been originally inventoried as “culturally unidentifiable” under the guidelines set forth in the Native American Graves Protection and Repatriation Act (NAGPRA). Of these, only 9,296 have since been culturally affiliated (National Park Service, 2019). For now, the remaining 133,809 are subject to the Department of the Interior’s final rule for the disposition of culturally unidentifiable human remains. Based largely on the recommendations of the Review Committee, a panel composed of representatives of federally recognized Indian tribes, Native Hawaiian organizations, national museums, and scientific organizations that was established with the passage of NAGPRA, the final rule prioritizes options for the disposition of human remains for which no cultural affiliation has been determined. According to this rule, if the remains were removed from tribal land, then the tribe from whose land the remains were excavated is given first priority for control of them. If this control is declined, or if the remains were not removed from tribal land, then second priority is given to the Indian tribe or Native Hawaiian organization that is recognized by the federal government as having aboriginally occupied the area from which the remains were removed. If neither of these first two priorities is available, or if the appropriate groups have been consulted and declined control, culturally unidentifiable human remains may then be offered to any federally-recognized Indian tribe. As a last resort, application can be made to the Secretary of the Interior for approval to either transfer the remains to a Native American group without federal recognition or to reinter them. Culturally unidentifiable human remains are therefore preferentially transferred to the control of groups with whom they share geographical ties (Birkhold, 2011; Tsosie, 2012).

Despite the ethical issues that can potentially arise from this prioritization (see Birkhold, 2011), the order is consistent with the traditional knowledge expressed by a number of Native American groups. The Mi'kmaq, for example, hold that they are descended from the people who lived on their land before them, regardless of the existence of continuity in language, culture, or biology. For them, places in common make them a common people (Julien et al., 2008). A similar conviction is expressed by the Haudenosaunee who understand that they draw nourishment from the land they live on and that land is composed, in part, of the people who came before them. There is thus a continuity drawn from place that supersedes that drawn from biology or culture (Hill, 2006). Or, as expressed by the Wampanoag, "We name ourselves after the land we live with. Because not only are we breathing in, we are also drinking the water that is flavored by that very land. Whatever is deposited in the soil is in the water, in us. So we are all one thing, and we name ourselves after the place that is our nurturing, that sustains our life" (quoted in Peters, 2006:40-41). The Zuni tribe, recognizing that many pueblos were occupied by both their own ancestors and those of the Hopi, share cultural affiliation with the Hopi because, in the words of Eldrick Seoutewa, "Different tribes were within the same area, and are thus related" (Welch & Ferguson, 2007:183). There is, then, a recurring understanding among many Native American groups that shared places contribute to shared identity in ways that are separate from (and perhaps more important than) culture or biology.

While the preferential transfer of culturally unidentifiable human remains to Native American groups who share a common geography with them is therefore both reasonable and culturally sensitive, the basis on which such geographical ties are determined is problematic. Due to the long history of forced relocation, contemporary tribal lands are rarely coterminous with the regions occupied by tribes at the time of European contact. Further, aboriginal occupancy of land is determined by treaty, an Act of Congress, an Executive Order, or by judgments of the United States Court of Claims or the Indian Claims Commission (ICC). The ICC held that aboriginal title could be established to a particular region and for a particular tribe only through the demonstration of exclusive use and occupancy of that area by that group (Rosenthal, 1985; Zedeño, 2000). As Kaplan states:

> Hence, some tribes were shown – by evidence of their early origins and life-styles – to have engaged in wide and extensive migrations and were seen to have failed in establishing aboriginal title. Similarly, other tribes failed to maintain a distinct tribal identity because of their intimate contacts with other tribes, and were similarly seen to have failed. But where evidence of the political and social composition; hunting, fishing, gathering, and agricultural activities; commerce and social organization; and population of a tribe pointed to such intensive use of a particular claimed territory that the use was found to be to the exclusion not only of other tribes, but also of white explorers, traders, miners, and settlers,

> Indians were successful in establishing the type of “use and occupancy” required to establish aboriginal title. (1985:74-75).

As noted by Rosenthal, however, “Exclusivity was a white man’s concept” (1985:52). Overlapping land claims were frequent and where multiple tribes could be shown to have used the same lands, aboriginal title was generally denied (Kaplan, 1985; Rosenthal, 1985; Sutton, 1985). Consequently, the requirement of exclusivity of use and occupation resulted in a situation in which the area to which a tribe was given aboriginal title (if such was granted at all) often represented only a fraction of the lands that they traditionally used and occupied.

This refashioning of ethnohistorically documented patterns of Native American land use to conform to a pattern dictated by European and Euro-American notions of ownership and property rights undermines the cultural sensitivity displayed by the order of disposition of culturally unidentifiable human remains established in the final rule. While the repatriation of such remains to Native American groups geographically linked with the area from which they were removed is a laudable solution to the problem of human remains without cultural affiliation, the determination of such linkages by means of the modern distribution of reservation lands or through federally-recognized aboriginal occupancy distorts the historical reality of such ties. Tribes whose use of a tract of land did not meet the exclusivity requirement for the establishment of aboriginal title are potentially excluded from the consultation process required during repatriation. This, as well as the preferential transfer of control of culturally unidentifiable human remains to federally-recognized tribes, can result in a situation in which remains are repatriated to a

Native American organization whose historical and/or geographic ties to them are less secure than those of other, unconsulted groups.

One possible solution to this problem is to revise the means by which geographic ties between contemporary tribes and human remains lacking cultural affiliation are determined by adopting a model of land use that is more consistent with patterns documented in the ethnohistoric literature.

The ICC's insistence on the demonstration of the exclusive use and occupancy of an area of land for the establishment of aboriginal title is an example of what Zedeño refers to as a space-bound system of land tenure, implying "ownership of a portion of the earth's surface and everything that lies within its boundaries" (2000:98). In contrast, research undertaken in compliance with a growing body of federal legislation intended for the purpose of Native American cultural preservation emphasizes the identification and documentation of traditional cultural properties. According to National Register Bulletin 38, "[a] traditional cultural property…can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in the community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker & King, 1990:1). Traditional cultural properties are an example of what Zedeño (2000) refers to as place-bound tenure. Influenced by contemporary collaborations between anthropologists and indigenous communities (e.g., Astor-Aguilera 2010; Bernardini 2005; Brown & Emery 2008; Colwell-Chanthaphonh & Ferguson 2006; Colwell-Chanthaphonh et al. 2008; Fowles 2013; Hill 2006; Julien et al. 2008; Kuwanwisiwma & Ferguson 2009; Peters 2006; Stoffle & Zedeño 2001; Welch &

Ferguson 2007), place-bound approaches to land tenure recognize that the use of land extends beyond strictly economic concerns and, instead, encompasses all aspects of social life. As such, place-bound systems of tenure provide a model of land use that may better approximate those that have been ethnohistorically documented for a number of Native American societies.

Outline of the Current Research

The question of whether space-bound or place-bound models of land tenure are more appropriate for approaching issues of repatriation can be addressed through reference to the archaeological record. To this end, this dissertation evaluates the relative applicability of such models to foraging societies of the prehistoric Ohio Valley. Specifically, it draws on osteological and mortuary data derived from a series of burial mounds associated with Adena ceremonialism (approximately 500 BCE to CE 200) that are located in northern Kentucky and were (for the most part) excavated under the auspices of the Works Projects Administration and the direction of William S. Webb. By comparing the relative amounts of skeletal and dental phenotypic variability exhibited by burial samples derived from multiple spatial scales (i.e., individual interment episodes, entire burial mounds, and the study region as a whole), this research assesses the degree to which these mounds are consistent with the establishment and long-term maintenance of mutually exclusive territories by the populations responsible for their construction.

The historical development of the Adena concept is the focus of Chapter 2. Although initially thought to represent a developmental stage of the archaeologically better-known Hopewell culture (e.g., Mills, 1917), Adena soon came to be thought of as a culture in its own right (e.g., Shetrone, 1920). In both instances, the term "culture" was meant to imply a social group analogous to historically documented tribes. The first synthetic analysis of Adena was undertaken by Greenman in 1932, and the trait-list definition that he constructed set the stage for the next four decades of research pertaining to Adena. Based on his excavations of a series of Adena mounds in Kentucky (most of which form the basis for the current research), Webb and colleagues (Webb & Baby, 1957; Webb & Snow, 1945) iteratively revised and expanded the trait-list definition of Adena, presenting new syntheses in 1945 and again in 1957. Data derived from the Kentucky excavations moved archaeological discussion of Adena beyond its relationship with Hopewell and prompted speculations and assertions regarding Adena settlement pattern, social structure, ceremonial life, subsistence, and, primarily through the contributions of Charles E. Snow, population origins. Whereas the work of Webb and colleagues presented Adena mounds from throughout the Ohio Valley as representative of a single, unified "people," Dragoo's excavation (1963) of the Cresap Mound in West Virginia prompted him to question this unity, arguing instead that Adena was characterized by both temporal and geographic variability. Contemporary research emphasizes this variability and has recast Adena as a mortuary program that was engaged in by multiple, distinct social groups (e.g., Abrams & Freter 2005; Aument 1990; Fitting & Brose 1971:45; Hays 1995; Rafferty 2005:153). Despite the increased emphasis placed on the documentation of variability, however, interpretations of Adena mounds have tended to be fairly uniform and functional, with many researchers suggesting that mound construction was implicated in both group integration and territorial maintenance (e.g., Abrams, 1992a,b; Charles, 1992; Clay, 1991; Mainfort, 1989; Railey, 1991, 1996; Seeman & Branch, 2006; Shryock, 1987).

The interpretation of mound construction as indicative of territoriality is an example of the application of a space-bound model of land tenure and it is the validity of this interpretation that is the subject of Chapter 3. Specifically, after providing a brief overview of models of human territoriality that have been influential in both anthropology and archaeology, the particular intellectual lineage that underlies the inference of territorial behavior within past societies from their construction of monuments is detailed. As it has been applied to Adena, the linkage between monumentality and territoriality rests on three main assumptions: (1) that Adena mounds functioned as "…permanent, specialized, bounded area[s] for the exclusive disposal of [the] dead" (Goldstein, 1976:61), (2) that the resources exploited by Adena populations were both dense and predictable, and (3) that Adena populations can be characterized as sedentary. The degree to which these assumptions are upheld by the Adena archaeological record is then evaluated through a discussion of mound structure and variability, current data pertaining to subsistence practices, and the available archaeological evidence for sedentism. The degree to which each of these assumptions is supported is ambiguous and/or regionally variable.

Chapter 4 develops an alternative, place-bound model for the interpretation of Adena mounds. The model is based on Schlanger's concept of a persistent place – or a location that is "used repeatedly during the long-term occupation of a region" (1992:92). Importantly, the notion of a persistent place focuses on the ways in which the use of such locations changed over time, allowing for discontinuities, alterations, and their integration within changing social configurations. This concept is expanded on in two primary ways: 1) through the incorporation of literature derived from humanist geography that characterizes places as emergent phenomena resulting from the interplay of perception, memory, and the localized interactions of people, and 2) by drawing on anthropological literature that explores indigenous ontologies and conceptions of personhood. The result is a reformulation of the persistent place concept that explicitly considers how the perception of place as mediated by worldview can affect the (dis)continuous use of a location over time. While the continuous association of specific group identities and specific places has often been interpreted as evidence for territoriality, this expansion of the persistent place concept provides a mechanism whereby the linkage between group identity and place can remain intact despite changes in group composition. This raises the possibility that some Adena mounds resulted from the cumulative actions of multiple, distinct groups.

Chapter 5 frames the interpretation of Adena mounds as either territorial markers or as persistent places as two alternative scenarios. Briefly, under the expectations of the territorial hypothesis, a given mound is expected to be the product of the actions of a single, stably located, descent-based corporate group. In contrast, if mounds are better characterized as persistent places, it can reasonably be expected that multiple corporate groups contributed to their construction. For this reason, an analytical framework is developed that evaluates (1) the spatial distribution of shared practices (as evidenced by formal similarities in mortuary practices) and (2) the relative amount of biological variability exhibited by burial samples derived from different spatial scales. To this end, this research relies on three primary kinds of data: stratigraphic data (derived from profile maps generated during the original excavations), descriptions of mortuary contexts (derived from both original field notes and published site reports), and skeletal and dental phenotypic data (derived from the osteological collections produced by the excavations of the mounds in the research sample). The remainder of this chapter details data collection protocols and the analytical techniques employed for each of the different categories of data.

The results of the different analyses that were undertaken in the course of this research are presented in Chapter 6 and Appendices B through O. The analyses of different types of data are nested and the results build on each other. For example, the results of the reanalysis of the osteological collections used in this research are detailed in Appendix B. These results, however, are then employed in the cleaning and pretreatment of the phenotypic data. Likewise, the results of the reconstructions of mound stratigraphy and burial placement are detailed in Appendices C through O, but these reconstructions are then used to partition the phenotypic data into burial samples consistent with the different spatial scales used in the comparisons of phenotypic variability. The results of the analyses of both the phenotypic and the mortuary datasets are grouped according to the kind of analysis from which they derive (e.g., variability comparisons, cluster analyses, or Mantel tests). The results of these analyses are then synthesized and evaluated for the degree to which they are consistent with the expectations of the alternative scenarios developed in Chapter 5. While there is limited support for the territorial hypothesis, the majority of Adena mounds included in this research exhibit patterning consistent with their characterization as persistent places.

The concluding chapter of this dissertation seeks to contextualize the results of this research. They are discussed in relation to both the extant body of literature concerning Adena ceremonialism and the alternative interpretational frameworks that were presented in Chapters 3 and 4. The implications of this research for the consultation process involved in the repatriation of culturally unidentifiable human remains mandated under NAGPRA are also discussed. The dissertation closes with some suggestions for future research.

CHAPTER TWO

AN HISTORICAL REVIEW OF THE ADENA CONCEPT

Introduction

As currently conceptualized by most archaeologists, Adena is a mortuary program that was engaged in by multiple, distinct social groups throughout the Ohio Valley and exhibited local variations upon common themes (e.g., Abrams & Freter 2005; Aument 1990; Fitting & Brose 1971:45; Hays 1995; Rafferty 2005:153). It takes its name from the Adena Mound, located in Ross County, Ohio, and excavated by the Ohio State Archaeological and Historical Society in 1901 (Mills, 1902). The mound, in turn, was named for having once stood on the Adena estate of Thomas Worthington, the sixth governor of the state of Ohio. According to Webb and Snow (1974: 8), the word “Adena” derives from a Greek adverb meaning “nothing lacking.” Although intended to convey Governor Worthington’s satisfaction with the area in which he resided, the name becomes slightly ironic when applied to a mortuary complex that remains poorly understood despite more than a century of scholarly research and speculation.

When Mills (1902) reported the results of the excavation of the Adena Mound, he described a conical earthen mound within which individuals had been interred in elaborate log tombs and were accompanied by finely made artifacts manufactured from exotic raw materials such as marine shell and copper. This is essentially the picture drawn by discussions of Adena found within contemporary introductory archaeology textbooks (e.g., Bense, 1994; Fagan, 2005) – a fact that is not surprising, given that Mills’ published report would later form the basis for Greenman's (1932a) trait-list definition of the Adena "culture." Although the material description of Adena has remained stable for more than a century, the Adena concept – the collection of inferences drawn from these material remains – has been far more mutable. This chapter begins with a description of the manner in which the Adena concept was originally constructed and subsequently revised before concluding with an exploration of how such revisions have affected archaeological interpretations of the mounds themselves.

The Historical Construction of the Adena Concept

While the first recorded excavation of what would come to be called an Adena mound took place in 1838 (Hemmings, 1984; Norona, 1953; Webb & Snow, 1974), it was the 1901 excavation of the Adena Mound, in Ross County, Ohio, that provided the Adena concept with both its name and core characteristics (Greenman, 1932a; Shetrone, 1920). Although Mills (1902) provided a detailed report of the results of the excavation, he made no suggestion as to how these material remains should be interpreted aside from a brief comparison of the earspools depicted on an effigy pipe (Figure 1) to those recovered from burial associations in nearby tumuli. It was not until 15 years later, when reporting on the excavation of the Westenhaver Mound in adjacent Pickaway County, that Mills offered the opinion that the Westenhaver and Adena mounds "represent an interesting and distinct stage in the development of the Hopewell culture, to which they undoubtedly belong…" (1917: 266). This assertion was made primarily on material grounds, noting that artifacts recovered from these mounds, while less numerous, were similar in both material and style to those recovered from Hopewell earthworks and that, although

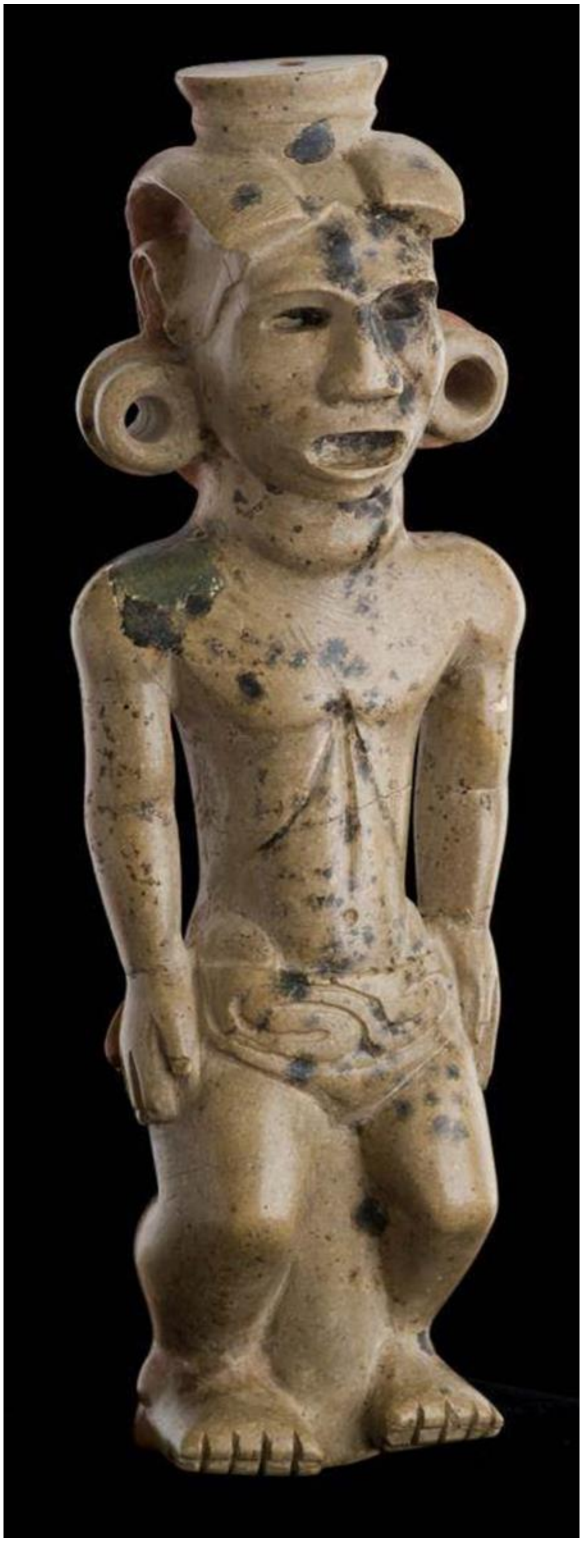


Figure 1: Human effigy pipe recovered from the Adena Mound (adapted from "Is the man on the Adena pipe a dwarf?" by B. Lepper, 2013. Copyright 2019 by Ohio History Connection)

evidence of the use of fire within mortuary practices was present at Westenhaver, cremation of the dead had yet to become de rigueur (Mills, 1917).

Where Mills (1917) was confident in his ascription of the Adena and Westenhaver mounds to Hopewell, Shetrone (1920) was more hesitant. Shetrone saw these mounds as part of a broader pattern, the characteristics of which included:

> Shapely, conical mounds, generally single but sometimes occurring in apparent series; mounds unaccompanied by earthworks; absence of indications of pre-structures of upright timbers; sites of mounds unleveled and showing no evidence of previous use; erection of mounds often begun by piling logs and brush upon the sites or bases; non-cremation of the dead; burial made upon the base line and throughout the mounds, usually with an important central grave below the base line; sepulchers of logs often used, particularly for the more important burials. Materials from distant sources, as with the Hopewell culture proper, were extensively used, but copper appears to have been employed for objects of ornamentation only, and rarely if ever for utility implements. Of the artifacts persistently occurring there may be mentioned copper bracelets and finger rings; gorgets of the expanded center and concaved edge type; tubular pipes; necklaces of beads made from univalve shells; and projectile points of flint of the ovate unnotched and the stemmed types. (1920: 160)

Although many of these characteristics would be discarded or modified by later researchers (e.g., Dragoo, 1963; Greenman, 1932a; Swartz, 1971; Webb & Baby, 1957; Webb & Snow, 1945), Shetrone (1920) viewed them as sufficiently divergent from typical Hopewell features to merit their designation as a separate culture (by which term he meant a social group analogous to historic tribes). Moreover, while sites conforming to this constellation of traits seemed to occur most frequently within the Scioto valley, Shetrone (1920) recognized that similar sites had been reported from the Miami valley, in southwestern Ohio, as well as the Kanawha valley of West Virginia. Separated from Hopewell, Adena had become its own entity.

In 1930, Emerson Greenman and Robert Goslin directed the excavation of the Coon Mound, located in Athens County, Ohio. Although nearly three-quarters of the mound had been removed prior to excavation and large portions of the remainder had been disturbed, the characteristics of a burial recovered from an undisturbed, central sub-floor tomb prompted Greenman (1932a) to attribute the Coon Mound to Adena. Excavation of this mound also spurred Greenman (1932a) to undertake an analysis of what Shetrone (1920) had dubbed the “Adena culture.” To do so, Greenman employed what he termed “the zoological method” (1932a: 411), taking the Adena Mound as his type specimen and assigning other mounds to Adena based upon how closely their traits aligned with those of the Ross County mound. Although this methodology has fallen out of favor, at the time that Greenman undertook his analysis the trait list approach was considered by many to be not only highly scientific, but entirely appropriate to the delineation of prehistoric cultures (Haag, 1974; Milner & Smith, 1986).

Greenman's (1932a) trait list description of Adena was both careful and nuanced. Mounds were labeled as Adena if they shared at least two of the 33 traits that Greenman gleaned from Mills' (1902) published report of the Adena Mound. These initial traits pertained to a wide variety of archaeological observations, including details of mound construction (e.g., trait 16, "primary strata"), aspects of mortuary practices (e.g., trait 17, "red ochre on skeletons"), and artifact classes (e.g., trait 4, "copper bracelets") (Greenman, 1932a: Table A). Alternatively, a mound was classed as Adena if it exhibited traits that were either common to many other Adena mounds or traits that were found rarely, but only in mounds already identified as Adena. In both of these cases, a mound was only labeled as Adena if it had no observable affinity with any other prehistoric group (e.g., Hopewell). Greenman (1932a) identified a total of 70 Adena mounds in this fashion, with sites located in Ohio, Indiana, Illinois, Pennsylvania, West Virginia, and Tennessee.

Recognizing that his approach was limited because the Adena Mound was unlikely to share many of its traits with any other given mound, Greenman (1932a) used the characteristics of the 70 Adena mounds that he had identified to develop a more generalized Adena trait list. In doing so, he was careful to separate local variation from broader, regional patterns by excluding traits that were only exhibited by single or geographically neighboring mounds. Using this exclusion criterion, Greenman produced an additional 26 traits that he considered to be characteristic of Adena. He presented the complete list of 59 traits as well as the total number of times that each trait occurred and the number of different mounds in which it was found in his Table A (Greenman 1932a: 420-424; see also Appendix A). Those traits that Greenman thought were likely to be local variants or the products of trade relations (an additional 69 entries) were presented in his Table C, along with the mound(s) that each trait was found in (1932a: 442-445). In this way, Greenman's (1932a) study, although emphasizing general patterns, anticipated the contemporary concern with localized patterns of variation (e.g., Abrams & Freter 2005; Applegate 2005; Aument 1990; Greber 1991, 2005; Hays 1995; Henry 2013).

Greenman's caution and attention to detail, however, were undermined by the variable nature of his source material. Of the 70 mounds that he identified as Adena, only 15 were recorded by Greenman (1932a) as having been completely excavated. The remainder had been documented by various researchers and enthusiasts employing a variety of excavation techniques. Synthesis of the source material was further complicated by idiosyncrasies in both the style and content of each excavation report, leaving many details of mound exploration open to interpretation (Webb & Snow, 1974). Although this situation was unavoidable, given that very few archaeologists at the time had any formal training and that excavation location and technique were frequently a matter of personal choice (Guthe, 1967; Milner & Smith, 1986), the equally unavoidable result was that Greenman's (1932a) characterization of Adena was based on data that are both incomplete and inconsistently described. The first major synthesis of Adena had, both intentionally and otherwise, conflated three different kinds of variability: chronological, methodological, and geographical. While Greenman (1932a) attempted to account for the latter, later researchers did not.

The second major study of Adena was published in 1945, when William S. Webb and Charles E. Snow presented their synthesis of a series of excavations in Kentucky that had been conducted under the auspices of the Work Projects Administration (WPA) and its New Deal predecessors. By unpacking Greenman's (1932a) supplemental tables, reformulating the descriptions of his original traits, and adding new traits based on the results of the WPA excavations in Kentucky, Webb and colleagues expanded the Adena trait list to include a total of 243 entries (Webb & Baby, 1957; Webb & Snow, 1945). Traits were grouped into a number of categories (see Appendix A), many of which (e.g., earthwork traits, cremation traits, house traits) directly contradicted the description of Adena provided by Shetrone (1920). On the basis of this extended trait list, and provided they met an unspecified "minimum requirement for acceptance" (Webb & Snow, 1974:11), new sites were added to the Adena register. Webb and Snow's (1945) synthesis more than doubled the number of sites thought to be Adena in origin (from 70 to 173) and this number was later increased to 222 by Webb and Baby (1957). Adena mounds and earthworks were identified in Ohio, Indiana, Illinois, West Virginia, Pennsylvania, Kentucky, and Tennessee with apparent Adena foci in the valleys of the Scioto, Hocking, and Kanawha rivers as well as in the Kentucky Bluegrass.

The excavations that prompted Webb and Snow's (1945) expansion of the Adena concept took place during a period of rapid change within American archaeology. The influx of federal funding via the WPA and its predecessor programs resulted in the development, deployment, and standardization of new field techniques as well as the mobilization of large labor pools (Guthe, 1967; Milner & Jacobi, 2006; Milner & Smith, 1986; 1998). Where Greenman (1932a) had frequently been forced to rely on reports detailing the discoveries made during excavations amounting to little more than tunneling operations, Webb and colleagues were able to draw on complete, systematic excavations employing grid systems and involving the relatively meticulous recording of three-dimensional provenience for both artifacts and features (see Figure 2). The improved methodological rigor of the WPA-funded excavations contributed to the discovery of structural remains beneath several mounds as well as the recognition of a wider range of mortuary treatments than had previously been documented (e.g., Webb, 1940; 1941a, b; 1942; 1943a, b; Webb & Elliott, 1942). Where prior discussions of Adena had largely focused on its relationship to Hopewell (e.g., Mills, 1917; Shetrone, 1920; Greenman, 1932a), these new data enabled speculation regarding Adena settlement pattern, social structure, ceremonial life, and subsistence (e.g., Goslin, 1957; Webb, 1943a; Webb, 1942; Webb & Baby, 1957; Webb & Snow, 1945). The WPA excavations also generated a large skeletal collection, the study of which led to observations concerning disease as well as discussion and debate concerning the origin of Adena populations (Webb & Baby, 1957; Webb & Snow, 1945). Although previously discussed as a "culture" in the sense of a social group analogous to historically known tribes (e.g., Shetrone, 1920), the work of Webb and colleagues moved the Adena concept beyond the delineation of a material trait list and initiated the consideration of, as their titles suggest, the Adena people.

The relative thoroughness with which the WPA excavations had been undertaken also resulted in a more complete understanding of variation in mound structure. Several of the mounds excavated in Kentucky exhibited multiple stages of construction (e.g., Webb, 1940; 1941b; 1942; 1943a; Webb & Elliott, 1942). Evidence of this had been observed by Mills (1902) in the Adena Mound and was common enough to be included by Greenman (1932a) as number 16 in his Adena trait list. The quality of the WPA excavations, however, allowed for speculation on the duration of time that elapsed

Figure 2. Excavation of the larger Robbins Mound (15Be3) exhibiting terraced excavation techniques and the presence of several log tombs at different depths within the mound. Photograph 189BE3, WPA/TVA Archives, presented courtesy of the William S. Webb Museum of Anthropology, University of Kentucky.

between construction episodes. For example, in the larger of the Wright Mounds (15Mm6), each of the four construction stages noted by Webb were separated by a thin humus line, suggesting lengthy periods during which the mound lay relatively undisturbed between episodes of interment (Webb, 1940). Similarly, patterns of post-molds underlying mounds were found to overlap at several sites (e.g., Webb, 1940; 1942), indicating that the locations of some mounds may have been important for an extended period of time prior to the beginning of mound construction. Despite these indications that certain mounds may represent activities spanning from several decades to several centuries, little effort was made by Webb and Snow (1945) to generate an internal chronology for Adena using available stratigraphic evidence. Instead, the chronological placement of specific sites (see Table 1) was at first based upon the perceived similarity of their characteristics to those of Hopewellian mounds and earthworks (Webb & Snow, 1945) and, later, based upon a small sample of (problematic) radiometric dates (Webb & Baby, 1957).

The increased methodological rigor that produced the data upon which the work of Webb and colleagues relied was, unfortunately, accompanied by a reduction in analytical rigor. While Greenman's (1932a) trait list formed the framework for their re-analysis, Webb and Snow (1945) eschewed the use of his "zoological method," noting that any given site identified as Adena was unlikely to exhibit more than a small portion of the total trait complex. Although this reasoning is defensible, the result was the inclusion of many single-occurrence traits within the revised Adena trait list. This effectively negated the effort that Greenman (1932a) had expended in order to control for and catalogue local variations in mound structure, mortuary practices, and artifact forms.

Table 1

Adena Chronologies over Time.
Note the inversion of several sites between Webb and Snow’s (1945) sorting and Dragoo’s (1963) sorting. Bolded and italicized entries indicate sites analyzed as part of this research.

Webb & Snow, 1945			
"Early Adena"		**"Late Adena"**	
Site	**State**	**Site**	**State**
Gildwell Mound	Indiana	Adena Mound	Ohio
Nowlin Mound	Indiana	Metzger Mound	Ohio
Redman Mound 3	Ohio	Mt. Vernon Cemetery Mound	Ohio
Ricketts Site (15Mm3)	***Kentucky***	Fortney Mound	Ohio
Robbins Mound (15Be3)	***Kentucky***	Beech Bottom Mound	West Virginia
C & O Mound (15Jo9)	***Kentucky***	Great Smith Mound	West Virginia
		Wright Mound (15Mm6)	***Kentucky***

Webb & Baby, 1957					
"Early Adena"			**"Late Adena**		
Site	**State**	**Original Date**	**Site**	**State**	**Original Date**
Toepfner Mound	Ohio	2377 ± 150	Florence Mound	Ohio	1425 ± 250
		2780 ± 410	Cowan Creek Mound	Ohio	1509 ± 250
Dover Mound	***Kentucky***	2650 ± 175	***Drake Mound***	***Kentucky***	1168 ± 150
		2169 ± 175			

Dragoo, 1963			
"Early-Middle Adena"		**"Late Adena (Robbins Complex)"**	
Site	**State**	**Site**	**State**
Cresap Mound	West Virginia	***Robbins Mound (15Be3)***	***Kentucky***
Natrium Mound	West Virginia	***Wright Mound (15Mm6)***	***Kentucky***
Beech Bottom Mound	West Virginia	***C & O Mound (15Jo9)***	***Kentucky***
Fisher Site	***Kentucky***	Adena Mound	Ohio
William H. Davis Mound	Ohio	Mound Camp	Indiana
		Nowlin Mound	Indiana
		Cresap Mound (top portion)	West Virginia

The abandonment of Greenman's (1932a) analytical principles also led to unwarranted generalizations from isolated archaeological finds. For example, the discovery of a paired-post structure underlying the circular Mt. Horeb earthwork (Webb, 1941a) led Webb and Snow (1945) to assert that *all* small, circular earthworks must have been built by Adena peoples. Such analytical maneuvers rightfully drew criticism and caused colleagues to question the validity of their conclusions (e.g., Griffin, 1974; Jennings, 1947; Morgan, 1946). The concerns of their contemporaries, however, seem to have been largely ignored as Webb and Baby's (1957) subsequent enlargement of the Adena trait list was accomplished in much the same way. The iterative expansion and application of the Adena trait list by Webb and colleagues had resulted in the description of a sedentary, stratified, agricultural society occupying a region well over 100,000 square kilometers in area and persisting with relatively few changes for more than two millennia. Such a monolithic characterization of Adena, however, would become untenable in the light of later analyses.

The publication of Dragoo's (1963) excavation of the Cresap Mound in Marshall County, West Virginia, and the careful review of Adena archaeology that accompanied his findings both built upon and diverged from earlier treatments of Adena. Although he applied the trait list compiled by Webb and colleagues for his determination of Adena affiliation for the Cresap Mound, Dragoo (1963) expressed understandable concern over its utility. Many of the traits presented by Webb and colleagues were, according to Dragoo, "…so general in nature and distribution as to make them useless in seeking cultural and temporal differences among the various Adena components" (1963: 176). Choosing to focus only on those traits that he perceived to be distinctive of Adena, Dragoo (1963) reduced the Adena trait list to a mere 44 entries, the majority of which pertained to aspects of material culture (see Figure 3, Appendix A). Culling of the trait list and thus removing considerable analytical noise unwittingly introduced into its prior incarnations laid the foundation for a more nuanced evaluation of Adena than had previously been presented.

Like many other Adena mounds, the Cresap Mound exhibited evidence of having been built in multiple stages and over a long period of time. Where previous researchers merely mentioned this in passing (e.g., Mills, 1902; Webb & Baby, 1957; Webb & Snow, 1945), Dragoo (1963) utilized the stratigraphy of the Cresap Mound as an organizational framework for his analysis of its contents. Reducing the Adena trait list facilitated the recognition that artifact styles and mortuary treatments from the earlier levels of the Cresap Mound were distinct from those recovered from later levels. Leery of both the accuracy and repeatability of radiocarbon dating at the time, Dragoo (1963) used the stratigraphic relationships exhibited by the Cresap Mound to develop an internal chronology as well as a developmental trajectory that he used to provide a rough chronological categorization for other sites attributed to Adena (see Table 1). In doing so, he salvaged indications of both temporal and geographic variability from the morass of the Adena trait list as developed by Webb and colleagues. The recovery of these dimensions of variation provided evidence that Adena was a far less unitary phenomenon than earlier researchers had presented it to be.

The dissatisfaction with the Adena trait list that had been expressed by Dragoo (1963) was shared by other researchers as well. At a conference in 1970 at Ball State University, the conclusion was reached that very few of the entries on the Adena trait list

Figure 3. Portion of an engraved tablet recovered from the larger Wright mound (15Mm6). Such tablets were considered to be reliable indicators of Adena mortuary practices by Dragoo (1963). Photograph by author, with permission of the William S. Webb Museum of Anthropology, University of Kentucky.

could reasonably be considered to be diagnostic. Further, almost every trait (the exceptions being artifact types of extremely limited occurrence) could be found in contexts that most archaeologists would be averse to labeling as Adena (Swartz, 1971). Despite this, the trait list was not entirely abandoned. Rather, it was suggested that it be repurposed, with researchers advocating the investigation of the spatio-temporal distributions of each particular trait as well as if and how such traits co-occured. The consensus opinion, concisely stated by Brose, was that "The key does not seem to be the particular artifact so much as it is the artifact in context" (discussion in Swartz, 1971: 177). In other words, Adena was not to be found in the enumeration of traits, but rather in how those traits came together to form particular patterns and the specific practices that such patterns represented.

Scrutiny of the Adena trait list also resulted in the realization that the majority of those traits that were thought to be characteristic of Adena were found only in sites regarded by Dragoo (1963) as Late Adena. In contrast, sites thought to be representative of Dragoo's (1963) Early/Middle Adena were not easily distinguishable from other Early Woodland mortuary manifestations. This observation led McMichael to propose a "contraction… in both time and space" (1971: 95) of where the label Adena was to be considered applicable. Where the iterative expansion of the Adena trait list had led to the identification of Adena sites dispersed throughout seven states and multiple millennia, McMichael (1971) suggested that Adena should more properly refer to sites dating from between 500 BC and AD 1 and located in southern Ohio, northeastern Kentucky, and western West Virginia.

Accompanying the reconceptualization of Adena as a spatio-temporally restricted set of practices was the abandonment of the notion held by earlier researchers (e.g., Shetrone, 1920; Greenman, 1932a; Webb & Baby, 1957; Webb & Snow, 1945) that Adena represented a unified social group analogous to historically known tribes or nations. Although made in reference to Adena sites located in Ohio, the observations of Fitting and Brose were equally applicable to Adena as a whole:

> Our knowledge of Adena architecture is primarily from charnel houses. Our understanding of the role which factors of topography and geography played in the patterning of sites is largely confined to some knowledge of the location of their more elaborate ceremonial mounds. Even our conception of the material culture of the Adena People is generally restrictive to grave goods. (1971: 33-34)

The vast majority of information pertaining to Adena had been derived from the excavation of mortuary sites and, as McKern (1939) had observed several decades earlier, burials rarely provided reliable information concerning settlement patterns or subsistence practices. The position that Adena represented a "culture" (*sensu* Shetrone, 1920) was no longer tenable. Rather, it was more appropriate to interpret Adena as a suite of burial practices – a mortuary complex.

The Ball State conference signaled a change in the trajectory of Adena research. The project of expanding the Adena trait list was abandoned, as was the assignment of sites to Adena based only on the presence of generalized characteristics. Instead, archaeologists began to focus on smaller geographic areas, such as river drainages, and expend effort into the elucidation of local variation in artifact form and developmental sequences, patterns of mortuary practices, and the development of models of sociopolitical organization (e.g., Abrams & Freter, 2005; Allen, 1981; Aument, 1990; Bush, 1975; Carskadden & Gregg, 1974; Clay, 1983; Fowler et al., 1976; Gartley, 1974; Greber, 2005; Hays, 1995; Henry, 2013). Emphasizing local sequences increased archaeological awareness of both the temporal and formal variability exhibited by sites attributed to Adena (Applegate, 2005). This, in turn, resulted in the widespread acknowledgement that Adena is far from the monolithic entity portrayed by the trait list approach. Rather, sites attributed to Adena most likely represent the actions of multiple, distinct, small-scale societies (e.g., Clay, 2005; Fitting & Brose, 1971; Greber, 2005; Hays, 1995; Pollack et al., 2005; Rafferty, 2005).

The recognition of multiple “Adenas” (Rafferty, 2005) has led some researchers to propose the adoption of modifying adjectives in order to provide regional specificity to various Adena manifestations (e.g., Greber, 2005). Citing the label’s historical connotations, Clay has taken a harder stance in stating that “Adena does not exist” (2005: 108) and advocating abandonment of the term. While the recent analytical focus on local variability is both necessary and laudable, it deemphasizes the fact that many mounds categorized as Adena exhibit intriguing similarities in formal aspects of both burials and mounds. It is here, in the evidence of a shared “structural grammar” (Rafferty, 2005: 165; see also Henry, 2013) pertaining to mortuary practices and mound construction, that Adena retains its conceptual utility. Adena has remained a viable archaeological construct because, as stated by Brose, it is recognizable as “…a pattern, it’s a way of doing things” (discussion in Swartz, 1971: 176).

Undergoing both an overly enthusiastic unification and a gradual dissolution, the Adena concept has been radically transformed over the course of the past century. From humble beginnings, where it was described as a layover en route to the cultural efflorescence known as Hopewell (e.g., Mills, 1917), Adena quickly grew into a "hydra-headed monster" (McMichael, 1971: 88). The process by which this happened has been succinctly summarized by Clay:

> Adena grew into a taxonomic Boy Scout list of merit badges grounded in no archaeological contexts. Applied in the real world, *any* small burial mound in the Middle Ohio Valley tends to get called "Adena," excavated or not. By extension, *any* potsherd anywhere near said mound tends to get called "Adena," regardless of *any* excavated information from the mound or even the physical characteristics of the sherd. Expanding this type of reasoning throughout the 222-trait list (as of 1957), Adena rapidly lost any precise meaning. (2005: 105, emphasis in original).

Over the past five decades, archaeologists have attempted to ameliorate the problems arising from the unchecked growth of the Adena trait list by focusing on how sites labeled as Adena fit into local archaeological sequences. As a result, the interpretation of Adena as a wide-ranging, long-lasting, unitary archaeological culture has been replaced by that of a spatiotemporally restricted mortuary complex participated in by several, distinct small-scale societies. Despite this drastic reformulation of the Adena concept, however, archaeological interpretation of the mounds on which it is based has remained surprisingly static.

Adena Mound Interpretations

Burial mounds are simultaneously the source of the majority of the data used to construct the Adena concept and one of its defining characteristics. Shetrone (1920: 160) described “shapely, conical mounds” as typical of Adena, and “mound conical” was the first entry in Greenman’s (1932) trait-list definition and the seventh in Webb and Snow’s (1945) subsequent expansion. This simple description, however, conceals a large amount of variation among mounds in terms of size, construction sequence, pre-mound activity, and the number of individuals interred within them (see Tables 3 and 4 for variation among the mounds considered in the current research). Such variability is well-recognized by archaeologists but has remained under-analyzed. Although some researchers have explicitly focused on mound variability in order to make inferences about Adena societies (e.g., Rafferty, 2005; Henry, 2013), the more general approach has been to treat mounds as more or less interchangeable within the cultural context that gave rise to them. In other words, archaeologists have tended to view the difference between a small, simple mound containing few interments and a large, structurally complex mound containing many individuals as a matter of degree, not of kind. As a result, interpretations of Adena mounds have tended to be generalizations, ascribing the same role to all mounds regardless of their size, outward form, or internal structure.

Early considerations of mounds focused on their mortuary aspect. Discussions of the purposes of mound-building beyond interment of the dead were rare, but not entirely absent. Greenman, for example, argued that

> The erection of a burial mound was a procedure involving the coming together of the surviving members of the group in a single enterprise highly charged with activities of a physical nature at a time when the group had been touched by the mysterious hand of death, when its members would unconsciously welcome an excuse to come physically close to one another as in all times of danger; the present danger being that of death, they would find further relief in manifesting the physical properties by which they lived and thereby (perhaps through some rule of primitive magic) to lay raw and violent hold upon life. The resulting mound, outstanding from the earth, would serve as concrete proof of their momentary victory over the ultimate catastrophe. (1932b: 293-294)

Such an argument effectively suggests that the purpose of mound construction, at least in part, was to achieve some measure of group integration after the disrupting influence of the death of a (presumably important) individual. Mound-building, then, was intimately bound up in the creation and maintenance of social bonds between the individuals involved in mound construction.

According to Webb and Snow (1974: 43), it "…is obvious to all investigators of Adena mounds" that they were constructed to serve as repositories for the dead. The interpretation of earthen mounds as indigenous cemeteries stretches back well over two hundred years in the Ohio Valley (Norona, 1953) and the description of the graves contained within them motivated many early mound explorations. Mounds that failed to disclose any evidence of burials were often labeled as "unproductive"; such mounds, however, were exceptional and it has been suggested that they resulted from some combination of taphonomic forces and inadequate excavation techniques (Webb & Snow, 1945). Contrary to Shetrone's (1920) statement that Adena societies did not engage in cremation of the dead, Adena mounds have been found to contain both cremations and inhumations, although the latter tend to be more common. Inhumations also tend to be more commonly associated with the construction of log tombs and the presence of grave goods, leading to speculation that such interments represent individuals of a higher social status than cremations (Webb, 1942; Webb & Snow, 1945; although see Clay, 1986 for an inversion of this stance). Higher social status, in general, has been suggested as necessary for mound burial by a number of researchers (e.g., Abrams, 1992a; Dragoo, 1963; Greenman, 1932a; Hemmings, 1984; Mainfort, 1989; McConaughy, 1990; Shryock, 1987). Whether social status acted as a selection criterion or not, what is clear is that the number of individuals afforded mound burial "…represented a selected minority of the total population" (Webb & Snow, 1974: 169). Adena mounds were not simply cemeteries, but places seemingly designated for the burial of a select few.

Although Shetrone stated that Adena mounds were characterized by an "…absence of indications of pre-structures of upright timbers" (1920: 160), the completeness of the WPA-funded excavations in Kentucky resulted in the discovery of 23 circular, paired-post structures underlying various mounds and earthworks attributed to Adena (see Figure 4 and Table 3 for details). Despite some variation in architectural details, most of these structures were ultimately interpreted by Webb and colleagues as residential dwellings (Webb, 1940; 1941a; 1941b; 1942; 1943a; 1943b; Webb & Elliott, 1942; Webb & Snow, 1945). The combination of submound post patterns and the frequent occurrence of a mound layer composed of humus containing chipped stone

Figure 4. Overlapping circular paired-post patterns underlying the smaller C & O mound (15Jo2). Photograph 88JO2a**,** WPA/TVA Archives, presented courtesy of the William S. Webb Museum of Anthropology, University of Kentucky.

debitage, ceramic sherds, faunal bone, charcoal, and often covering several thermal features led to the conclusion that Adena mounds were constructed above habitation sites. Indeed, Webb frequently referred to such layers as the “old village” (e.g., Webb, 1940: 48; 1942: 307; 1959: 6) or “village midden” (Webb, 1940: 48; 1942: 307; 1943b: 604). For Webb, the spatial association between mounds and alleged residential sites was so strong that a mound whose fill contained ceramic sherds was interpreted as having been constructed within a village despite the absence of any underlying structural remains (e.g., Webb, 1943b; 1959). The equation of mound sites with residential sites enabled Webb and Snow to interpret clusters of earthworks as indicative of “extensive Adena communit[ies]” (1974: 29). Fischer (1974) took this association even further, suggesting that mounds were *always* associated with habitation sites and that seemingly isolated mounds must have an as-of-yet undetected residential site nearby. The spatial distribution of Adena mounds came to be considered as isomorphic with that of Adena villages. By extension, such mounds served as a form of village cemetery although not, as discussed above, one meant for the interment of the general populace.

The perception of mounds as village cemeteries implicitly associated the construction of such earthworks with a single social group. For example, while discussing the occurrences of several individuals interred within a single grave, Webb proposed retainer sacrifice as a possible explanation since he thought it unlikely that several people from the same village would have expired at approximately the same time (Webb & Snow 1974: 72). The possibility that such interments represented individuals derived from other residential groups appears not to have been considered. Elsewhere, Webb indicated that the number of mounds in a given location is indicative of how long the underlying village was occupied (Webb & Snow, 1974: 33), apparently assuming both continuity and unity in regards to the population responsible for the construction of such mounds. Dragoo off-handedly referred to an “ancestral burial mound” (1963: 208), which suggests that he, too, viewed mounds as pertaining to a single, apparently lineal, group. Adena mounds, then, were thought to be associated with a single social group, indicate the location of where that group resided, and provide a material signature of the duration for which such a location had been occupied.

Webb and Snow’s (1945) equation of earthworks with residential sites was based upon the incorporation of midden materials (specifically ceramics) into mound fill and the frequent occurrence of submound structural remains. Although reported by Mills (1902), the occurrence of ceramic materials in unquestionable burial association was so rare among sites attributed to Adena that Webb and Snow (1945) viewed the absence of ceramics as characteristic of Adena mortuary practices. In this way, ceramic sherds became the indicator par excellence of domestic activities and, therefore, of residential sites. For example, despite the presence of a submound structure, the paucity of ceramics recovered from the Crigler mound led Webb (1943a) to conjecture that this mound and its underlying structure were spatially isolated from any associated village. In contrast, and despite the absence of any structural remains, the Dover mound (15Ms27) was identified as having been constructed above a village site due to the presence of submound thermal features, faunal remains, and ceramic sherds (Webb, 1959). Thermal features containing faunal remains were also discovered beneath the Ricketts mound (15Mm3), but this mound was interpreted as having been located at a remove from the nearest village based on the near absence of ceramics (Funkhouser & Webb, 1935; Webb & Funkhouser, 1940). Distributional analyses of Adena ceramics have indicated that the occurrence of ceramic sherds throughout mound fill is patterned and likely represents the use of ceramic vessels during mortuary feasting (e.g., Clay, 1983; O'Malley, 1988). Such alternative explanations for the presence of ceramic materials, however, were not considered by Webb and colleagues. This resulted in the extension of the perceived domestic nature of ceramic sherds to other aspects of mound fill and submound features. Instead of mounds, as mortuary contexts, affecting the interpretation of ceramic sherds, the presence of ceramics, interpreted as residential debris, contributed to the equation of burial mounds and habitation sites.

The spatial association of earthworks and habitation sites is undermined not only by unraveling the mistaken identification of ceramics with habitation, but also by a closer examination of the submound structures themselves. Webb and Snow's (1945) statement that circular, paired-post structures with a diameter of less than 60 feet (18.29 meters) represent Adena houses contrasts with a number of their earlier interpretations. For example, while the post pattern underlying the Morgan Stone mound (15Bh15) was initially interpreted as the remains of a house (Webb, 1941b), the post pattern discovered beneath the larger of the Robbins mounds (15Be3), although structurally similar, was thought by Webb to have been "…erected to serve some public purpose or the needs of some public officer rather than as the living quarters of a single family" (Webb & Elliott 1942: 489). Similarly, the internal features and relatively larger diameter of the structure underlying the Crigler mound (15Be27) prompted Webb to suggest that it had served as a "council house" (1943a: 527). The internal features or, rather, lack thereof, of many submound structures may account for Webb's hesitancy to classify them as houses (later generalizations aside). As Clay (1986) points out, the assortment of cooking features and storage pits that would be expected to be associated with residential structures is conspicuously absent among Adena submound structures. This, in conjunction with the observation that Webb's (1941b) reconstruction of an Adena house is both architecturally unlikely and entirely distinct from archaeologically or ethno-historically known residential structures (Clay, 1986), renders the argument that submound post patterns represent Adena houses (and the spatial association between mortuary and residential sites) dubious, at best.

Seeman (1986) has suggested that the paired-post structures underlying Adena mounds are better interpreted as mortuaries, or charnel houses. This suggestion was not new - Webb had raised (and ultimately discarded) this possibility in reference to the structure beneath the Robbins mound (Webb & Elliott, 1942), while Fitting and Brose (1971) mentioned it in passing in a discussion of Ohio Adena sites. Seeman (1986), however, placed Adena mounds and associated structural remains within the context of local developmental sequences of mortuary practices, arguing that, in the Ohio Valley, a spatial separation of the living and the dead was in practice by the Late Archaic period and continued through Middle Woodland times. It was therefore more parsimonious to conclude that the structures underlying Adena mounds were associated with the mortuary aspect of mound construction than to posit that Adena societies anomalously interred their dead in the midst of their habitation sites. Although the specific interpretation of these structures as mortuaries has been questioned (e.g., Clay, 1986, 1987, 2009; Clay & Niquette, 1992; Purtill et al. 2014), there is a consensus that paired-post, circular structures (whether or not they are associated with mounds or other earthworks) are functionally distinct from residential structures and likely represent some form of ceremonial activity.

This interpretational shift, from dwellings to ceremonial structure, changed the predominant understanding of Adena residential patterns. The idea of permanent, stably located villages (e.g., Webb & Snow, 1945; Fischer, 1974) was no longer tenable, and the remaining archaeologically known habitation sites were suggestive of small, transient camps (e.g., Bush, 1975; Carskadden & Gregg, 1974; Grantz, 1986; Seeman, 1985; see Chapter 3 for further discussion). In the absence of any sites indicative of population concentration, Seeman suggested that mounds and mound-building provided a means of creating and maintaining social ties among a dispersed population:

> For reasons as yet unknown, it would seem that the seasonal fusing of the far-flung macroband itself could no longer serve as the major context for social integration and was replaced by the periodic visits of a small community to interact ceremonially with their honored dead, and more importantly, with each other. (1986:576)

In a related argument, Clay (1986) proposed that mounds (as well as the ceremonial structures that preceded them in many locations) acted as focal points for Adena social groups. After the establishment of a mound, the interment of the dead offered an opportunity for members of a dispersed local group to coalesce and therefore played a role in the maintenance of group identity. Noting that many Adena mounds contain artifacts manufactured in styles found throughout a broader region, Clay (1991, 2002) later suggested that mounds likely served multiple, neighboring groups and that mound-building functioned to aid in the creation of intergroup alliances as a means of buffering against subsistence shortfalls. The abandonment of the notion that Adena groups resided in permanent villages therefore led to an increase in the perceived importance of mounds and mound-building for group integration, so much so that this functional interpretation of burial mounds has become prevalent within Adena archaeology (e.g., Abrams, 1992a; Clay & Niquette, 1992; Mainfort, 1989; Railey, 1991; Seeman & Branch, 2006).

Counterintuitively, the decoupling of Adena mortuary sites from residential sites coincided with the suggestion that mound construction was associated with territoriality – an idea whose theoretical basis can be found within the work of Charles and Buikstra (1983) and Chapman (1981, 1995) who, in turn, draw upon the work of Renfrew (1976), Saxe (1970; Saxe & Gall 1977) and Goldstein (1976, 1981). Briefly, the work of these researchers argued that the establishment of formal cemeteries (e.g., burial mounds) is a form of corporate group behavior that is associated with the exclusive control of "crucial but restricted resources" (Goldstein 1976: 61, 1981:61) and, by extension, the land from which such resources are drawn (Chapman, 1981). Several researchers have offered analyses that seem to support the association of mounds with local groups occupying spatially restricted territories. Greber (2005), for instance, in a comparison of Hopewell and Adena mortuary practices within the Scioto drainage of Ohio, argued that the increased transportation cost of interring fleshed bodies combined with the apparent emphasis on inhumation exhibited by Adena mounds suggests that such mounds were the product of localized populations. Seeman has argued that both the number and spatial distribution of Adena mounds are indicative of "…small social groups and correspondingly small extractive territories" (1986: 576; see also Seeman & Branch, 2006). In the Hocking valley of Ohio, Waldron and Abrams (1999) found that many mounds were potentially intervisible – an observation that has led some researchers to infer a stable territorial arrangement for this region (e.g., Stump et al., 2005). Even prior to much of this research, however, the assumption that the construction of burial mounds involved some degree of territorial signaling had nearly become a truism within Adena archaeology – one that had been stated by a number of researchers (e.g., Abrams 1992a, b; Clay 1984, 1986; Crowell et al. 2005; Railey 1991; although see Clay 1991, 1992, 1998 for a more nuanced view) and often without citation. Although archaeological understanding of Adena residential patterns had undergone radical changes, Adena mounds came to be seen as marking territory.

Despite a drastic reformulation of the Adena concept as a whole, the association of Adena mounds with a single, stably located social group has remained remarkably pervasive (although see Clay, 1991, 2002 for suggestions that mound construction may have involved the cooperation of multiple social groups). Mounds have been thought of as cemeteries for centuries and, in their association with mortuary practices, it was assumed that mound construction must therefore be one means of group integration in the face of a socially disruptive event. With the discovery of submound post patterns and their interpretation as residential structures, mounds became associated with villages. The reinterpretation of submound structures and the consequent shift from thinking of Adena as settled in permanent villages to living in small, dispersed, and relatively mobile groups resulted in mound construction being viewed as one of the primary ways in which thinly spread social groups were brought together, thereby increasing the role of mounds in the creation and maintenance of social bonds. Mounds themselves became thought of, at least by some by researchers, as the fixed anchors around which group movement revolved (e.g., Clay, 1986, 1991, 2002). Surprisingly, the territorial aspect of mounds and mound construction only became emphasized with the reconceptualization of Adena groups as dispersed and mobile (e.g., Abrams, 1992a,b; Charles, 1992; Clay, 1991; Mainfort, 1989; Railey, 1991, 1996; Seeman & Branch, 2006; Shryock, 1987), finding justification in works drawing on ethnographic research linking the formation of cemeteries with the control of limited resources (e.g., Chapman, 1981; Charles & Buikstra, 1983) or, on occasion, more directly from discussions of human territoriality (e.g., Dyson-Hudson & Smith, 1978). Where assertions of territoriality would have made more sense when Adena populations were understood to be sedentary agriculturalists, such characterizations seem at odds with how they are currently conceptualized.

Conclusion

Although considered to be scientifically appropriate at the time, the manner in which the Adena concept was initially defined would be considered problematic by contemporary archaeological standards. Although Greenman (1932a) was fastidious in his comparison of the material traits exhibited by the Adena mound to those of other mortuary manifestations, the inclusion in his list of a number of highly generalized traits would eventually undermine any integrity that the Adena concept may have initially held. The iterative expansion and application of Greenman’s (1932a) trait list by Webb and colleagues (Webb & Baby, 1957; Webb & Snow, 1945) resulted in the depiction of a unitary people who were settled in villages and engaged in agriculture – a people whose way of life spread throughout and beyond the Ohio Valley and persisted relatively unchanged for several centuries. Growing dissatisfaction with the generality of the Adena trait list during the latter half of the twentieth century (e.g., Dragoo, 1963; Swartz, 1971) eventually led to its distillation and the reconceptualization of Adena as a spatiotemporally restricted suite of mortuary practices engaged in by numerous small-scale societies and characterized by local variations upon common themes.

Throughout this reformulation of the Adena concept, the ways in which archaeologists have approached Adena mounds themselves have exhibited a certain degree of obstinacy. Discussions involving possible indigenous, emic understandings of and rationales for mound construction such as those that have been presented for the Illinois and Ohio Hopewell (e.g., Bernardini & Carr 2005; Buikstra & Charles 1999; Buikstra et al. 1998; Carr 2008; Charles et al. 2004; Hall 1977, 1997) or for southeastern Archaic mound complexes (e.g., Clark 2004; Crothers 2004; Gibson 2004; Sassaman & Heckenberger 2004) have been conspicuously absent in Adena literature. Instead, interpretations of Adena mounds have remained primarily functional in nature, emphasizing group integration and, more recently, territoriality (e.g., Abrams, 1992a,b; Charles, 1992; Clay, 1991; Mainfort, 1989; Railey, 1991, 1996; Seeman & Branch, 2006; Shryock, 1987; although see Pacheco & Burks 2008 for a contradictory stance). The theoretical underpinning of the territorial interpretation of mounds, however, is based primarily on ethnographic studies of sedentary agriculturalists (e.g., Goldstein, 1976; Saxe, 1970). While Adena groups were once considered to fit this description, the reconceptualization of Adena suggests that the continued interpretation of Adena mounds as territorial markers may be unwarranted – a suggestion that is explored in depth in the following chapter.

CHAPTER 3

TERRITORIALITY AND THE ADENA ARCHAEOLOGICAL RECORD

Introduction

Human territoriality has been a contested topic in anthropology for more than a century (Kelly, 1995). Whereas early researchers (e.g., Morgan, 1985; Speck, 1915) tended to view it as an either/or proposition, ethnographic work conducted over the last century has indicated that territoriality is a fluid, contextually driven behavior. This chapter begins by presenting some of the more commonly cited models of human territoriality from the last half century before moving on to discuss the specific intellectual lineage underlying the archaeological association of burial mounds and territorial behavior as it has been developed in North America and abroad. The applicability of these models to Adena is then questioned with reference to the archaeological record. This chapter concludes with a discussion of the vastly different temporal scales over which territorial systems remain stable and monuments persist within a landscape as well as the implications of this temporal disjunction for archaeologists.

Common Conceptions of Territoriality in Anthropology

Due in large part to the work of Speck (1915) among Algonkian speakers of northeastern North America, the notion that most foraging societies held and defended well-defined territories was widespread in anthropology in the mid-twentieth century. Indeed, this idea was so embedded in the anthropological imagination that humans were held to be territorial by nature, therefore making territorial disputes and any resultant conflicts an inevitable aspect of the human condition (Kelly, 1995). When Leacock (1954) later argued that the family hunting territories identified by Speck were the result of European contact and the fur trade, it was symptomatic of a wider rejection by anthropologists of the position that humans are inherently territorial. This change in stance was brought to the fore during the “Man the Hunter” conference, where it became increasingly clear that different foraging societies enacted territorial behavior to various degrees, had institutionalized means of accessing resources located beyond their purported territorial boundaries, and often adjusted their territorial bounds, behavior, or both over time. Such variation led Lee to caution that “…if we find boundaries in a given case, we should not commit the frequent error of assuming that they enclose a defended and exclusive territory” (Hiatt et al., 1968: 157). Given the observed variability in territorial behavior, researchers became interested in how such behavior arises as well as what conditions allow its persistence or facilitate its decline.

One of the more influential models of human territoriality was that presented by Dyson-Hudson and Smith (1978). Defining territory as “an area occupied more or less exclusively by an individual or group by means of repulsion through overt defense or some form of communication” (Dyson-Hudson & Smith, 1978: 22), these researchers explicitly avoided the question of whether humans were inherently territorial, opting for a sociobiological approach to territoriality that hinges on the viability of resource defense. Territorial behavior, they contend, should be understood as the outcome of a cost-benefit scenario where the benefits of maintaining exclusive access to critical resources must outweigh the costs of maintaining exclusivity (e.g., time, energy, or risk involved in the defense of resources; the diversion of time and energy away from other necessary activities; and the potential drawbacks of relying on a limited geographic area for resource needs) (Dyson-Hudson & Smith, 1978:24). Given this cost-benefit framework, the foraging strategy adopted by a particular group should depend on the distribution in both time and space of the resources that they are exploiting:

> [A] territorial system is more likely under conditions of high density and predictability of critical resources. However, it must be noted that if a resource is so abundant that its availability or rate of capture is not in any way limiting to a population, then there is no benefit to be gained by its defense and territoriality is not expected to occur. With relatively scarce but still predictable resources, large home ranges with some degree of overlap would be expected. With unpredictability of resources above a certain threshold, a territorial tie to a fixed area is not economically defendable, and the degree of movement in foraging over a large area must increase (nomadism). Depending on the average density of resources within a patch, unpredictable resources are most efficiently exploited by communal sharing of information (high average density) or by a high amount of dispersion (low average density). (Dyson-Hudson & Smith, 1978:25)

This proposed relationship between foraging strategy and resource distribution is schematically represented in Figure 5. Important to any application of Dyson-Hudson and Smith's model is their observation that resources are differentially distributed in both space and time and, therefore, will be defended differently, if at all. Furthermore,

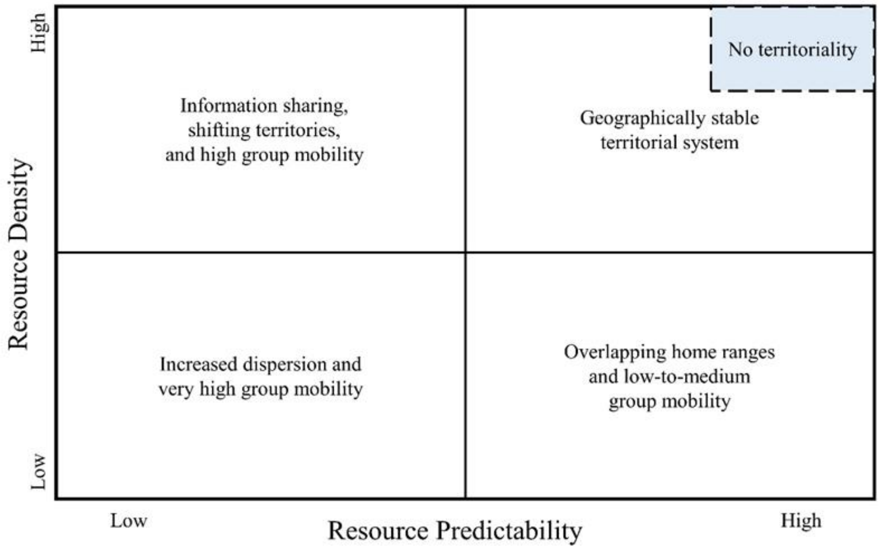


Figure 5. Relationship between resource distribution and foraging strategy (adapted from Dyson-Hudson & Smith, 1978: 26). Note that sufficiently dense and predictable resources are predicted to obviate the need for territorial behavior.

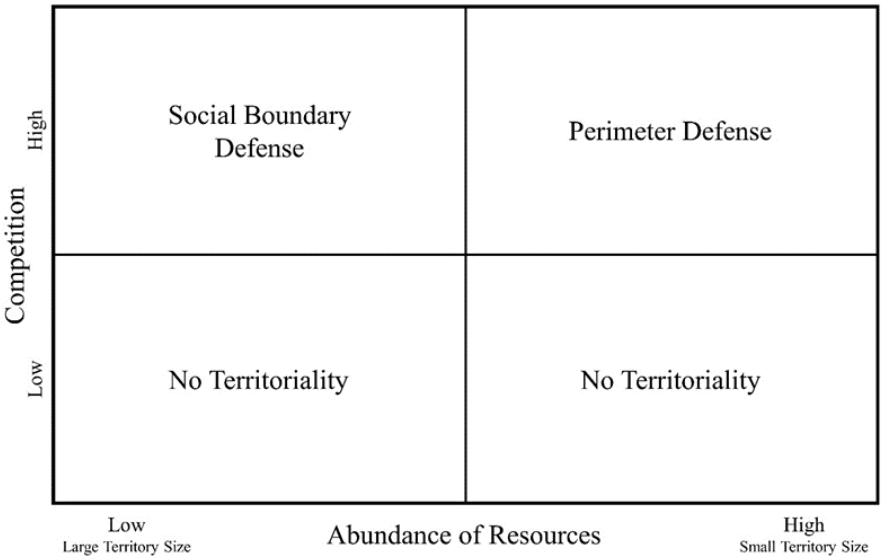


Figure 6. Relationship between resource abundance, competition, and the form in which territoriality is expected to manifest under Cashdan's (1983) model (adapted from Cashdan, 1983: 63). Note that, according to Cashdan (1983), the absence of competition results in situations where no territorial behavior is evident.

territorial behavior may be seasonal in nature, or may develop or disappear rapidly in response to changes in the spatio-temporal distribution of resources (Dyson-Hudson & Smith, 1978:23, 36). Because of this, Dyson-Hudson and Smith caution that “describing the behavior of a particular human group as ‘territorial’ or ‘nonterritorial’ can therefore be overly simplistic” (1978:37).

Among foraging societies of the Kalahari, however, the groups that exhibited the most territorial behavior were those in areas where resources were both sparse and unpredictable (Cashdan, 1983). Noting that this situation contradicted the model proposed by Dyson-Hudson and Smith (1978), Cashdan (1983) suggested that the cultural behaviors and values of humans may alter the ways in which the costs and benefits of resource defense are calculated, thereby making the application of models of territorial behavior derived from studies of non-human animals both inadvisable and inadequate. Drawing on the work of Carpenter and MacMillan (1976), Cashdan defines territoriality as “the maintenance of an area ‘within which the resident controls or restricts use of one or more environmental resources’” (1983:47) and contends that human groups have two distinct modes of engaging in such behavior. The first mode of human territoriality, which Cashdan terms *perimeter defense*, involves controlling access to the land itself. It is this kind of territorial behavior that most closely resembles that described in ethological studies and, Cashdan argues, groups participating in territorial systems involving perimeter defense should more or less conform to sociobiological models of territoriality such as that presented by Dyson-Hudson and Smith (1978). As resources become increasingly scarce or, alternatively, as their predictability decreases, territory size will increase and the costs associated with perimeter defense will eventually outweigh the benefits. At this threshold, Cashdan (1983) contends that forager groups will adopt a different mode of territorial behavior – what she describes as *social boundary defense*.

Whereas perimeter defense controls access to an area of land, social boundary defense controls access to the land-holding group itself. Since the rights to use local resources are vested in the social group occupying an area, rights of access to resources can then be obtained through various institutionalized means such as greeting ceremonies, marriage alliances, fictive kinship, exchange relationships, and systems of inheritance. Such reciprocal relationships allow for the formation of social groups where different members have access to distinct combinations of territories and, by extension, the resources that they contain. This promotes flux within social group membership as individuals frequently leave to visit other groups with which they have institutionalized ties. The result is a situation in which, at any given moment, a particular territory will likely be occupied by members of several different social groups. Such a situation, as Cashdan (1983) readily admits, initially appears as though it were non-territorial. In that access to resources is the result of an individual's participation in a network of relationships, however, social boundary defense is a viable means of resource control and therefore, by Cashdan's (1983) stated definition, a form of territoriality.

Cashdan argues that "territory size determines the *type* of territoriality, while competition for resources determines the *degree* of territorial exclusion" (1983:63). Territory size, however, is held to be a function of both the abundance and the predictability of resources. Where resources are both abundant and predictable, territories will be smaller in size. If there is also competition for those resources, then forager groups are expected to employ perimeter defense. As resources become either scarcer or less predictable, territory size will increase and, given sufficient population pressure to warrant competition for those resources, forager groups will engage in some form of social boundary defense. In situations in which there is little competition for resources, regardless of resource abundance or predictability, then territorial behavior is expected to be absent (see Figure 6). Cashdan's (1983) model makes explicit a point that is mentioned but left unelaborated in sociobiological models of human territoriality (e.g., Dyson-Hudson & Smith, 1978): the degree to which a forager group engages in territorial behavior depends on the amount of competition that exists for a given resource or set of resources. Multiple groups can occupy the same geographic area yet, if they are each exploiting different resources, or if resources are so abundant as to obviate competition for them, territorial behavior may never manifest.

One of the reasons that social boundary defense is effective is that the exchange of information between social groups can be mutually advantageous in marginal environments (Cashdan, 1983). It is this communicative aspect of territorial behavior that is emphasized by Ingold (1986). In contrast to Cashdan's (1983) conclusions, however, Ingold does not see territoriality as a means of controlling access to resources but rather as a form of cooperation: "…territorial behavior is basically a mode of communication, serving to convey information about the location of individuals dispersed in space" (Ingold, 1986:133). Through engaging in territorial behavior, social groups ensure that they are not simultaneously exploiting the resources in a given area or moving into an area in which the resources have already been depleted by another group. By distributing populations throughout a landscape, territoriality increases foraging efficiency. In common with the discussions of both Dyson-Hudson and Smith (1978) and Cashdan (1983), Ingold emphasizes that territorial behavior can be either engaged in or abandoned as ecological circumstances change over time.

Ingold draws a distinction between this conceptualization of territoriality and *tenure*, which he describes as "…a mode of appropriation, by which persons exert claims over resources dispersed in space" (1986:133). It should be noted that, within this framework, the models of both Dyson-Hudson and Smith (1978) and Cashdan (1983) are technically describing patterns of tenure among human foraging groups. According to Ingold (1986), tenure can take one of three forms: zero-dimensional, or tenure pertaining to particular places; one-dimensional, which refers to paths or tracks; and two-dimensional, involving claims to areas of land. Ingold (1986) asserts that anthropologists frequently mistake zero- or one-dimensional systems of tenure for two-dimensional systems, often resulting in claims of territoriality among foraging societies that do not meet stated expectations of exclusivity regarding access to resources. He suggests that "…tenure in hunting and gathering societies is not of surface area, but *of sites and paths within a landscape*" (Ingold, 1986: 153, emphasis in original), a conclusion that has found support in recent ethnographic work utilizing global positioning system (GPS) survey data (Albert & Le Tourneau, 2007).

Seeking a conceptualization of human territoriality equally applicable across multiple social and spatial scales, Sack defines it as "…the attempt to affect, influence, or control actions and interactions (of people, things, and relationships) by asserting and attempting to enforce control over a geographic area" (1983:55). According to Sack (1983), all manifestations of human territoriality involve at least the potential for the following three actions: classification, communication, and enforcement. Classification, in this framework, is spatial. A region is designated within which all things pertain to one category (e.g., “mine”) and outside of which all things pertain to a separate category (e.g., “theirs”). Territorial communication minimally involves the designation of a territory’s boundaries, but can include other forms of communication as well. Lastly, territorial enforcement refers to the maintenance of control over a given territory. Aside from providing the potential for classification, communication, and enforcement, territoriality may also reify power relationships, ameliorate social tensions by masking extant power dynamics, provide a sense of spatial identity, conceptually segregate objects from the space in which they are found, and beget more territoriality (Sack, 1983). In contrast to researchers who view territorial behavior as a response to ecological and demographic variables, Sack (1983) stresses that territoriality is a conscious act and, as such, can result from myriad motivating factors.

Although brief, the foregoing presentation of various anthropological approaches to human territoriality highlights the different ways in which this subject is understood. Where some researchers see territorial behavior as the result of environmental factors such as resource availability, others see territoriality primarily as a response to competition for resources and/or as a means of intergroup cooperation. Still other scholars see territorial behavior as motivated by the goals and desires of conscious actors. The diversity in how human territoriality is both defined and understood makes use of the term inherently vague unless a specific definition is provided. Given that the association of monuments with territoriality stems from a particular intellectual lineage, the question of whether Adena mounds served as territorial markers hinges on the understanding of territoriality that is embedded in that literature. As discussed in more detail below, it is the sociobiological model of human territoriality articulated by Dyson-Hudson and Smith (1978) that is implicit in the argumentation underlying assertions of Adena territoriality. As such, the definition of territorial behavior employed in this research falls in line with both that of Dyson-Hudson and Smith (1978) and that provided by Charles and Buikstra (1983): territoriality is the tendency of a group to occupy and maintain exclusive access to specific geographic areas and the resources they contain.

Adena Mounds as Territorial Markers

The assertion that burial mounds served a territorial function among Adena societies has become commonplace – so much so that the idea is often expressed as a truism and presented without citation (e.g., Abrams, 1992b; Clay, 1986; Crowell et al., 2005; Seeman, 1986). When citations *are* provided (e.g., Railey, 1991; Seeman & Branch, 2006), they include the work of Charles and Buikstra (1983) as well as Chapman (1981) who, in turn, rely heavily on the work of Saxe (1970), Goldstein (1976, 1981), and Renfrew (1976). As unlikely as it sounds, then, the association of monuments with territoriality stems in part from ethnographic research in the highlands of New Guinea. Working among the Mae Enga (sedentary horticulturalists whose “clan territories are staunchly defended and guarded” [Goldstein, 1976: 40]), Meggitt (1965a) noted an association between the scarcity of land and an increased emphasis on agnatic descent. Such emphasis often took the form of mortuary practices that legitimized a group’s access to limited land resources by tying its living members to a deceased ancestor

(Meggitt, 1965b). This ethnographic linkage between limited resources and the emphasis of lineal descent within mortuary practices was the inspiration for Saxe's Hypothesis #8:

> To the degree that corporate 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. (1970:119)

Saxe goes on to define a "formal disposal area" as a "permanently specialized, bounded territorial area such as a 'cemetery'" and to suggest that "…as the importance of lineality or corporateness decreases, or the resource base shifts to less restricted, we would expect the disposal areas to become less specialized…" (1970: 119). This hypothesis was evaluated by Saxe using a limited ethnographic sample of three societies and found to be generally supported.

The framing of Saxe's eighth hypothesis, however, involved a number of departures from Meggitt's original observations. Although downplayed by Saxe as "merely carr[ying] Meggitt's formulation one step further" (1970: 121), these alterations were later critically evaluated by Goldstein (1976). Goldstein (1976) questioned the specificity of Saxe's hypothesis in regards to his reduction of the emphasis on descent from an ancestor (or group thereof) to the establishment of a formal area for the disposal of the dead. At the same time, Goldstein (1976) expressed concern over Saxe's replacement of "land" with "vital resources," suggesting that the specific relationship between sedentism, land as a restricted resource, and the ritualization of ancestral rights to the land as observed by Meggitt (1965a,b) may not be generalizable to more mobile societies. Despite these reservations, the potential archaeological utility of the converse of Saxe's Hypothesis #8 prompted Goldstein (1976) to investigate its performance using ethnographic data drawn from a sample of 30 different societies. The results of her evaluation of Saxe's hypothesis led to her tripartite reformulation of it, or what is now commonly referred to as the Saxe-Goldstein hypothesis:

> 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.
>
> B. If a permanent, specialized bounded area for the exclusive disposal of the 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, 1976:61; 1981:61, emphasis in original)

Importantly, both Saxe’s (1970) original hypothesis and Goldstein’s (1976, 1981) reformulation of it were intended as a means of inferring aspects of social organization from the archaeological record. Territoriality is not mentioned aside from within Saxe’s vague definition of a formal disposal area, where it appears that the term “territorial” is meant to denote a region in space.

Although coeval with Goldstein’s evaluation of Saxe’s work, the inception of the association between monumentality and territoriality occurred on the other side of the Atlantic. Despite historical antecedents tying the placement of family tombs to the legitimation of land rights (see Morris, 1991), Renfrew (1976) was the first to explicitly link the construction of monuments to the marking of territories. Territorial behavior, according to Renfrew, “implies the habitual use of a specific, localised area which constitutes the sphere of influence of the individual or the group. Often foreigners are excluded from this territory and from access to its resources” (1976: 205). As such, territoriality is often accompanied by a spatially-anchored sense of group identity. Among segmentary societies, Renfrew suggests that this sense of group identity was ritually reaffirmed and that such rituals were enacted near the center of the region occupied by a given group. These locations often exhibited some form of cultural elaboration and the construction of monuments was one way among many to mark the significance of such places. Monuments, therefore, would have functioned as territorial markers by materializing a given group’s sense of spatial identity. Such a function would only be enhanced when a monument doubled as a place of burial. In support of this argument, Renfrew (1976) draws on a single ethnographic example – the stone *marae* of the Tuamoto Islands.

Renfrew (1976) provides a series of caveats to the territorial interpretation of monuments. First, the use of monuments to infer territorial spacing should not be undertaken if there is any evidence that such sites were enmeshed in a hierarchical social formation. In other words, each monument should reasonably be attributable to a separate social group of equal political standing to its neighbors. Further, monuments that acted as territorial markers should exhibit fairly regular spacing, provided that the monuments being examined were all contemporaneous. At the same time, however, Renfrew (1976: 211) suggests that monuments that appear to indicate territorial spacing were likely used simultaneously. This latter suggestion fails to take into account that the places where prior monuments had been constructed may be avoided for reasons other than active occupation by a rival group. Renfrew (1976) applied this argumentation to the spatial distribution of megaliths on the Scottish islands of Rousay and Arran in order to suggest that the initial appearance of monuments among the small-scale segmentary societies of this region indicated increased territoriality resulting from population stress consequent to the adoption of agriculture.

Chapman (1981) wove the works of Saxe (1970), Goldstein (1976), and Renfrew (1976) into a single narrative by suggesting that Mesolithic groups took advantage of resource-rich areas such as estuaries, peninsulas, straits, and islands to become increasingly sedentary. The combination of sedentism and abundant resources resulted in population growth and, consequently, population stress. This, in turn, led to the emergence of formal areas for the disposal of the dead as a means to claim both resources and land. Where Renfrew (1976) specifically linked monumental construction to territoriality, Chapman (1981) sees monuments as a specific manifestation of the formal disposal areas discussed by Saxe (1970) and Goldstein (1976) and thereby extends Renfrew's territoriality thesis to include non-monumental mortuary features. Monumental constructions, he suggested, likely represent a difference of degree, not of kind, and may result from situations in which relatively greater population pressure necessitated a more visible means of marking territory.

In North American archaeology, the linkage between monumentality and territoriality was first made by Charles and Buikstra (1983), who drew upon the selection of works discussed above. Beginning their discussion with a review of the Saxe-Goldstein hypothesis, these authors go on to generate four additional postulates:

> 1. Utilization of formal cemetery areas will correlate with sedentary subsistence strategies employed by the group(s) using the cemetery.
> 2. The degree of spatial structuring present in the mortuary domain will correlate with the degree of competition among groups for crucial resources.
> 3. Within the larger society, corporate groups will be distinguished by inclusion in separate cemeteries or in spatially distinct areas within a single cemetery.
> 4. Inclusion of individuals in the cemetery implies inclusion of those individuals in the corporate group. (Charles & Buikstra, 1983: 119-120)

The first of these postulates – that cemetery formation is correlated with sedentism – is crucial to their argument that Archaic burial mounds can be understood as territorial markers. Noting the discrepancy between the ethnographic models drawn on by Saxe (1970) and Goldstein (1976, 1981) and Archaic populations (the majority of the former are sedentary agriculturalists, and the latter are foraging societies), Charles and Buikstra (1983) suggest that the relative density of resources available in the Illinois Valley allowed for a fairly sedentary existence – a situation without parallel among modern hunter-gatherers who tend to persist in marginalized environments. Sedentism allowed for the formation of corporate groups and thus resulted in the use of bounded cemeteries. Citing the work of Dyson-Hudson and Smith (1978), Charles and Buikstra (1983) argue that a stable and predictable resource base should produce a fairly stable territorial system. Given the combination of sedentism, the existence of corporate groups (as inferred by the presence of bounded cemeteries in the form of burial mounds), and the prediction of a stable territorial system, Charles and Buikstra (1983) follow Chapman (1981) and suggest that the appearance of bluff top mounds was related to resource competition and consequent territoriality.

Given the above derivation of the association between monumentality and territoriality, the assertion that Adena mounds functioned (at least in part) as territorial markers (e.g., Abrams, 1992b; Clay, 1986; Crowell et al., 2005; Seeman, 1986; Seeman & Branch, 2006) rests on three assumptions. First, in order to satisfy the conditions of the Saxe-Goldstein hypothesis, Adena mounds must be considered as "…permanent, specialized, bounded area[s] for the exclusive disposal of their dead" (Goldstein, 1976:61). Second, the citation of Dyson-Hudson and Smith's (1978) sociobiological model of human territoriality by Charles and Buikstra (1983) necessitates that the resource base exploited by Adena peoples be both dense and predictable. Lastly, the linkage between territorial behavior and the construction of monuments is an elision of the ideas presented by both Chapman (1981) and Charles and Buikstra (1983).

Sedentism, which plays a key role in the models of these authors as well as those of their intellectual predecessors, is necessary for the association to retain its validity. While Charles and Buikstra (1983) were explicit in providing their reasoning as to why Archaic populations in the Illinois Valley could be considered sedentary and therefore amenable to the models of Saxe (1970), Goldstein (1976), Renfrew (1976), and Chapman (1981), a similar argument has yet to be made for Adena. To evaluate whether these assumptions are warranted, we must turn to the Adena archaeological record.

Archaeological Ambiguities

Assumption 1: Applicability of the Saxe-Goldstein hypothesis.

Earthen mounds, including those later attributed to Adena, have been interpreted as repositories for the dead for more than two centuries (Norona, 1953). From the earliest investigations, excavators of Adena mounds focused on the recovery and description of graves and their contents (e.g., Greenman, 1932; Mills, 1902; Norona, 1953). Likely influenced by this methodological emphasis, Webb and Snow explicitly stated that the "primary purpose of mound[s] [was] to cover burials," and included this as a defining trait of Adena (1974:16, Trait 22). Dragoo expressed a similar sentiment, referring to such monuments as "ancestral burial mound[s]" (1963:208). That Adena mounds functioned as mortuary contexts is unquestionable. That they functioned as "…permanent, specialized, bounded area[s] for the exclusive disposal of [the] dead" (Goldstein, 1976:61) is a different matter.

Throughout the history of Adena research, there has been a strict analytical separation between mortuary and domestic activities. The unprecedented methodological rigor of the WPA-funded excavations resulted in the documentation of a number of mound features that had previously been poorly known. Among these were the frequent inclusion of debitage, ceramic sherds, faunal bone, and charcoal within mound fill as well as the occurrence of submound thermal features and structural remains. These were considered by Webb and colleagues to be the remains of residential villages and their associated midden materials, fortuitously preserved by but ultimately unrelated to the process of mound construction and associated mortuary practices (Webb, 1940, 1941a,b, 1942, 1943a,b; Webb & Elliott, 1942; Webb & Snow, 1945). Whereas Webb and colleagues saw mounds and residential sites as spatially coincident but temporally disjunct, later researchers saw Adena as the continuance of a Late Archaic pattern involving the geographic separation of the living and the dead. As such, structural remains came to be interpreted as charnel houses and so-called midden materials became evidence of mortuary feasting or other forms of graveside ritual (e.g., Clay, 1983; O'Malley, 1988; Seeman, 1986). In both cases, mounds continued to be understood as solely associated with the disposal of the dead – first through the dismissal of archaeological evidence for other activities as incidental inclusions from earlier events and later by means of reinterpreting such evidence to be indicative of ancillary mortuary practices.

The idea that Adena mounds were intended to be repositories for the dead is so pervasive that it has been invoked even in the absence of evidence for formal graves. In the Upper Scioto River Valley of central Ohio, for example, the Arthur James, Bagley, La Moreaux, and White II mounds were built over post patterns but contained only fragments of cremated human bone scattered throughout their fill (Hays, 1994; Potter, 1971). These sites have been interpreted to represent a two-stage mortuary program in which individuals were either interred in pits or left exposed on scaffolds during the process of decomposition before later being exhumed, cremated, and ultimately either scattered or redeposited elsewhere (Hays, 1994). Although these sites are considered to be a distinct regional variant of Adena mortuary practices, similar suggestions have been made regarding the discovery of four open-air paired-post circles at the Niebert Site and their association with the nearby Kirk and Newman mounds in Mason County, West Virginia (Clay & Niquette, 1992). The smaller of the Robbins mounds, located in Boone County, Kentucky, is reported to have contained evidence of a single, collapsed Adena tomb. The tomb contained no evidence of logs, bark, or human remains, but did produce a single copper bracelet (Webb & Elliott, 1942). Although Webb held this paucity of archaeological remains to be the result of taphonomic processes, the absence of any organic material despite the capacity of copper for preservation suggests that such remains may have simply been absent. It seems, then, that at least *some* mounds were not intended to be sites for the permanent deposition of the dead, but rather temporary layovers within a longer postmortem trajectory.

This possibility is further supported by ample evidence suggesting that long-term exposure of and/or access to remains was a prominent feature of the Adena mortuary program. Several individuals have been recovered who exhibit the application of various pigments (graphite and red ochre) directly to their skeletal elements (e.g., Mills, 1902; Webb, 1940, 1943a; Webb & Haag, 1947). Further, comparison of the observed and expected frequencies of skeletal elements based on their respective bone densities suggests that postmortem manipulation of skeletal remains, including the intentional removal of portions of the skeleton, was a common occurrence within Adena mortuary practices (Fenton, 1991). Such postmortem manipulation may have been facilitated through the use of roofed tombs (e.g., Greenman, 1932; Webb, 1940, 1943a; Webb & Elliott, 1942) but other, less archaeologically visible means of maintaining access to the deceased may also have been employed. Webb and Snow (1945) speculated that cremation followed by off-mound deposition was the most common treatment of the dead among Adena societies whereas log tombs and mound burial were reserved for individuals of higher status. The above evidence of prolonged interaction between the living and the dead, however, suggests that the difference between off-mound cremation and within-mound inhumation may not be relative social standing, but rather the degree of progression through an extended mortuary program. Similar conclusions have been reached by both Mainfort (1989) and Clay and Niquette (1992), who speculated that some mounds were used in the processing of the dead rather than their permanent disposal. Extended and repeated interaction with the dead, removal of skeletal elements, and the possibility that mound interment was a transitory state for many individuals suggest that certainly some (if not most) Adena mounds were sites involved in more than just the “exclusive” disposal of the dead (Goldstein, 1976: 61).

Hall (1979, 1997) has proposed that the use of water-laden soils in mound construction may be a reference to an early version of the Earth Diver creation myth. This idea has been applied to Hopewell archaeology by several researchers (e.g., Buikstra et al., 1998; Carr, 2008; Sunderhaus & Blosser, 2006), but has had little impact on interpretations of Adena mounds. The use of wet clays, often bearing the impression of coarse grasses, leaves, and twigs suggesting derivation from nearby marshlands or riverbanks, is common in the construction of Adena mounds (e.g., Bache & Satterthwaite 1930; Hemmings 1978; Webb 1940, 1941a, 1942, 1953; Webb & Elliott 1942). Webb (1945) has suggested that such impressions may reflect the method in which loads of earth were transported to the site or, more practically, resulted from the use of grass and twigs to provide traction on the clay's slick surface during mound construction. Given Hall's (1979, 1997) proposal, however, the use of subaqueous sediments in mound building may indicate that the construction of an Adena mound was, in part, a reenactment of the creation of the world. Therefore, mound construction would not have solely been for the interment of the dead but would also have been implicated in world renewal.

The interpretation of Adena mounds as territorial markers relies, in part, on the applicability of the Saxe-Goldstein hypothesis. For this hypothesis to apply, Adena mounds should represent "…permanent, specialized, bounded area[s] for the exclusive disposal of [the] dead" (Goldstein, 1976:61). As discussed above, there is evidence that at least some burial mounds were not intended to be final resting places for the deceased, but rather represent one stage in an extended mortuary program. Further, the postmortem manipulation of the dead and the use of clays derived from marshes and riverbanks suggest that mound construction may have served purposes beyond simply the interment of the dead. Although Adena mounds were unquestionably involved in mortuary practices, it is possible that they were neither intended to be permanent facilities for the disposal of the dead nor used exclusively for that purpose. As Charles points out, "…there is no a priori basis on which to assume that all the activities that took place in a particular location are directly related to funerary ritual. Westminster Abbey contains the remains of British monarchs, Isaac Newton, Charles Darwin, and others, but it was not specifically constructed as a monument to the dead" (2005:16). The degree to which Adena mounds meet the criteria of the Saxe-Goldstein hypothesis is therefore uncertain.

Assumption 2: Density and predictability of the resource base. Charles and Buikstra (1983), in drawing on the sociobiological model of forager territoriality presented by Dyson-Hudson and Smith (1978), make the argument that resources in the Illinois Valley were sufficiently dense and predictable to both allow for sedentism and support a stable territorial system. The extension of their proposition that burial mounds serve, in part, as territorial markers to Adena implicitly makes a similar statement. Fairly little can be said, however, about the subsistence activities of Adena groups. In part, this is because most excavations have dealt with mound contexts and many of these sites were excavated prior to the development of flotation techniques. Further, neither faunal remains nor carbonized plant remains were typically collected during the WPA excavations and even those samples that arrived at the laboratory were rarely retained (Milner & Smith 1998:4). Despite these shortcomings, early impressions were that Adena societies engaged in agriculture. At the time, this was based on the observation that "…they elected to live in such fertile rolling valleys instead of in the rough hill country or the more heavily wooded-country…" (Webb & Funkhouser, 1940: 264-265). This suggestion found tentative support with the discovery of a corn cob within mound fill – a discovery that prompted Webb and Snow to state that maize was used by Adena groups (1945: 312). Although the corn cob was later determined to be intrusive, a fair amount of reliable subsistence data had been derived from mound and rockshelter excavations by the time of Webb and Baby's (1957) second expansion of the Adena trait list. The picture that had begun to form was of a hunting and gathering economy, supplemented by small-scale horticulture. Faunal exploitation focused primarily on white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*) while also incorporating several species of small mammals and fish. Plant remains indicated heavy reliance on hickory (*Carya* sp.) and black walnut (*Juglans nigra*), with supplementation by species which have since come to be recognized as indigenous cultigens, including goosefoot (*Chenopodium berlandieri*), marshelder or sumpweed (*Iva annua*), maygrass (*Phalaris caroliniana*), squash (*Cucurbita pepo*), and sunflower (*Helianthus annuus*) (Goslin 1957).

The excavation of several open-air, non-mound locations that are contemporary with Adena ceremonialism basically confirms this picture. Although the soils at the Crawford-Grist Site #2 in Fayette County, Pennsylvania, were too acidic for the adequate preservation of faunal material, there is some scant evidence for the exploitation of freshwater mussels as well as fish, although specific species were not identifiable (Grantz 1986:16). Slightly better evidence for faunal exploitation was recovered from the Locust Site in Muskingum County, Ohio, where there is evidence for the exploitation of shellfish as well as mammalian fauna, but the only identifiable species deriving from Early Woodland contexts (estimated to date between 150 B.C. – A.D. 100 based on ceramic affiliation) is white-tailed deer (Seeman, 1985). Deer and turtle were both recovered from the Niebert Site in Mason County, West Virginia (Niquette & Clay, 1989), and white-tailed deer and freshwater mollusks are reported from the Boudinot #4 site in Athens County, Ohio (Abrams, 1989a). There is also evidence for dog consumption, among other faunal species, from the Middle Woodland component of the Miller site in Garrard County, Kentucky (Applegate, 2008).

Hickory nuts are fairly ubiquitous at habitation sites attributed to Adena, having been found at Crawford-Grist #2 (Grantz, 1986), the Locust Site (Seeman, 1985), Boudinot #4 (Abrams, 1989a; Wymer & Abrams, 2003), and Niebert (Wymer 1989:137) as well as the Buckmeyer site in Perry County, Ohio (Bush 1975), the Duncan Falls site in Muskingum County, Ohio (Carskadden & Gregg 1974), and the Calloway site, in Martin County, Kentucky (Niquette et al. 1987). Black walnut was also common, with remains having been recovered from Duncan Falls, Boudinot #4, Calloway, Locust, and Niebert. So many nutshells were recovered from Duncan Falls, in fact, that the excavators suggested that the site's occupants emphasized the collection and storage of nuts (Carskadden & Gregg 1974:4). Other kinds of nuts recovered include acorn (*Quercus* sp.) at Crawford-Grist #2, Calloway, and Niebert; hazelnut (*Corylus* sp.) from Calloway and Niebert; and chestnut (*Castanea* sp.) from Calloway and Locust. Other wild plant remains include *Rubus* species (likely either blackberry or raspberry) and pokeweed (*Phytolacca*) berries from Crawford-Grist #2, persimmon (*Diospyros virginiana*) from Calloway, and red mulberry (*Morus rubra*) from Niebert. In addition, honey locust (*Gleditsia triacanthos*), grape (*Vitis* sp.), and sumac (*Rhus* sp.) seeds were recovered from Calloway and Niebert, with sumac also being recovered from the Locust site.

Members of the Eastern Agricultural Complex (EAC) were also found at several of these sites. Goosefoot and knotweed (*Polygonum erectum*) were recovered from Crawford-Grist #2 and goosefoot, maygrass, knotweed, and sumpweed were recovered from the Early Woodland component at the Locust site as well as from Boudinot #4, with increasing diversity over time observed at the latter (Crowell et al. 2005:95; Wymer & Abrams, 2003). At Niebert, members of the EAC account for 31.48% of the identifiable seed assemblage from Middle Woodland contexts (defined for Niebert as 400 B.C. – A.D. 400 [Niquette & Clay 1989:15]). Although dominated by goosefoot and maygrass, squash, sunflower, and sumpweed were also present in the Niebert assemblage, along with a single specimen of little barley (*Hordeum pusillum*) (Wymer 1989:141). In Kentucky, there is evidence for the utilization of goosefoot, sumpweed, and sunflower from the Miller site, goosefoot and maygrass from the Calloway site and the Hayes site in Carroll County, and maygrass and squash from the Gate Eleven site in Madison County, Kentucky (Applegate, 2008; Niquette et al., 1987). Despite each of these species having been cultivated, the degree to which their representation at these sites represents horticultural activity or the utilization of wild species is often unclear (e.g., Seeman 1985:89-90; Wymer 1989:141).

Recent excavations indicate that a large variety of plants were used in ceremonial contexts as well. The Amburgey site is located in Montgomery County, Kentucky. Although unassociated with a mound and producing some artifacts that are more typically associated with Hopewell, it has been interpreted as a ceremonial structure coeval with the Wright mounds (Richmond & Kerr, 2005). Various features and postmolds at Amburgey have yielded seeds representing members of the EAC, including goosefoot, knotweed, marshelder, and squash. The low count of these seeds, however, has led to the suggestion that they likely represent the remains of wild plants and not the domesticated varieties (Richmond & Kerr, 2005:80). A number of other species were also represented, including purslane (*Portulaca oleracea*), oxalis (*Oxalis stricta*), dock (*Rumex* sp.), bedstraw (*Galium trifidium*), sticky catchfly (*Silene antirrhina*), chokeberry (*Aronia* sp.), eastern redbud (*Cercis canadensis*), St. John's wort (*Hypericum* sp.), and pokeweed. Ethnographic evidence indicates that, aside from their utility as subsistence resources, purslane and oxalis had medicinal applications. Medicinal uses are recorded for bedstraw and sticky catchfly, as well, with the former also being utilized as an incense (Richmond & Kerr, 2005). Erect knotweed, goosefoot, maygrass, sunflower, and marshelder were also recovered from the Walker-Noe site, a small mound located on a tributary of Paint Lick Creek in Kentucky, as well as the remains of hickory, black walnut, butternut, pecan (*Carya illinoinensis*), acorn, sumac, grape, persimmon, honey locust, and blackberry (Pollack et al., 2005). Given their context, such remains may indicate feasting or, possibly, some other ceremonial use.

The evidence for the use of wild resources by Adena populations fits comfortably within its broader spatiotemporal context. Archaeological remains of the Late Archaic Riverton Culture in the central Wabash Valley indicate focal exploitation of both deer and turkey (Winters, 1969), and this pattern is replicated by contemporaneous populations along the Green River, in Kentucky (Marquardt & Watson, 1983, 2005; Pedde & Prufer, 2001; Winters, 1974), and in the Hocking Valley of Ohio (Heyman et al., 2005). Shellfish were heavily utilized where available as well as a wide variety of smaller game (Heyman et al., 2005; Marquardt & Watson, 1983, 2005; Pedde & Prufer, 2001; Winters, 1969, 1974). Later in time, Hopewell populations in the Scioto drainage of Ohio also relied heavily on deer, small mammals, and mollusks as well as various species of fish, turtles, and birds. Of the latter, turkey, ducks, and geese appear to have been taken most often (Carr, 2008b). The exploitation of wild plant species exhibits continuity throughout time, as well. Nuts, especially hickory, walnuts, and acorns, were an important resource for Late Archaic and Middle Woodland populations throughout the region and wild seed assemblages from both time periods include persimmon, blackberry or raspberry, grape, honey locust, pokeberry, sumac, and other species (Carr, 2008b; Marquardt & Watson, 1983, 2005; Patton & Curran, 2016; Pecora & Burks, 2005; Pedde & Prufer, 2001; Winters, 1969, 1974; Wymer, 1987, 1992).

While members of the EAC have been recovered from many sites temporally associated with Adena (e.g., Abrams, 1989a; Applegate, 2008; Crowell et al., 2005; Goslin, 1957; Grantz, 1986; Niquette & Clay, 1989; Pollack et al., 2005; Richmond & Kerr, 2005; Seeman, 1985; Wymer, 1989; Wymer & Abrams, 2003), the overall contribution of these plants to Adena subsistence practices is unclear. Early excavations of sites attributed to the Riverton Culture of the Late Archaic indicated that the importance of EAC crops was minimal and the appearance of goosefoot and knotweed likely represented the utilization of weedy varieties (Winters, 1969). Recent analyses of soil samples from these sites, however, indicates that at least five different domesticates (thin-testa chenopod, pale-seeded chenopod, bottle gourd, marshelder, and sunflower, and possibly *Cucurbita pepo* and little barley) were utilized by Riverton populations, forming what Smith and Yarnell (2009) refer to as an initial crop complex (ICC). The abundance and variety of other subsistence remains at Riverton sites, however, led Smith and Yarnell to conclude that the appearance of a domesticated crop complex represented "an integrated and additive expansion and enhancement of preexisting hunting and gathering economies" (2009:6566). Analysis of the assemblages derived from the County Home site confirms the cultivation of a comparable ICC by Late Archaic populations of the

Hocking Valley, Ohio. Similar to Riverton, the presence of such seed crops seems to indicate the augmentation of the existing subsistence base rather than the substitution of horticulture for hunting and gathering (Patton & Curran, 2016). In contrast, and although weedy progenitors of EAC crops such as chenopod, knotweed, sunflower, and little barley were present, it appears that the only species cultivated by the Green River inhabitants was a variety of squash, likely *Cucurbita pepo* var. *ovifera* (Jefferies, 2008; Marquardt & Watson 1983, 2005; Pedde & Prufer, 2001). The earliest and most abundant evidence for indigenous cultivation in Kentucky comes from upland rockshelters and caves (Gremillion, 1994; Jefferies, 2008), where the large number of domesticated seeds has been interpreted as representing the storage of food for lean winters or as insurance against nut mast failure (Gremillion, 2002, 2004). In general, it appears that populations temporally precedent to Adena ceremonialism utilized domesticated plants primarily to bolster their existing subsistence adaptations and thus engaged in horticultural activities to differing degrees.

Domesticated members of the EAC appear to have played a much larger role in the subsistence practices of Middle Woodland populations in the Scioto drainage and surrounding areas, making up approximately 70 to 80 percent of the seed assemblages from these sites (Wymer, 1992; Wymer & Abrams, 2003). While such abundance of domesticated seeds has led some researchers to conclude that Hopewell populations are best characterized as farmers (e.g., Wymer, 1996) others have continued to argue that food production played only a minor role in Hopewellian subsistence patterns (e.g., Yerkes, 2006). The latter arguments have been made primarily on the basis of a lack of evidence that Hopewell groups invested substantial time in food production as well as the conspicuous absence of agricultural implements from the Middle Woodland archaeological record. Recent experimental work, however, has suggested that the domesticated varieties of EAC crops require human intervention to thrive (Patton, 2016) and this result seems to be confirmed by the fact that prehistoric cultigens are genetically distinct from extant species, indicating that cultivated species became extinct when no longer tended (Wymer, 2016). These findings would suggest at least moderate time investment in the cultivation of EAC crops on the part of prehistoric populations. In addition, the kinds of seed coat changes seen in members of the EAC is the result of garden competition, an observation that Wymer (2016) uses to argue that such indigenous cultigens were staples of the Hopewellian diet. While Wymer (cited in Carr, 2008b) has proposed that EAC crops account for between 30 to 50 percent of the annual diet, Carr (2008b) has suggested that this estimate should be closer to 25 percent. He justified this adjustment primarily through reference to estimates of Mississippian reliance on maize agriculture, historic accounts of Central Algonkin tribes, long-standing consistencies in wild resource utilization, a lack of agricultural implements in the archaeological record of this time period, and the scarcity of storage pits within Scioto Hopewellian and Licking drainage domestic contexts, which he takes to be indicative of limited agricultural production (Carr 2008b:82-84). Therefore, although indigenous cultigens were relied upon much more heavily during the Middle Woodland than the Late Archaic, they likely remained supplementary to foraged foods.

Despite a paucity of subsistence evidence from habitation sites demonstrably associated with Adena ceremonialism, it is reasonable to assume that Adena use of cultivated plants lies somewhere between the level exhibited by Late Archaic populations and that proposed for the Middle Woodland. Although it has been estimated that garden production accounted for approximately 66% of the diet of Late Archaic individuals recovered from Salts Cave, Kentucky (Yarnell, 1974a), it is likely that this estimate, derived from the results of analyses of mummified intestinal contents as well as paleofeces (Stewart, 1974; Yarnell, 1974b), reflects either a specialized diet used by these mirabilite miners or, alternatively, the seasonal consumption of stored foods (Schoenwetter, 1974). The latter explanation finds support in the work of Gremillion (2002, 2004), who suggested that the abundance of starchy seeds recovered from Late Archaic rockshelter sites in Kentucky is an artifact of the exceptional preservation of such settings as well as seed storage for use during colder months rather than the intensity of their exploitation. A more telling comparison is offered by Wymer and Abrams (2003), who report that EAC members account for approximately 15 to 20 percent of seed assemblages that are roughly contemporaneous with Adena ceremonialism – an amount that is less than one-third of their contribution to subsequent Middle Woodland assemblages. If it is reasonable to assume that seed assemblages from both time periods are subject to similar preservation biases, then this suggests that indigenous cultigens accounted for approximately eight to 15 percent of the annual diet of Adena populations.

The sociobiological model of human territoriality proposed by Dyson-Hudson and Smith (1978) and drawn upon by Charles and Buikstra (1983) indicates that a geographically stable territorial system is expected to arise in situations in which resource distribution is both dense and predictable. The available evidence suggests that wild resources, both hunted and gathered, composed the bulk of the annual diet of Adena populations. Of these, white-tailed deer, turkey, and various nut species appear to have been of primary importance. Nut yields, however, are inconsistent from year to year (Ford, 1979) and, furthermore, provide an important food resource for both deer and turkey during the fall. This suggests that sporadic failures of a nut crop could lead to seasonal shortages of favored faunal resources, as well. Pacheco and Dancey (2006) have suggested that, for Hopewell groups, such subsistence shortfalls would have been buffered by exploitation of other plant and animal species as well as the use of indigenous cultigens, effectively producing a dense and predictable, albeit dispersed, resource base. Adena populations, however, appear to have relied substantially less on domesticated plants than has been suggested for the Hopewell. Consequently, the seasonal variability in nut yields and the attendant effects on faunal availability may have reduced resource predictability for Adena groups. According to Dyson-Hudson and Smith (1978), the combination of dense resource distributions with unpredictable yields typically produces systems involving information sharing, shifting territories, and increased group mobility. In reality, this situation was probably more complex. Seasonal variations in resource availability as well as longer temporal cycles likely produced ecological settings which alternated between supporting a stable territorial system and necessitating shifting territorial formations and higher mobility. The degree to which Adena populations engaged in territorial behavior is therefore likely to have been both geographically and temporally variable. As a result, the blanket characterization of Adena mounds as serving a territorial function is questionable.

Assumption 3: Sedentism.

The Saxe-Goldstein hypothesis is based on ethnographic observations drawn from societies that were primarily characterized as sedentary agriculturalists. In fact, only six of the 30 groups used by Goldstein to evaluate and refine Saxe's original formulation are described as "nomadic" or "semi-nomadic" (Goldstein 1976:50-54). In her critique of Saxe's (1970) initial work, Goldstein is careful to note that "…he does not consider the effect that mobility may have on the hypothesis" (1976:39) and, in her summary of her own findings, she notes that the use of formal cemeteries was exclusively associated with agricultural societies, none of which were mobile (1976:49). The applicability of the Saxe-Goldstein hypothesis to more mobile groups is therefore unknown and sedentism consequently plays a key role in the models of Chapman (1981) and Charles and Buikstra (1983). Although Webb believed that the circular post patterns discovered underlying some Adena mounds represented the remains of houses (e.g., Webb 1940, 1943a, 1943b; Webb & Elliott 1942; Webb & Snow 1945), subsequent reinterpretations of such structures (e.g., Clay, 1986, 1987, 1991, 1998; Purtill et al., 2014; Seeman, 1986) suggest that their use was specialized and not associated with domestic activities. Webb's (1945) characterization of the Adena as sedentary is therefore rendered moot and an evaluation of the degree to which Adena groups engaged in sedentism must rely instead on contemporary, although not demonstrably affiliated, habitation sites.

Sedentism, by which is meant year-long residence at a particular site, is one extreme on a continuum of mobility patterns. Archaeological correlates of sedentism include "a full range of seasonal subsistence indicators, the presence of storage facilities, the presence of domestic dwellings, the rebuilding of houses on the same location, and a diverse artifact assemblage indicative of a variety of procurement, maintenance, and processing activities" (Clay & Creasman 1999:1-2). Further, it can be expected that the longer a structure is to be occupied, the more robust its components will be and the more energy will be expended in its construction (Abrams, 1989b; Abrams & Patton, 2015; Clay & Creasman, 1999). Circular structures, for example, typically require substantially less time and investment of energy to construct than rectangular ones and, as such, the latter tend to be associated with relatively longer periods of residence (Abrams & Patton, 2015; Whiting & Ayres, 1968). In assessing the duration of occupation of habitation sites roughly coeval with the construction of Adena mounds, the following discussion will emphasize indicators of seasonality as well as the presence and characteristics of any domestic structural remains.

Although subsistence data from Duncan Falls is limited to quantities of charred nutshell, some of which seems to have been stored, Carskadden and Gregg (1974) suggested that the archaeological remains from the site indicated a series of fall occupations. Subsistence data from the Buckmeyer site is likewise scant, but, again, the presence of charred hickory shell could suggest a fall occupation (Bush 1975). Both early summer products (e.g., maygrass) and mid-fall products (e.g., nuts and sumpweed) were present in Early Woodland contexts at the Locust site, a situation that prompted Seeman (1985) to suggest either multi-season occupation of the site or the existence of food storage. The botanical remains from Crawford-Grist #2 suggested a minimum occupation of late summer through late fall or early winter, but faunal indicators of seasonality are absent (Grantz 1986), and the same could be said for the Calloway site (Niquette et al. 1987). Subsistence remains from the Boudinot #4 site were not well discussed, but the presence of hickory nuts may again indicate fall harvesting (Abrams 1989) and more recent research has suggested that Boudinot #4 was likely occupied on a seasonal basis in the spring and the fall (Crowell et al. 2005). Botanical remains from the Niebert site spanned from late spring to late fall in their availability (Wymer 1989). It should be noted, however, that virtually all of the botanical remains from these sites had the possibility of being stored for later consumption, thus making this particular class of evidence a weak indication of seasonality (Niquette et al. 1987; Winters 1969).

Duncan Falls yielded 20 post molds, and the excavators suggested that eight of these were loosely aligned in an arc that, if completed, would have had a diameter of between 11.6 and 12.2 meters. They were careful to note, however, that gaps in the pattern may indicate that this was merely a windbreak or some other temporary shelter. No dimensions for the post molds were provided (Carskadden & Gregg 1974). At the Buckmeyer site, 23 post molds were discovered. Nine of these formed a circular pattern approximately 10.1 meters in diameter, but with most post molds separated by 3 or 3.5 meters. Four more post molds, possibly roof supports, were located in the interior of the structure, and a series of eight post molds seems to have formed a concentric screen to the south of the circular structure. The Buckmeyer post molds varied in depth from 17.8 to 61 cm, and averaged 12.7 cm in diameter (Bush 1975). Only five post molds were uncovered at Locust, and no structural patterns were identified (Seeman 1985). Seventeen post molds were identified at Crawford-Grist #2, and these ranged in depth from 10 to 16 centimeters below the plow zone and averaged 10 to 15 centimeters in diameter. Although no house patterns were noted, Grantz suggested that they might represent windbreaks or temporary structures (1986). Only three post molds were found at Boudinot #4, and these range from six to 14 cm in depth below the plow zone and from seven to 10 cm in diameter. Although no pattern was evident in their distribution, Abrams suggested that they represented part of a residential structure (1989). No structures at any of these sites exhibit any evidence of rebuilding.

A number of sites with structural remains have been documented within the Kentucky Bluegrass, as well. The Early Woodland component of the Stone site, in Clark County, produced post-molds arranged in a circular pattern with a diameter of 4.5 meters. This structure was associated with a hearth as well as multiple external pits, likely used for cooking (Applegate, 2008) and has been interpreted as representing a short-term occupation, indicative of relatively mobile hunter-gatherers (Jefferies, 2008). A circular structure with a diameter approximately twice that of the structure at Stone was discovered at the Grayson site, in Carter County. Grayson was interpreted to be a seasonal encampment (Applegate, 2008). In Lewis County, on the floodplain of the Ohio River, a number of residential structures have been recovered. Site 15Lw302A had four post molds arranged in an arc, while site 15Lw314C has evidence of several structures that have been interpreted as lean-tos. Site 15Lw316A produced evidence of two separate structures, somewhat separated in time, with the earlier structure being circular in shape and the later one consisting of 17 post molds arranged in a semi-circle. A cluster of post molds from site 15Lw301C may represent the corner of a rectilinear structure and remains from site 15Lw353 suggest the presence of a house floor surrounded by eight post molds arranged in a rectilinear pattern (Abrams, 2008). If this collection of sites is contemporary, then it may represent a large, dispersed community. Associated artifacts, however, as well as a smattering of radiocarbon dates and no evidence for rebuilding, suggest that many of these structures were not contemporaneous and instead indicate intermittent occupation of the same area.

The occurrence of at least one and possibly two rectangular structures in Lewis County is notable, especially since artifacts associated with these structures suggest that they are Middle Woodland in age. If these structures are, in fact, later than the nearby circular and semi-circular post patterns, then this change in structural arrangement may be indicative of increasing sedentism. Such a pattern has been suggested for the Hocking Valley of Ohio. Structural remains from the Early Woodland Patton 3 site provide strong evidence for a change in the form of domestic architecture with circular forms being supplanted by larger and more robust rectangular forms constructed using wattle and daub. This rectangular pattern continued to be used through the Late Woodland period in this area, with later examples, such as the Patton I and Allen sites, exhibiting internal and external hearths, distinct work areas, and evidence for several episodes of rebuilding. Such domestic buildings have been interpreted as enabling year-round residence and up to 20 years of relatively continuous occupation (Abrams & Patton, 2015; Patton, 2016; Weaver et al., 2011). In the Hocking Valley, then, there is strong evidence that populations were becoming increasingly sedentary at roughly the same time that Adena mounds began appearing in numbers.

Regionally, however, this does not appear to be the case. Most habitation sites that are coeval with Adena ceremonialism have produced subsistence remains that are seasonally restricted, ambiguous, or both. While storage pits have been tentatively identified at some sites (e.g., Duncan Falls [Carskadden & Gregg, 1974], Crawford-Grist #2 [Grantz, 1986], and Calloway [Niquette et al., 1987]), they lack the substantial character of those discovered at, for example, Robeson Hills, associated with the Late Archaic Riverton Culture (Winters, 1969). Robeson Hills, however, was interpreted to be a winter encampment and so the differing character of the storage pits may be better interpreted as an indicator of seasonality than as signaling a prolonged period of occupation. Although the structural remains from the Hocking Valley (and possibly Lewis County, Kentucky) present conspicuous exceptions, the vast majority of post patterns, where present, represent either circular structures or the construction of lean-tos, both of which are typically associated with higher mobility and shorter durations of occupation. To date, no structures have been discovered that are remotely comparable to those from the Hopewell habitation site of Brown's Bottom #1 (Pacheco et al., 2009a), where the remains of white-tailed deer indicate year-round exploitation of this species (Pacheco, personal communication, 2012) or the nearby Lady's Run site (Pacheco et al., 2009b). Mickelson (2002), in a recent analysis of the changing distributions of site types in eastern Kentucky, has suggested that populations were shifting from employing strategies of residential mobility to those of logistical mobility (sensu Binford, 1980). This characterization, however, is probably overly simplistic as his analysis relies primarily on site size and artifact diversity and does not appear to take evidence for occupational duration into account. In a recent survey of domestic architecture from the Early and Middle Woodland periods across the whole of Kentucky, Applegate suggests that "In most cases, Early-Middle Woodland settlement strategies involved residential mobility, with relatively short-term occupations spanning several weeks to several months. There is little indication of year-round habitation of domestic sites" (2013:43). She concludes that "Logistical mobility associated with a collector subsistence strategy best characterizes the nature of Early-Middle Woodland settlement across Kentucky" (2013:43). The available evidence is most consistent with local groups occupying sites on a seasonal basis before changing locations.

Available evidence regarding populations contemporary with Adena ceremonialism suggests that they engaged in sedentism to varying degrees. In the Hocking Valley, there are good indications of prolonged occupation of the same sites, coincident with an increasing use of domesticated plants. In the Kentucky Bluegrass, arguably the core area of Adena ceremonialism as defined and elaborated by Webb (Webb & Baby, 1957; Webb & Snow, 1945), the archaeological record has produced no comparable signs of decreasing mobility. Sites in this area are instead indicative of short-term occupations and the only signs of substantial architecture are associated with structures commonly interpreted to be ceremonial. While this does not preclude the possibility that local groups maintained some form of home range within which they conducted their seasonal rounds, neither does it lead inevitably to such a conclusion. As with the preceding discussion of subsistence practices and resource exploitation, the degree to which Adena populations can be characterized as sedentary seems to exhibit both geographic and temporal variability. In turn, this suggests that many Adena mounds will not meet the criteria necessitated by the models of both Chapman (1981) and Charles and Buikstra (1983) that link the construction of burial monuments to territorial behavior.

Summary.

Review of the archaeological evidence currently available suggests that the interpretation of Adena mounds as territorial markers may be unwarranted. Although such mounds were undeniably involved in the mortuary program of groups participating in Adena ceremonialism, there is some indication that many mounds were not used solely for the disposal of the deceased and, furthermore, that mound interment may in some cases have represented a hiatus in an extended process of interaction with the dead. The degree to which Adena mounds fit the description of "…permanent, specialized, bounded area[s] for the exclusive disposal of their dead" (Goldstein, 1976:61) necessitated by the Saxe-Goldstein hypothesis is therefore questionable. Floral and faunal remains indicate a subsistence adaptation primarily based on hunting and gathering (with focal species including white-tailed deer, turkey, and hickory nuts) supplemented by regionally variable, but limited, cultivation of members of the Eastern Agricultural Complex. Based on the sociobiological model of human territoriality underpinning the linkage of territorial behavior to the construction of monuments, the exploitation of such resources, assuming some degree of temporal and geographic flux in their availability, would likely have resulted in cycling between the establishment of stable territorial systems and circumstances necessitating an increase in group mobility and accompanied by frequent shifts in the size and location of territories (Dyson-Hudson & Smith, 1978). Subsistence and structural remains suggest regionally variable mobility patterns, with populations in the Hocking Valley exhibiting increased sedentism while those in the Kentucky Bluegrass are characterized by short-term occupations and higher mobility. Since sedentism is a key factor in the theoretical models associating monumentality and territoriality (Chapman, 1981; Charles & Buikstra, 1983; Renfrew, 1976), this suggests that, while such models may be applicable in southeastern Ohio, their utility within the core area of Adena ceremonialism is an open question.

Discussion & Conclusion

A broader consideration of human territoriality suggests further problems with the interpretation of burial mounds as territorial markers. While the various anthropological approaches to the topic discussed earlier differ in their particular definitions of territoriality, there is a consensus that territorial behavior is contingent upon both cultural and ecological factors (Cashdan, 1983; Casimir, 1992; Dyson-Hudson & Smith, 1978; Ingold, 1986; Lovell, 1998; Rao, 1992; Sack, 1983). While this contingency is acknowledged by archaeological applications of territorial models (e.g., Chapman, 1995; Charles & Buikstra, 1983), little attention has been paid to the resulting temporal aspects of human territoriality (although see Van Valkenburgh & Osborne, 2013, for an admonishment concerning the unconsidered assessment of territorial behavior within archaeology). Given that territorial behavior is known to be at least partially determined by factors such as resource density and predictability (e.g., Dyson-Hudson & Smith, 1978) as well as population density and spatial structure (i.e., group size and aggregation) (Cashdan, 1983), it follows that different resources will be defended differently, if at all. Additionally, territorial behavior may be seasonal in nature, or can develop or disappear rapidly in response to changes in the spatio-temporal distribution of both resources and people (e.g., Beach et al., 1992; Casimir, 1992; Dyson-Hudson & Smith, 1978; Fowler, 1982; Leacock, 1954; Speck, 1915). Even in situations where territorial behavior itself is relatively constant, the areas of land occupied by foraging peoples shift in both size and location on a fairly regular basis and frequently within a matter of years (Helm, 1968; Ingold, 1986; Kelly, 1995). Human territoriality is therefore not an either/or proposition but rather a temporally restricted response to a particular arrangement of ecological and cultural variables.

With the adoption of interpretive frameworks influenced by practice and structuration theories (Bourdieu 1977; Giddens 1984), the prolonged temporality of monuments has been increasingly emphasized within archaeology. Previously, archaeologists tended to focus on episodes of construction, alteration, or abandonment within the lives of monuments (Barrett, 1999). Paradoxically, this emphasis on moments of change lead to static conceptions of both the monument itself and the landscape in which it was found. Conceived of as a succession of steady states without consideration of how they were engaged with and perceived in the interims, monuments and landscapes were taken out of context and consequently detached from their own history (Darvill, 1999). Recent work, however, has demonstrated a growing concern with the dynamism of both landscapes and monuments (e.g, Beneš & Zvelebil, 1999; Bradley, 1993, 2000; Cooney, 1999; Owoc, 2004; Pollard, 2004; Riordan, 2006). Like current conceptions of territoriality, contemporary understandings of monuments recognize their fluidity and potential to change over time.

The temporal scale over which forager territories shift, however, is very different from that of the construction and alteration of monuments. Where the spatial extent and location of forager territories typically changes within a matter of years (Helm, 1968; Ingold, 1986; Kelly, 1995), monuments persist for decades, and often centuries, between archaeologically observable alterations (e.g., Abrams, 1992a; Allen & Gardiner, 2002; Bradley, 1993; Riordan, 2006; Scarre, 2002). Moreover, monuments were often constructed at places that had prior significance (Bradley, 1993, 2000; Cooney, 1999;

Pollard, 2004) and such locations frequently remained important and were reutilized despite changing social and political configurations (Allen & Gardiner 2002; Bradley 1998, 2000). As Barrett (1988, 1994, 2001) pointed out, this implies that the meaning of a given monument is contextual – it derives from the kinds of social interactions in which it was involved at any given time; therefore, attributing a generalized territorial function to monuments strips them of their spatio-temporally specific meaning(s) (Hodder, 1984).

The internal structure of Adena mounds has frequently been described as "vertical" in its orientation (e.g., Clay, 1986; Greber, 1991, 2005), meaning that the superimposition of features is a common occurrence. The implications of this internal organization, however, have infrequently been addressed (although see Clay, 1986, 1987, 1998, 2002). As a result, archaeologists tend to view an Adena mound as a single site, while it might more appropriately be considered as an archaeological palimpsest – the cumulative manifestation of the sporadic use of a particular location over time. At both the Wright (15Mm6) and C & O (15Jo9) mounds, for example, Webb documented layers of humus between construction episodes, suggesting considerable hiatuses in mound construction (Webb, 1940, 1942). Dragoo (1963), too, documented the presence of a thick humus zone at the Cresap Mound and interpreted it to be indicative of the passage of a substantial amount of time between phases of mound-building. Likewise, the repeated construction of newer tombs in the depressions created by the collapse of older ones at the Robbins mound (15Be3) led Webb to posit a period of between 50 and 300 years for the duration of its construction (Webb & Elliott, 1942). Disparate radiocarbon dates from mound features at the Dover mound (15Ms27) suggest that approximately a century elapsed between construction episodes (Turnbow, 1981, cited in Hays, 1994:68).

While the latter estimate may be questioned due to the radiocarbon dating techniques of the time, the recovery of charred tree stumps approximately a foot in diameter at the interface between these construction episodes suggests that substantial time did, indeed, elapse (Webb, 1959:13). Furthermore, some Kentucky Adena mounds were constructed above pre-existing burials (e.g. Webb, 1942) and mounds were superimposed upon Archaic cemeteries at both the William Davis Mound in Ohio and the Cotiga Mound in West Virginia. Likewise, “intrusive” burials have been recovered from mounds in Kentucky (e.g. Webb, 1943a) as well as from the Willow Island Mound in West Virginia (Hemmings, 1978). These observations suggest that, despite changing social configurations, specific places exhibited long-term continuity within regional mortuary programs. The common characterization of Adena mounds as serving a territorial function may therefore be an inadequate representation of the ways in which different groups engaged with these monuments over time. Given the disparity between the tempo of territoriality and that of monumental construction and alteration, it may be more useful to characterize these mounds as “persistent places” (Schlanger, 1992), a concept that will be explored and expanded upon in the following chapter.

CHAPTER 4

(PERSISTENT) PLACES AND PERSONS

Introduction

As discussed in the previous chapter, there are widespread similarities in both mortuary practices and mound construction among Adena mounds. Further, many mounds exhibit evidence for discontinuous use while simultaneously indicating that certain locations were used repeatedly for interments over a long period of time. These aspects of Adena archaeology are not easily reconciled with an understanding of burial mounds as indicative of territorial behavior. It is the purpose of this chapter to provide an alternative interpretation of Adena mounds – as “persistent places” – that is more consistent with what is observed in the archaeological record. To do so, this chapter begins with a discussion and critique of the concept of persistent places as originally articulated by Schlanger (1992). Following this, approaches to the concept of place within humanist geography are detailed in order to develop an understanding of place as an emergent phenomena, one whose characteristics are dependent on perception and the localized interactions of people. The chapter then provides a discussion of the concept of personhood, contrasting the notion of person that is characteristic of modern Western society with those that have emerged from anthropological work among indigenous societies. An expanded definition of persistent places is developed from these alternative understandings of person and place and the concluding discussion explores its implications for our understanding of territorial behavior among foraging groups as well as its applicability to Adena archaeology.

Persistent Places

Schlanger defines a persistent place as “a place that is used repeatedly during the long-term occupation of a region” (1992: 92) – a definition that is overly vague and, given the lengths of time typically dealt with in archaeology, becomes so inclusive that it loses analytical utility. It is Schlanger’s categorization of persistent places that salvages the concept and provides some guidance as to its application within archaeology. According to Schlanger, there are three (often overlapping) types of persistent place:

> First, a persistent place may have unique qualities that make it particularly suited for certain activities, practices, or behaviors… Second, a persistent place may be marked by certain features that serve to focus reoccupations… Finally, persistent places may form on landscapes through a long process of occupation and revisitation that is independent of cultural features but is dependent on the presence of cultural materials. (Schlanger 1992: 97)

Although not explicitly addressed by Schlanger (1992), these three categories include situations in which the resettlement of a location is encouraged by local environmental changes that occur after its abandonment but result, in part, from its prior occupation (Binford, 1972). The persistence of a place, then, is the result of both the actions that it enables or constrains (in turn affected by actions previously undertaken at that location) and the resources that it provides.

To a certain extent, these ideas were articulated a decade earlier by Binford (1982), who noted that the view that archaeologists have of the past is derived from the depositional record at fixed locations within a broader landscape. Although Binford (1982) was more explicitly concerned with site patterning, particularly the ways in which changes to residential systems affect the utilization of different locations and the implications of this for interpretations of the archaeological record, he observed that specific places tended to be used more frequently than others and that these locations often provided access to certain resource(s) and/or facilitated some specific activity. Focused as he was on site patterning, Binford's (1982) discussion of changes in the use of certain places is inextricably tied to archaeological sites – to concentrations of cultural features and materials with defined spatio-temporal boundaries. It is here that one of the primary differences between Binford's (1982) presentation of an archaeology of place and Schlanger's (1992) articulation of persistent places can be found: persistent place, as a concept, is scale-free. The concept of persistent places was explicitly developed by Schlanger (1992) to incorporate both archaeological sites and isolated cultural features or artifacts within a single analytical framework. As such, persistent places can be identified at a variety of spatial scales, from large tracts of land incorporating multiple archaeological sites and/or diffuse artifact scatters (e.g., Littleton & Allen, 2007; Purtill, 2012; Schlanger, 1992; Schneider, 2015; Thompson, 2010) to single sites or specific features on the landscape, artificial or otherwise (e.g., di Lernia & Tafuri, 2013; Gamble, 2017; Moore, 2015; Schlanger, 1992). Further, Schlanger's emphasis on the repeated use of a location through time moves away from the temporal limits typically attached to a given site or its components and, instead, approaches persistent places as archaeological palimpsests – resulting from the superimposition of the material residue of multiple (and potentially unrelated) activities.

It is in the interaction of the layers of such palimpsests that Schlanger's (1992) concept of persistent places further differentiates itself from Binford's (1982) archaeology of place. Schlanger's categorization of persistent places makes it clear that the persistence of any given place is contingent upon at least three factors. First, a persistent place may result from "unique qualities that make it particularly suited for certain activities, practices, or behaviors" (Schlanger, 1992:92). Examples of such qualities include (but are certainly not limited to) arable soil, available shelter, passages through difficult terrain, and good vantage points. Second, the persistence of a place is affected by localized resource availability, such as springs, stands of timber, quarries or outcrops of valued minerals, places with an abundance of game, or even locations where a specific species can be exploited (e.g., eagle nesting locations). Lastly, human behavior undertaken at a certain location can affect its persistence by altering one or both of the first two factors. For example, the construction of a dwelling that is left intact after its abandonment creates a source of both shelter and raw materials for future inhabitants of the area. Alternatively, exhaustion of the soil through over-farming may render a region unusable, precipitating either its abandonment or a shift in its utilization. Through its explicit acknowledgment that the ways in which human populations engage with a given place are affected by that location's history and can, in turn, affect its future use, Schlanger's concept of persistent places effectively becomes a spatial application of practice and structuration theories (e.g., Bourdieu, 1977; Giddens, 1984) – a scale-free antecessor of more recent work falling under the rubric of landscape archaeology (e.g., Barrett, 1994, 1999a,b; Beneš and Zvelebil, 1999; Bradley, 1993, 1998a, 2000; Darvill, 1999; Edmonds, 1999; Evans, 1985; Tilley, 1994; Whittlesey, 2009; Zedeño, 2000).

Binford's archaeology of place deals largely with what he describes as the "economic potential" (1982: 20) of locations and how this changes as the result of increasing or decreasing residential mobility. In this, Schlanger's (1992) formulation of persistent places is not much of a departure from Binford's earlier work. Although her categorization of persistent places uses language that is broad enough to allow for other possibilities, the examples that she provides suggest that Schlanger understands the establishment and (dis)continuous use of such locations to result primarily from patterns of activity related to subsistence and/or resource extraction. In contrast to such an implicitly functionalist stance, much work within humanist geography holds that experience, perception, and memory are of at least equal importance to economic factors in both the process of place-making and the ways in which certain locations are used, reused, or avoided through time.

Place and Place-Making

The literature concerning place and place-making is both vast and diverse, with many different approaches to the subject taken both within and between academic disciplines. Williams (2012), however, contends that the majority of this work falls into one or more of three broad categories – approaches that she describes as positivist, cultural constructivist, and phenomenological. The positivist approach holds that place is inert, a mere backdrop for the more academically interesting behaviors of its various inhabitants (Williams, 2012). Under the influence of practice and structuration theories (e.g., Bourdieu, 1977; Giddens, 1984), positivist approaches to place have fallen out of favor within anthropology and will therefore not be considered within the following discussion. Instead, an emphasis will be placed on approaches to place that can be considered to be both cultural constructivist and phenomenological, primarily stemming from the humanist geography of the last three decades of the 20th century. These works contribute to theoretical elaborations within contemporary landscape archaeology as well as provide a basis for the expansion of the concept of persistent places.

Williams (2012) differentiates between cultural constructivist and phenomenological approaches to place primarily on the basis of three factors. First, constructivist approaches tend to view *place* as the particular, local derivatives of an abstract and universal *space*, whereas phenomenological approaches hold that place is primary and space is simultaneously a quality of place and the result of the relationships *between* places. Second, constructivists view place as a substrate upon which meanings are inscribed and social structures are built. Phenomenologists, on the other hand, attribute comparatively more agency to place, allowing for the ability of place to act on individuals or societies through means independent of the social constructions with which they are saddled. Third, Williams (2012) implicitly suggests that, within constructivist approaches, the experience of and interaction with place is filtered through the lens of culture. In contrast, phenomenological approaches to place hold that the physical body is the primary medium through which places are apprehended, understood, and experienced. While Williams (2012) readily admits that cultural constructivist and phenomenological approaches to place are not mutually exclusive; they are perhaps better conceptualized as poles on a continuum rather than distinct, albeit overlapping, categories. This is, in part, due to the widespread influence of the phenomenology of both Heidegger and Merleau-Ponty on theoretical approaches to place, especially those found within humanist geography.

In the widest sense, Heidegger defines a thing as anything “that is a something and not nothing” (1967: 6). While this definition is a bit murky, he uses it to encapsulate both the concrete (e.g., spear, bee, rock, engine) and the abstract (e.g., wishes, ideas, loyalties, quantities) and contends that all things have two common qualities. First, all things are located within space and time and, in part, defined by their coordinates within these matrices. Second, all things have properties. Such properties can be mutable (which, in itself, is a property), but it is in both the sum and the intersection of its particular properties that a thing comes to be. Further, a change in one thing’s properties may in turn cause changes in the properties of a different thing, the relationship between the two things being a shared, although not necessarily symmetric, property (Heidegger, 1967). Such a characterization of things implies that all things are relational – that they exist solely as a result of their relationships with other things and, further, that some properties of a thing are emergent and can only be known through its interaction with other things. As such, things, including places, *gather* – they bring into themselves the myriad relationships that they are a part of and are embedded in shifting networks of association (Heidegger, 1971). Merleau-Ponty reaches similar conclusions, asserting that

> The thing is inseparable from a person perceiving it, and can never be actually *in itself* because its articulations are those of our very existence, and because it stands at the other end of our gaze or at the terminus of a sensory exploration which invests it with humanity. To this extent, every perception is a communication or a communion, the taking up or completion by us of some extraneous intention or, on the other hand, the complete expression outside ourselves of our perceptual powers and a coition, so to speak, of our body with things. (Merleau-Ponty 1989:320, emphasis in original)

He goes on to state that “The thing and the world exist only in so far as they are experienced by me or by subjects like me, since they are both the concatenation of our perspectives, yet they transcend all perspectives because this chain is temporal and incomplete” (Merleau-Ponty 1989: 333). As things, places and the people experiencing them are mutually constituted. Places come into being as the result of both *how* they are *by* whom they are perceived.

It is the idea that place results from perception that has found wide purchase within humanist geography. Tuan emphasizes the role of experience in the perception of place, defining *experience* as “the various modes through which a person knows and constructs a reality” (1977: 8). Experience, for Tuan, is filtered through both thought and emotion as well as the physical senses. Further, experience is cumulative, both implicated in and resulting from a process of learning (Tuan, 1977), and thereby affected by the vagaries of memory and the process of remembering. The way in which an individual perceives a place, then, will be affected by that individual’s totality of experience and, consequently, no two individuals will perceive a place in exactly the same way. Godkin (1980), too, underscores the importance of experience in the perception of place, making explicit the ability of a given place, as a result of its inherent materiality, to evoke memories of other places and/or times, potentially affecting how it is perceived. Relph asserts that places "are constructed in our memories and affections through repeated encounters and complex associations" (1985: 26). Through their entanglement within such citational fields (*sensu* Jones, 2007), places become "reservoirs of significant life experiences lying at the center of a person's identity and sense of psychological well-being" (Godkin, 1980: 73) and, as a result, a person's sense of self becomes tied to their sense of place (Buttimer, 1980). As Basso notes, persons experiencing a given place

> …may also dwell on aspects of themselves, on sides and corners of their own evolving identities. For the self-conscious experience of place is inevitably a product and expression of the self whose experience it is, and therefore, unavoidably, the nature of that experience (its intentional thrust, its substantive content, its affective tones and colorings) is shaped at every turn by the personal and social biography of the one who sustains it… Place-based thoughts about the self lead commonly to thoughts of other things – other places, other people, other times, whole networks of associations that ramify unaccountably within the expanding spheres of awareness that they themselves engender.
>
> (Basso, 1996a: 55)

Basso refers to this process as one of “interanimation” (1996: 55). It is a process by which person makes place while place makes person.

It is, however, equally valid to say that *people* make places since the perception of place is an undertaking with both individual and collective components. Places are spatial anchors for networks of interaction (Buttimer, 1980), gathering things together that are both animate and inanimate as well as experiences, histories and ideas (Casey, 1996; Heidegger, 1971). The way that a given place is perceived and interacted with by one individual may affect the ways in which other individuals perceive and interact with that place (Relph, 1985; Stewart, 1996). As such, the character of a given place derives in part from interactions that occur far beyond the confines of its material components (Ingold, 1993; Seamon & Mugerauer, 1985). For example, the clear-cutting of a forest might be perceived as beneficial by farmers, enabling them to use that place for growing their crops, and simultaneously perceived to be detrimental by hunters or conservationists due to the consequent disruption of the biotic community. Alternatively, a location where a person experienced something traumatic may cause that place to be avoided by other individuals with knowledge of the event. Even the language that an individual speaks, often the consequence of the situation into which they were born, both constrains and enables their perception of place (Mugerauer, 1985). Seamon (1980) contends that the character of a place results in part from the concatenation of the habitual ways in which people interact with it. Places are therefore dynamic and emergent, exhibiting both continuity and change as the networks of interaction in which they are enmeshed are altered. It is this fusion of continuity and change that prompted Pred to assert that place is a process in which “thoughts, actions, experiences, and ascriptions of meaning are constantly *becoming*, through their involvement in the workings of society and its structural components as they express themselves in the becoming of places" (1985:338) or, in other words, "biographies are formed through the becoming of places, and places become through the formation of biographies" (1985:340). Places, emerging from the intersection of so many phenomenon, are historically contingent – no two places will ever be the same, nor is it likely that one place will be exactly the same at different points in time. That a particular place is both emergent and unique is also emphasized by Casey, who asserts that "rather than being one definite sort of thing – for example, physical, spiritual, cultural, social – a given place takes on the qualities of its occupants, reflecting these qualities in its own constitution and description and expressing them in its occurrence as an event: places not only *are,* they *happen*" (1996: 27, emphasis in original). An important implication of the conceptualization of place as both process (e.g., Pred, 1985) and event (e.g., Casey, 1996) is that all places will eventually come to an end – they are maintained only so long as the networks of interaction that produce them remain intact. Places can also be reborn, resurrected, and reincarnated as such networks reform, are renewed, or relocate.

As Williams (2012) has noted, these various approaches differ in the amount of agency that they ascribe to place, ranging from it being presented as a *tabula rasa* upon which meaning is inscribed to it achieving something akin to the secondary agency described by Gell (1998). While place and person are held to be mutually constituted, it is through perception that such constitution is understood to occur. Place, however, is never considered to be on the perceiving end of the relationship – it is always perceived. The construction of people by places is consistently held to be the result of a place's ability to evoke past experiences and other people. Bell (1997) goes so far as to suggest that the evocation of the presence of other people is a universal characteristic of place. Further, he suggests that such “ghosts of place” can derive from the past, present, or the future of a given place and may be either familiar or wholly unknown to those perceiving them. *Places*, as the approaches discussed above consistently make clear, have everything to do with *people* and the shifting networks of interaction in which they are embedded. This, however, begs the question: what is a person?

Persons, Human and Otherwise

For humanist geographers, this is a question that is left relatively unexamined. The implicit assumption in the works discussed above is that the category of *person* is coterminous with that of *human being*, but such a stance, as will be discussed below, is both historically contingent and but one of many that have been formulated within anthropology. A comprehensive review of conceptions of personhood would entail not only a lengthy discussion of how this topic has been approached within anthropology, philosophy, and studies of religion (e.g., Fowler, 2004; Hallowell, 1967; Jones, 2005; Lee, 1979; Mauss, 1985; Merleau-Ponty, 1989; Meskell & Joyce, 2003; Morris, 1991, 1994; Strathern, 1988; Winquist, 1998), but would also necessitate detours into the historical development and revival(s) of the concept of animacy within anthropology (e.g., Durkheim, 1915; Guthrie, 1993; Lévi-Strauss, 1962; Tylor, 1958 [1871]) as well as the relatively recent emergence within the same discipline of an emphasis on materiality (e.g., Gell, 1998; Jones, 2007; Thomas, 2007). As the focus here is on the articulation of person with place, such a discussion is beyond the scope of the current chapter.

Both *person* and *personhood* are terms that are rarely given adequate (if any) definition by those who employ them. In an effort to alleviate any ambiguity in the following discussion, the term *person* will be used to denote any entity that can intentionally engage in reciprocal social relationships. Being a person is therefore distinct from being an *agent*, where, taking Gell's definition of such to be typical, "An agent is one who 'causes events to happen' in their vicinity" albeit "not necessarily the specific events which were 'intended' by the agent" (1998:16). While all persons have the capacity to be agents, the converse does not hold true. *Personhood*, then, is simply the status of being a person. These definitions are both broad and innocuous enough to apply equally well throughout the following brief discussion concerning the characteristics assigned to persons, the ways in which the status of personhood is recognized, and, consequently, the kinds of entities to which this status applies.

Although having multiple origins, Descartes' famous dictum *je pense, donc je suis* is often held to be emblematic of the epistemological shift that ultimately resulted in the Enlightenment of 18th century Europe. Descartes' proposition that thinking and being are inextricably entwined stemmed from his employment of radical doubt to question the entirety of existence, ultimately locating the only certainty of being within his own consciousness – the subjectivity of the self (Winquist, 1998). This setting aside of the self eventually resulted in the opposition within post-Enlightenment thinking of mind and body, subject and object, and, through the elaboration of these, culture and nature. Such dualisms dovetailed with the opposition of spirit and flesh – fundamental to the Christian conceptualization of the Great Chain of Being – and its derivative, the separation of human from inhuman. A person, in this tradition, is coterminous with the self and, consequently, is unambiguously confined to one side of each of these dualisms. Further, as loci of rational consciousness, persons (human/mind/subject/culture) become points from which meanings emerge and relationships are constructed (Thomas, 2007). Thus, Mauss characterizes the Western conception of a person as “a rational substance, indivisible and individual” (1985:20). The equation of *person* with *human being* is therefore the product of a specific intellectual lineage – a cultural construct of post-Enlightenment Western society that is entangled with the similarly derived dualisms of mind and body, subject and object, nature and culture, and human and inhuman (Latour, 1993; Strathern, 1980).

It is against this foil of a bounded, self-contained, human individual that alternative conceptions of personhood have been articulated within anthropology, including that of the dividual as developed by Marriott (1976) and popularized by Strathern (1988). The concept of the dividual stems from the recognition that, in many societies, humans are understood to be composed of multiple parts, deriving and maintaining the substance(s) of their bodies through social interactions. Such persons have typically been characterized as either partible (e.g., Strathern, 1988) or permeable (e.g., Busby, 1997). Partible persons are conceptualized as internally divided, a composite of separable components that are each considered to be an objectification of a specific social relationship. Such components can be added, subtracted, and exchanged with the consequence that portions of a person may exist beyond the boundaries of the body. No such partitioning is possible within a permeable person, however, where, although bodily substances are understood to originate from different sources, such substances are blended together. The result is that, while the relative concentrations of the substances that constitute a person can be affected through engagement in social relationships, those substances cannot be precipitated from their internal solution and subsequently removed or exchanged, thereby confining the person to their body.

In its opposition to the concept of the individual, the dividual is likewise a product of Western intellectual discourse and a construct of modern anthropology. Further, dividuality and individuality are not mutually exclusive, but rather two poles of a continuum. LiPuma contends that all cultures will exhibit aspects of both:

> "…it is a misunderstanding to assume either that the social emerges out of individual actions, a powerful strain in Western ideology which has seeped into much of its scientific epistemology, or that the individual ever completely disappears by virtue of indigenous forms of relational totalization (such as those posited for certain New Guinea societies). It would seem rather that *persons emerge precisely from that tension between dividual and individual aspects/relations*. And the terms and conditions of this tension, and thus the kind (and range) of persons that it produces will vary historically." (LiPuma, 1998: 57, emphasis in original)

If this assertion is valid, then persons who can be characterized as pure dividuals or pure individuals do not exist. Rather, all persons are relational, differing only in the degree to which individual or dividual aspects of their personhood are emphasized and the contexts in which this occurs. To be a person therefore requires the presence of other persons, the perception of whom is an activity that is, in itself, culturally contingent.

Personhood, by virtue of it being defined within this discussion as the status of being a person, can be both ascribed and achieved (*sensu* Linton, 1936). As typically conceived in those disciplines influenced by post-Enlightenment thinking, personhood is an ascribed status, inherent in humans by virtue of their being fortunate enough to occupy the favored side of the opposition between subject and object and therefore possessing mind and/or soul in addition to body as well as culture in addition to nature. Moreover, personhood is actively denied to objects, including features of the physical environment, animals, plants, and sometimes – in certain contexts of colonialism, racism, and missionary activities – even to specific groups of humans. According to Viveiros de Castro (1998, 2004), however, the perception of personhood as pertaining solely to humanity is a matter of perspective. Contending that a near-universal trait of Amerindian ontologies is the assertion that the original state of all species was one of humanity, Viveiros de Castro claims that, in Amerindian experience, all living things share a common interiority, an anthropomorphic consciousness. Clarifying this statement, he asserts that animals (and, presumably, other living things) are not subjects because they have a human inner essence but, rather, are human because they have the potential to be subjects. Further, to be a subject, one must necessarily have a point of view – a perspective:

> Typically, in normal conditions, humans see humans as humans, animals as animals and spirits (if they see them) as spirits; however animals (predators) and spirits see humans as animals (as prey) to the same extent that animals (as prey) see humans as spirits or as animals (predators). By the same token, animals and

> spirits see themselves as humans: they perceive themselves as (or become) anthropomorphic beings when they are in their own houses or villages and they experience their own habits and characteristics in the form of culture – they see their food as human food (jaguars see blood as manioc beer, vultures see the maggots in rotting meat as grilled fish, etc.), they see their bodily attributes (fur, feathers, claws, beaks, etc.) as body decorations or cultural instruments, they see their social system as organized in the same way as human institutions are (with chiefs, shamans, ceremonies, exogamous moieties, etc.). (Viveiros de Castro 1998: 470)

Such perspectivism, as Viveiros de Castro (1998, 2004) refers to it, is therefore not a dissolution of the Western subject/object dualism but, rather, a statement that the assignment of something to either side of this opposition is relative to the stance of the observer. This is not an adoption of relativism, however, in that subjects each perceive their world in exactly the same way – it is simply that the roles within these worlds are filled by different constellations of subjects and objects. This unity of perceptions produced by a myriad of perspectives prompts Viveiros de Castro (1998, 2004) to suggest that, in contrast to the Western espousal of multiculturalism, Amerindian ontologies can be characterized as multinaturalist. The distinction between nature and culture is therefore retained while their roles are reversed – culture becomes the fixed substrate upon which nature is elaborated. As a result of this universalization of culture, all species are understood to see themselves as people. Viveiros de Castro goes on to note that many indigenous words that are glossed as meaning “people” (e.g., *wari’*, *dene*, or *masa*) are applicable to multiple classes of beings. Usage of such terms appears to be both contextual and reflexive, however, in that when "used by humans they denote human beings; used by peccaries, howler monkeys or beavers they self-refer to peccaries, howler monkeys or beavers" (Viveiros de Castro, 1998: 477). Therefore, from the point of view of any given species, personhood is ascribed to all of its members and (under most circumstances) seems not to be attributed to members of other species.

Other scholars, however, contend that many societies see personhood as emerging from a process of mutual engagement – a status that is achieved and, consequently, one that can be stripped from those who have achieved it. Ingold, drawing on ethnographic material pertaining to a range of hunting and gathering societies, contends that "the perception of the social world is grounded in the direct, mutually attentive involvement of self and other in shared contexts of experience…" (2000: 47). Working among the Nayaka of South India, Bird-David, too, sees mutuality as key to the recognition of personhood. Drawing on Strathern's (1988) rendering of the dividual, Bird-David (1999) creates the neologism "to dividuate" and sets it against the verb "to individuate," which she takes to denote the recognition of a person as a self-contained whole. To dividuate a person is then to be

> …conscious of how she relates with me. This is not to say that I am conscious of the relationship with her "in itself," as a thing. Rather, I am conscious of the *relatedness with* my interlocutor *as I engage with her*, attentive to what she does in relation to what I do, to how she talks and listens to me as I talk and listen to

> her, to what happens simultaneously and mutually to me, to her, to *us*. (Bird-David, 1999: S72, emphasis in original).

A similar situation seems to exist among the Yukaghirs of Siberia, where "…entities gain personhood by virtue of being practically bound up together within specific contexts of real-world engagement" (Willerslev, 2007: 118). Personhood in these contexts therefore not only requires the perception of other persons but also necessitates the active participation in and maintenance of social relations with them. To cease all such relations is to cede personhood.

Two different distributions of personhood result from its conceptualization as either ascribed or achieved. As articulated by Viveiros de Castro (1998, 2004), perspectivism holds that humans do not routinely recognize animals as persons, nor do animals typically acknowledge the personhood of humans: "Amerindians do not spontaneously see animals and other nonhumans as persons; the personhood or subjectivity of the latter is considered a nonevident aspect of them. It is necessary *to know how* to personify nonhumans, and it is necessary to personify them in *order to know*" (Viveiros de Castro, 2004: 469, emphasis in original). The personhood of each species is therefore kept separate, contained within its own distinct nature, and only rarely are they brought into alignment through the intentional adoption of alternative points of view. For Viveiros de Castro (1998, 2004), the ability to adopt a perspective lies within the mind, but the specificity of the point of view adopted is determined by the body that houses the consciousness. The body, however, extends beyond its physical form to encompass "an assemblage of affects or ways of being that constitute a *habitus*"

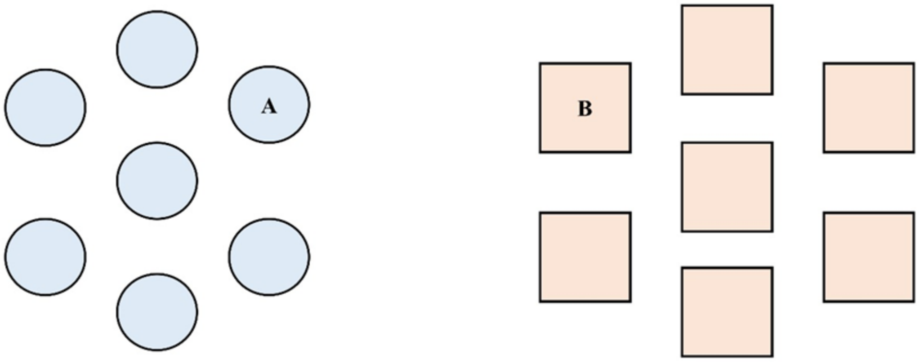


Figure 2. Distribution of personhood as an ascribed status. Individuals A recognizes every individual that shares its outward form as a person, but such recognition does not extend to individuals outwardly similar to Individual B.

(Viveiros de Castro, 1998: 478, emphasis in original). Thus, the adoption of a novel perspective can be accomplished by changing one's outward form, such as by donning a mask or other raiment, and/or by changing one's bodily comportment to align more closely with that of another species. Such a shift in point of view is always temporary and is typically undertaken by powerful individuals for the purposes of mediating relationships between humans and nonhumans. According to Viveiros de Castro, for all but shamans, "A meeting or exchange of perspectives is, in brief, a dangerous business" (2004: 468). Consequently, "Perspectives should be kept separate. Only shamans, who are so to speak species-androgynous, can make perspectives communicate, and then only under special, controlled conditions (Viveiros de Castro, 2004: 471). In general, then, ascribed personhood as found in both modernity and perspectivism is limited to and roughly coterminous with one's own kind (see Figure 7).

In contrast, achieved personhood exhibits a more dispersed range of application. In advocating for the adoption of "relationships thinking" within biology, Ingold asserts that

> [E]very organism is an open system, generated within a relational field that cuts across the interface with its environment. For the developing human organism, that field *includes* the nexus of relations with other humans. It is this nexus of social relations that constitutes him or her as a person. Thus the process of becoming a person is integral to the process of becoming an organism; more specifically it is that part of the process that has to do with the development of consciousness. The human being is not two things, then, but one; not an individual *and* a person, but, quite simply, an organism. As the person is an aspect of the organism, so social life is an aspect of organic life in general. (Ingold 1990:220, emphasis in original)

Consequently, Ingold (1990) observes that personhood is not by necessity restricted to human beings but, rather, is an inherent potentiality of conscious life. Further, one's perception of the relational field in which they are embedded is influenced by what Ingold refers to as "an education of attention" (1996: 40) which is itself the result of direct, practical engagement in those relationships. It follows, then, that a person's prior experiences will affect their perception of other persons (both human and otherwise) in their immediate environment and, moreover, different persons will perceive the components of their environments in different ways. Bird-David (1999) describes a similar dispersal of personhood in her discussion of *devaru* among the Nayaka. Devaru are persons, but decidedly not human. According to Bird-David, "When [the Nayaka] pick up a relatively changing thing with their relatively changing selves – and, all the more, when it appears in a relatively unusual manner – they regard as devaru *this* particular thing within *this* particular situation" (1999: S74, emphasis in original). Bird-David goes on to state that "Devaru are not limited to certain classes of things. They are certain things-in-situations of whatever class or, better, certain situations" (1999: S75). For the Yukaghirs, the potential for personhood is nearly ubiquitous within their environment, but "[w]hether or not an entity *actually* reveals itself as a person depends on the context in which it is place and experienced" (Willerslev, 2007: 117). Yet personhood, once achieved, must be maintained. Among the Nayaka, personhood is made through participation in sharing relationships; it can be unmade by withdrawing from them (Bird-David, 1999). Among the Yukaghir, hunters who have ceased communication with other people, are known to become *syugusuy suroma* – fur-covered human-shaped creatures – and are no longer considered to be persons (Willerslev, 2007). Achieved personhood therefore perpetuates patterns in which any entity of every kind is potentially a person, but not *every* entity of *any* kind is *necessarily* a person (see Figure 8).

The ascription of personhood, at least as found within post-Enlightenment thought and perspectivism as articulated by Viveiros de Castro (1998, 2004), is associated with the maintenance of the oppositions between subject and object, culture and nature, and mind and body. Within most non-Western societies, however, such constructs are unlikely to be viewed as having any validity (e.g., Descola, 1996; Macnaghten & Urry, 1998; Pollard, 2004; Strathern, 1980; Thomas, 2001). The understanding of personhood

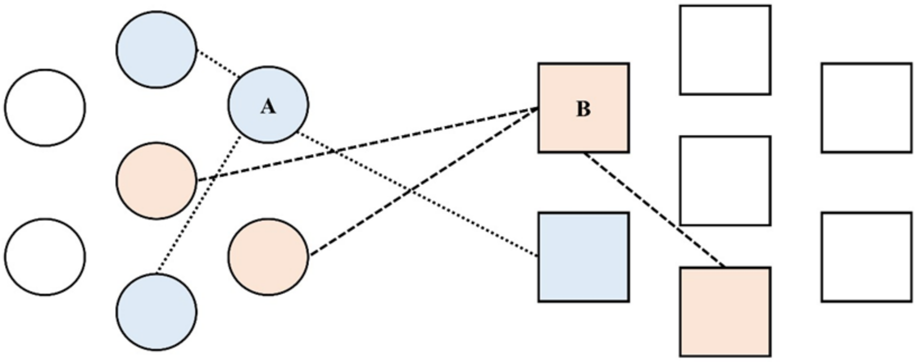


Figure 8. Distribution of personhood as an achieved status. Individuals A and B recognize as persons those who they share a relationship with. Note that, in this case, personhood is neither confined to an outward form nor unquestioningly attributed to all individuals of the same form. Rather, personhood is distributed ego-centrically for each individual.

as an achieved status, on the other hand, has been advocated by scholars actively working to abolish such dualisms. Even though much of such work still derives from modern Western discourse by means of finding theoretical justification in the phenomenology of Heidegger (1967) and Merleau-Ponty (1989), the model of personhood as an emergent phenomenon and a status potentially achievable by many different kinds of entities is seemingly more in line with both contemporary interpretations of ethnographic data as well as indigenous accounts of their experiences of the environment. For archaeological contexts in which it can be reasonably assumed that the dualisms that structure Western modernity were not employed, the adoption of a concept of personhood as achieved, emergent, and relational may be more appropriate than working under the assumption that social relations between *people* are confined within the limits of *human* society.

The consideration of personhood as emergent and achieved has recently gathered momentum within anthropology. Referred to as the "ontological turn" by some (e.g., Bessire & Bond, 2014; Bray, 2009) and "relationality" by others (Watts, 2013), both terms describe an amalgam of theoretical and methodological approaches aimed at undermining what Latour (1993:11) has called the "critical project" of modernity: the categorical separation of nature from culture, subject from object, and mind from body. As discussed earlier, the understanding of personhood as relational places no inherent restrictions on what kinds of things can be considered persons. An anecdote from the work of Hallowell among the Berens River Ojibwa provides a salient example. The Ojibwa linguistically discern between two kinds of nouns – what Western society would gloss as animate and inanimate. "Animate" nouns, however, do not denote an innate quality of something but, rather, a potential. Stones, for example, are linguistically animate but, when Hallowell inquired of one of his informants whether all of the stones around them were alive, his informant's response (after a short period of reflection) was "No! But some are" (Hallowell, 1960: 24). The deciding factor for whether or not any particular thing is, in fact, alive and, moreover, reveals itself to be a person is experience; whether or not the thing in question has ever participated in a social interaction with a human (Bird-David, 1999; Hallowell, 1960; Straus, 1982; Willerslev, 2007). Such other-than-human persons (Hallowell, 1960) can be animals, plants, material objects, and non-corporeal entities (including dead humans). To date, archaeological applications of such ideas have typically been restricted to interpretations of "ritual" practices or anomalous deposits (e.g., Brück, 1999; Groleau, 2009; Herva, 2009; Hill, 2011; Losey et al., 2013; McNiven, 2013).There has been relatively little consideration of how immersion within a relational ontology would affect the human perception of place or alter human action within the broader environment (although see Brown & Emery, 2008; Carroll et al., 2004; Carr, 2008c: 646-655; and David et al., 2010 for brief explorations of this topic), but it is apparent that the networks of interaction from which places arise and through which they are maintained are much wider than is typically considered by archaeologists.

Persistence and Places Revisited

One of the strengths of Schlanger's (1992) concept of persistent places is her explicit acknowledgment that the ways in which human populations engage with a specific location is contingent, in part, on that location's history. To approach a location as a persistent place is to avoid arbitrarily partitioning the history of its use into convenient parcels and to instead emphasize that the interactions between people and their surroundings are path dependent – they are affected by what has occurred in the past and they alter the possibilities of what can take place in the future. Although she does not use the term, Schlanger (1992) frames such path dependency in terms of the material affordances (*sensu* Gibson, 1979) of a place, on the resources provided or the subsistence activities enabled. Affordances, however, are more than material. According to Gibson, "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill… It implies the complementarity of the animal and the environment" (1979: 127). The affordances of a certain place are therefore emergent in that they arise from the interaction of a person with that place. While the material components of the environment certainly affect this, so, too, does a person's perception of that environment, especially as tempered by their prior experiences and their recollection of those experiences.

For this reason, the persistence of place has been attributed by some researchers (e.g., Gamble, 2017) to the actions of social memory. As discussed above, the experience of place is colored by the memories that it invokes while simultaneously forming the foundation for the establishment of new memories. Memories, however, are "structured by language, by teaching and observing, by collectively held ideas, and by experiences shared with others" (Fentress & Wickham, 1992: 7). All memories, therefore, are social memories, for even when experienced by an individual they are only made intelligible through their placement within the cultural milieu (Halbwachs, 1992). Consequently, the individual experience of place is always contingent upon collective memory. Any given body of social memory, however, requires the continued existence of a collective in which it inheres – dispersal of the collective results in disintegration of their collective memory. A persistent place, however, is constructed and reconstructed as the networks of interaction that sustain it are formed, altered, and disbanded. Therefore, while social memory is indeed implicated in the persistence of place, persistent places transcend social memory in that they are able to be simultaneously and/or successively incorporated into multiple unrelated corpuses of collective memory.

That the persistence of place can be affected by both perception and memory finds ample support within anthropological literature from around the world. For example, some Australian aboriginal societies use their own moiety structure to characterize features of their physical environment. This merging of social division and landform helps them to navigate novel surroundings and avoid unknown yet powerful and/or dangerous places (Morphy, 1995; Smith, 1999). Bradley (1998b) suggests that geological formations were perceived as the remnants of tombs by megalithic builders and, consequently, incorporated into their constructions. Scarre (2002) documents the gradual attribution of several European megalithic sites to the actions of Christian saints, suggesting that the characterization of monuments and other places changes with the composition of the interaction networks in which they are embedded. In North America, Carroll, Zedeño, and Stoffle (2004) argued that the locations chosen for historic performances of the Ghost Dance were often thought to be sites of previous ceremonial practices. The actions undertaken earlier at these sites were understood to enhance the potency of the location and, consequently, that of the Ghost Dance itself. The Navajo consider elevated places as particularly effective locations for prayers, offerings, and ceremonies as such activities are understood to affect everything visible from the vantage point at which they are undertaken. Conversely, some landforms are perceived to be too powerful to permit mundane residential activities or grazing upon them (Kelley & Francis, 1993). Among Western Apache groups, materials are collected from ancient sites for use within ceremonies due to the power perceived to be inherent in such places (Ferguson & Colwell-Chanthaphonh 2006:223; Welch & Ferguson 2007). Differences in oral traditions cause Hopi and Zuni observers to understand the same ancestral Puebloan sites in different ways, each group recognizing the sites as their own based on perceived similarities in material culture and architectural styles (Colwell-Chanthaphonh et al. 2008; Ferguson & Colwell-Chanthaphonh 2006; Kuwanwisiwma & Ferguson 2009). As a final example, Mugerauer (1985) has demonstrated how language traditions created (mis)understandings of environmental features and affected landscape use among

European settlers of the American West. Experience, perception, and memory therefore not only contribute to how specific places are *understood* but also affect how people *engaged with* such places over time.

These varied examples suggest that Schlanger's (1992) formulation of persistent places is overly constrained by its emphasis upon material resources and subsistence activities and that consideration of the effects of perception and memory will result in an interpretational framework that can better accommodate the range of possible reasons for a given place's persistence (or lack thereof). The definition of persistent place that will be used throughout the remainder of this work represents an expansion of Schlanger's (1992) conception and incorporates aspects of the above discussion. A persistent place is defined here to be a place that is repeatedly engaged with throughout the long-term history of a region as a result of the particular affordances (*sensu* Gibson, 1979) that it is perceived to offer. Such affordances may be material, such as an abundance of a particular economic resource, or immaterial, such as enhanced opportunities to interact with other people. The perception of the affordances offered by a given place is, in turn, at least partly contingent upon the perceiver's personal experiences and memories as well as received wisdom in the form of collective memory and worldview (*sensu* Redfield, 1952). This explicit consideration of the perception of place as mediated by worldview has implications for our understanding of territorial behavior among foraging groups.

Concluding Discussion: Accommodating Adena Archaeology

Places emerge from and are maintained by localized networks of interaction that involve both people and things. In societies in which persons are not limited to human beings, emplaced social relations between humans and other-than-human persons can produce patterning that approximates what many researchers understand to be territorial behavior. Many indigenous societies (e.g., Astor-Aguilera, 2010; Bird-David, 1999; Carr, 2005; Deloria, 1975; Layton, 1999; Morrison, 2000; Viveiros de Castro, 1998; Willerslev, 2007) subscribe to what Hallowell (1966) has described as a personalistic theory of causation, where the day to day events that are understood within the context of modernity to be mechanistic, fortuitous, or accidental are perceived instead to be volitional –the result of the actions and intentions of a *person*, human or otherwise. Within such a framework, injury, illness, drought, famine, and death are all perceived to be potential results of violation of the social obligations owed to other-than-human persons. Indigenous communities associate other-than-human persons with a variety of features of their environment, including streams, springs, caves, mountains, hills, unusual rock formations, canyons, discolorations on rock faces, mineral deposits, locations with unusual plant growth, locations that produce echoes or gusts of air, locations that have been struck by lightning, abandoned buildings, graves, and ceremonial locations (Astor-Aguilera, 2010; Ferguson & Colwell-Chanthaphonh, 2006; Dillehay, 2007; Grinnell, 2008; Hallowell, 1960, 1966; Jones, 1939; Kelley & Francis, 1993; Layton, 1999; Morphy, 1995; Stoffle et al., 2001; Swanton, 1931, 1942; Willerslev, 2004, 2007; Zedeño, 2000, 2009). It follows, then, that the permissible forms of engagement with certain places on the landscape are dictated by the social obligations that obtain between humans and the other-than-humans that are associated with those places.

Knowingly committed or not, violations of such social obligations may have dire consequences. For example, among the Alawa of Australia, certain trees, rocks, and waterholes are understood to have been formed through the actions of ancestral beings and are held to maintain that association. It is considered necessary to care for such places, to maintain them, and to undertake ceremonies at such locations in order to sustain fertility and "keep the country alive" (Layton, 1999: 223). Further, "Failure to protect sites and perform ceremonies would put the community at risk from the creative, heroic ancestors' anger, leading to human illness and the loss of fertility in the land" (Layton, 1999: 228). Elsewhere in Australia, among the Burunga, "…traversing the land is something that needs to be constantly negotiated; it is necessary that people be aware of how they are interacting with, and how their actions may impinge upon, what are essentially living landscapes, landscapes capable of retribution for misdeeds as well as munificence" (Smith, 1999: 194). Dillehay (2007) reports that indigenous communities in Chile understand mounds, or *kuel*, to require the interaction and attention of living individuals. When neglected, *kuel* become malicious and can inflict illness upon human populations – a situation that can be corrected through propitiation. Basso (1996b), too, records an instance where transgressions on the part of the Western Apache brought about the disappearance of water from a place that had hitherto provided a stable supply of it.

These examples suggest that some greeting ceremonies, often interpreted as a form of territoriality by means of social boundary maintenance (e.g., Cashdan, 1983), may instead be intended to prevent transgressions against other-than-human persons and thereby avoid the resulting consequences. Layton (1995) suggests that, in order to forage within a given area, one needs to have been brought into contact with its "sacred" objects and taught the songs that explain the association of such objects with the surrounding land. Such a ceremony only needs to be undertaken once, however. Once the songs associated with an area have been learned, it is safe to travel in that region. Working among the Cree, Scott contends that the

> Cree, in their own view, legitimately exercise and maintain their rights as against alien claimants who fail to conform to criteria of sharing and stewardship. Historically, when white men have apparently conformed to tenets of reciprocity, and contributed to stewardship of resources, they have been accorded a measure of legitimate participation in the Cree system. Thus, when white men fail these standard, evasion or opposition is deemed legitimate by Cree. (Scott, 1988: 40).

In both of these cases it appears that what is being described is not territoriality as typically understood. Rather than the exclusive control of restricted resources, it seems that these indigenous societies are seeking to ensure the maintenance of proper social relations. Failure to engage in greeting ceremonies or in reciprocity and stewardship is met with aggression or expulsion because transgressions committed by individuals who are ignorant of existing social obligations between humans and other-than-humans are perceived to result in very real and potentially wide-ranging consequences.

Places, and engagement with them, are crucial to the maintenance of a sense of identity (e.g., Basso, 1996b; Buttimer, 1980; Deloria, 1975, 1999; Fowles, 2013; Godkin, 1980). For a group to move to a new area, they must necessarily become enmeshed in a skein of novel relationships and, as a result, undergo an alteration of identity (Fowles, 2013). In Australia, when a place is abandoned, either by accident or intention, the ceremonial ties between places associated with ancestral beings and living humans are severed, resulting in a loss of fertility and a failure of permanent water in the surrounding area (Layton, 1995). When this happens, new groups move into the abandoned area such that "…the ancestral grid remains fairly constant, with new groups occupying existing spaces and taking over the sacra and the spiritual responsibilities that were exercised by those who preceded them. In a sense, the new group takes on the clothing of the old group so that, from an ancestral perspective, nothing has changed" (Morphy, 1995: 190). In these Australian examples, engagement with the same places results in distinct groups with shared aspects of identity. Douglass (1969) reports a similar phenomenon among Spanish-speaking Basques, where identity is derived from a group's residence within a *basseria* – a named farmstead associated not only with a dwelling and agricultural holdings, but also a *sepulturie* located within the village church – rather than from biological descent. The identity conferred through association with a given *basseria* may be adopted by several unrelated domestic groups over the course of time and, likewise, offerings made at the *sepulturie* are for the benefit of all inhabitants of the *basseria*, regardless of consanguinity. To be Yukaghir, too, is not so much a matter of biological descent as it is "…a quality that is obtained through one's occupation and territory of residence" (Willerslev, 2007: 6). Several indigenous societies in North America have also expressed that their engagement in situated practices shared with precedent groups constitutes a common identity with them (e.g., Hill, 2006; Julien et al., 2008; Peters, 2006; Welch & Ferguson, 2007). The continuous association of specific identities with specific places is often taken as evidence of territoriality on the part of a region's residents. As the examples above demonstrate, however, the linkage between identity and place can remain intact despite significant changes in the composition of the occupying group.

Expanding upon Schlanger's (1992) use of the term and conceptualizing Adena mounds as persistent places recognizes the potential interplay between perception, memory, and temporal endurance and its effects on how such monuments were apprehended and interacted with over time. In contrast to the territorial hypothesis, for which geographically widespread commonalities in mound form and construction, discontinuous depositional episodes, and the long-term continuity within regional mortuary programs exhibited by mound locations are all problematic, the consideration of Adena mounds as persistent places is able to comfortably accommodate each of these idiosyncrasies of Adena archaeology. The framework advocated here does not preclude the possibility that mortuary mounds served a territorial function. Rather, approaching Adena mounds as persistent places allows for the possibility that such monuments were multiply authored and engaged with by different groups through time. In so doing, it enables a more thorough and nuanced investigation of the social dynamics underlying mound construction during this poorly understood period in American prehistory.

CHAPTER 5

ALTERNATIVE SCENARIOS, MATERIALS, AND METHODS

Introduction

The previous two chapters have explored two alternative interpretations of Adena burial mounds. Chapter 3 reviewed the intellectual lineage from which the hypothesis that such mounds served a territorial function derives, stated the assumptions that are implicit in such a claim, evaluated the extant archaeological evidence to see if these assumptions can be reasonably said to have been met, and ultimately concluded that there is ample reason to question the applicability of the territorial hypothesis to Adena mounds. Chapter 4 wove together conceptions of place from humanist geography and anthropological writings concerning indigenous conceptions of personhood to argue that behavior commonly interpreted to be territorial may instead be intended to maintain proper social relations between human communities and the myriad entities with which they interact. Having provided a plausible alternative rationale underlying allegedly territorial behavior, Chapter 4 suggested that Adena mounds can be characterized as persistent places, or locations used repeatedly over a long period of time as a result of the particular affordances that they offer.

It is the purpose of the current chapter to develop an analytical framework capable of evaluating the degree to which these alternative interpretations are supported by the archaeological record. This chapter begins by formulating two alternative scenarios and exploring the implications that each has for the expected patterning of archaeological and bioarchaeological data. It then provides a description of the museum collections employed in the current research and the categories of data that were collected. Following this, justifications and protocols for data collection, pretreatment (where applicable), and analytical methods are detailed within each category of data before concluding with a discussion of how the different analyses will be integrated.

Alternative Scenarios

As discussed in Chapter 3, the hypothesis that Adena mounds served a territorial function, drawing as it does on the work of Saxe (1970), Goldstein (1976), and Charles and Buikstra (1983), understands such mounds to be "permanent, specialized, bounded area[s] for the exclusive disposal of the dead" (Goldstein, 1976:61; 1981:61). Further, the existence of these mounds is used to infer the presence of "a corporate group that has rights over the use and/or control of crucial but restricted resources" where such "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" (Goldstein, 1976:61; 1981:61). This idea is extended to territorial claims by Charles and Buikstra, who state that "If a group wishes to claim right of ownership or access to a specific plot of land, including lineal inheritance of those rights, a cemetery is one obvious means of signifying that relationship" (1983:121). To suggest that Adena mounds are indicative of territorial behavior, then, effectively makes the claim that the construction and maintenance of a particular mound are the results of the actions of a single, stably located, descent-based corporate group.

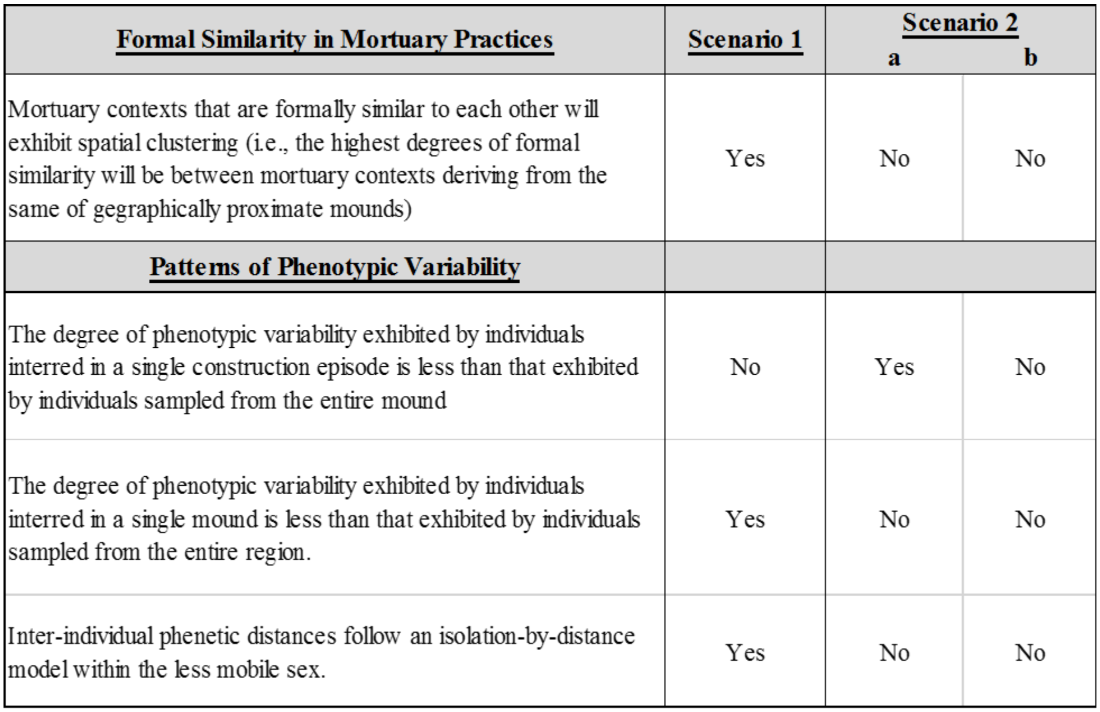
In contrast, the reconceptualization of Adena mounds as persistent places presented in Chapter 4 raises the possibility that such mounds were engaged with by multiple descent-based corporate groups between their initial construction and the achievement of their “final” form. This may occur because such locations provide particular affordances that are recognized by different groups, such as access to particular subsistence resources or a shared recognition that past actions undertaken at these locations have invested them with power that may enhance the efficacy of ritual practices. Alternatively, it may occur as the result of an understanding that such places are embedded in geographically anchored social networks that obligate specific actions – such as those necessary for the maintenance of the land’s fertility or the prevention of misfortune (e.g., Basso, 1996b; Dillehay, 2007; Douglass, 1969; Layton, 1995, 1999; Morphy, 1995) – on the part of their human participants, regardless of who those participants happen to be at any given time. Given that Adena peoples in Kentucky appear to have been at least seasonally mobile (Applegate, 2013; Clay, 1998) as well as the disparate tempos of mound construction/alteration and territorial relocation among foraging societies, the engagement of a specific mound by multiple groups over time becomes not only possible, but probable.

In terms of archaeological visibility, the primary difference between these two interpretations of Adena mounds is the number of different descent-based corporate groups that were involved in the initial construction of a burial mound and its augmentation over time. Past evaluations of territoriality on the part of Adena populations have emphasized the spatial distribution of burial mounds (e.g., Seeman & Branch, 2006; Waldron & Abrams, 1999) as supporting evidence for their arguments, following reasoning similar to that provided by Renfrew (1976), who hypothesized that monuments that served a territorial function should exhibit regular spacing, provided that they were contemporaneous. Employing some rather circular logic, Renfrew (1976) also argued that monuments that exhibit regular spacing were likely to have been in use simultaneously, thereby avoiding the problem of demonstrating contemporaneity. Concurrent use, however, is a salient issue when evaluating the spatial distribution of Adena mounds in that many mounds included in surveys have never been systematically excavated (if excavated at all) and their affiliation with Adena is based primarily on their shape and chronological data derived from neighboring, typically non-mound, sites (e.g., Seeman & Branch, 2006; Waldron & Abrams, 1999). Evaluating territorial behavior through the investigation of the number of descent-based corporate groups involved in the construction of a given mound circumvents the issue of mound contemporaneity by drawing conclusions based upon the use of a single location through time, thereby providing an advantage over inferences of territoriality derived from the spatial distribution of burial mounds.

For this reason, the analytical framework developed here approaches the question of whether Adena mound construction and maintenance was associated with territorial behavior by investigating 1) the spatial distribution of *shared practices* as evidenced by formally similar mortuary contexts and 2) the relative amounts of *biological variability* present at multiple spatial scales as assessed by cranial and dental phenotypic variability. These two lines of evidence are expected to pattern differently under the following two scenarios (see Table 2). For each of the scenarios that follow, two assumptions are made. First, it is assumed that a single descent-based corporate group represents only a

Table 2

Archaeological Expectations for Each Scenario



Formal Similarity in Mortuary Practices	**Scenario 1**	**Scenario 2**	
		a	**b**
Mortuary contexts that are formally similar to each other will exhibit spatial clustering (i.e., the highest degrees of formal similarity will be between mortuary contexts deriving from the same of gegraphically proximate mounds)	Yes	No	No
Patterns of Phenotypic Variability			
The degree of phenotypic variability exhibited by individuals interred in a single construction episode is less than that exhibited by individuals sampled from the entire mound	No	Yes	No
The degree of phenotypic variability exhibited by individuals interred in a single mound is less than that exhibited by individuals sampled from the entire region.	Yes	No	No
Inter-individual phenetic distances follow an isolation-by-distance model within the less mobile sex.	Yes	No	No

subset of the total biological variability present at the regional scale. This assumption is reasonable given ethnohistorically documented patterns of social organization within indigenous societies of the Eastern Woodlands (e.g., Bock, 1978; Callendar, 1978; Fenton, 1978; Goddard, 1978; Heidenreich, 1978; Jones, 1939; Radin, 1970; Ritzenhaler, 1978; Swanton, 1911, 1928, 1931, 1942, 1946; Tooker, 1978). Second, it is assumed that the overall amount of biological variability at the regional scale remained relatively constant over the span of time during which the mounds under investigation were constructed. This assumption is considered to be valid given the finding that, despite hypotheses of large-scale population replacement associated with the rise of both Adena and Hopewell ceremonialism (e.g., Dragoo, 1963, 1964; Webb & Snow, 1945), regional populations in the Ohio Valley exhibit long-term biological continuity (e.g., Sciulli, 1998; Sciulli et al., 1984; Sciulli & Mahaney, 1986).

Scenario 1: Mounds served a territorial function.

Under this scenario, Adena mounds resulted from the continuous use of a location over time by a single, stably located, descent-based corporate group. Alternatively, and as has been suggested by Clay (1998), mounds may represent boundary maintenance activities undertaken by neighboring corporate groups. While these two formulations differ in their placement of mounds in relation to the spatial extent of a territory (i.e., centrally or peripherally), they both share similar archaeological manifestations regarding the degree and spatial patterning of both formal similarity in mortuary practices and skeletal phenotypic variability. Given geographic stability, regional patterns of corporate group interaction would have followed an isolation-by-distance model, where interaction (mate-exchange, trade, etc.) occurred most frequently with neighboring groups and decreased in frequency as geographic distance between corporate groups increased. This scenario would result in the spatial restriction of formally similar mortuary contexts as the occurrence of practices shared between distinct groups could be expected to decrease with increasing geographic distance. Similarly, if a given mound is the product of the actions of only one or of consistently neighboring descent-based corporate groups, then the amount of biological variability exhibited by the individuals interred within a single episode of mound construction would approximate that exhibited by the entire sample of individuals interred within the mound. Isolation-by-distance, however, would result in a situation where the amount of biological variability exhibited by a single mound's burial

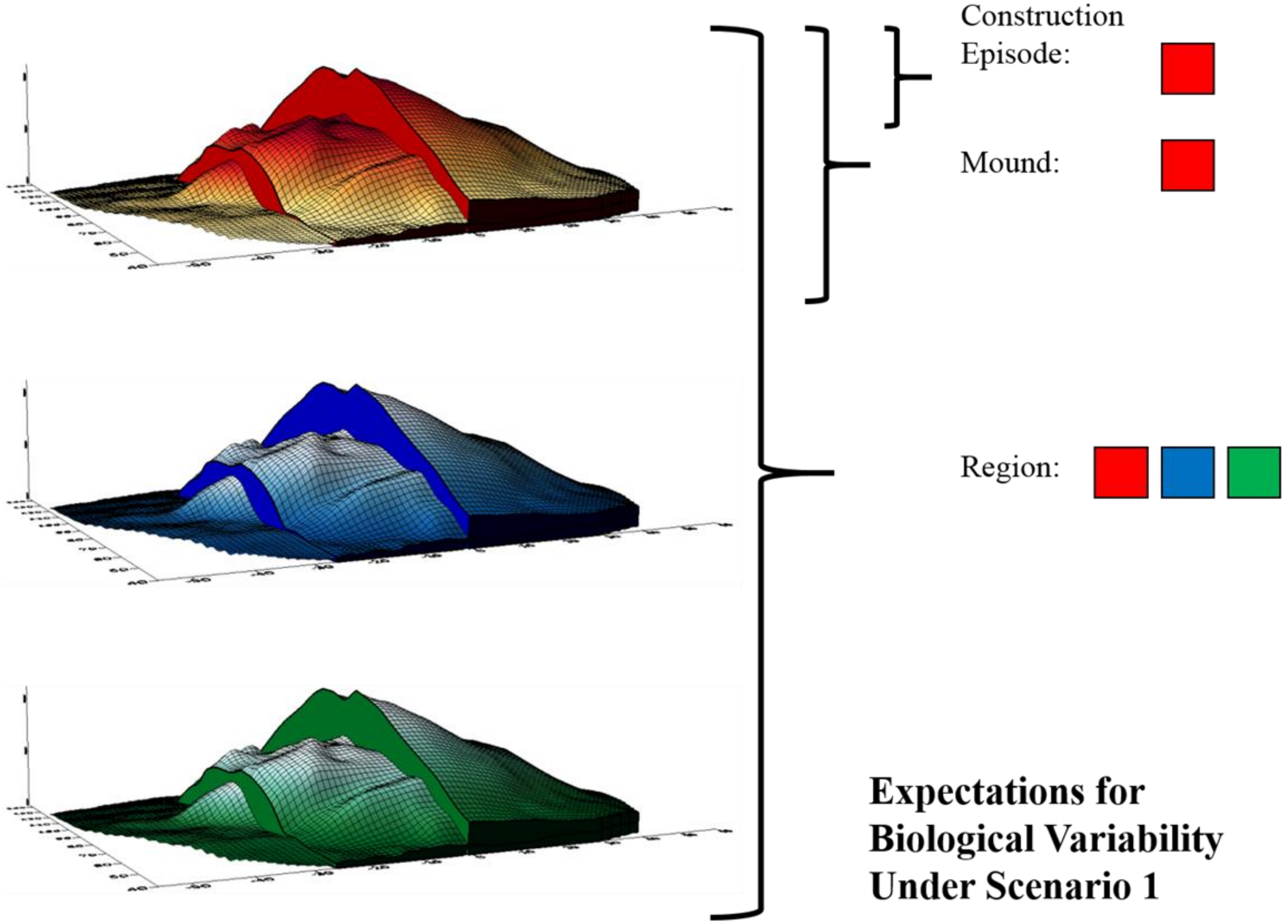


Figure 9. Expectations for biological variability under Scenario 1. Under the expectation that mounds served a territorial function, phenetic variability within a mound should be a subset of the biological variability present in the region as a whole.

sample would be significantly less than that exhibited by the regional burial sample (see Figure 9 and Table 2).

Scenario 2: Mounds as persistent places.

In this scenario, Adena mounds are considered to be persistent places and, consequently, potentially the product of the actions of multiple descent-based corporate groups over time. This could result in two basic patterns of land use in which *a*) a mound may be used sequentially by distinct corporate groups or *b*) a mound may be used by multiple corporate groups simultaneously. In both cases, such fluidity would not be expected to produce patterns of interaction that adhere to an isolation-by-distance model and so no spatial restriction of formally similar mortuary contexts is expected to occur. Further, the amount of biological variability present within a mound's burial sample would not be expected to be significantly different from that present on a regional scale.

Scenario 2a.

If corporate groups moving across the landscape participated in a shared tradition of mound building, it is possible that a mound would have been perceived as the product of the actions of a given group's biological predecessors, regardless of whether or not biological continuity existed between the population that constructed the mound and the population that currently occupied the area in which it was located. Alternatively, if burial mounds were recognized by multiple groups to be sites where ritual practices had previously been undertaken, then it is possible that they would have preferentially been sought out as locations in which to perform new rituals. Consideration of these possibilities, as well as the disparity between the time scale on which forager territories

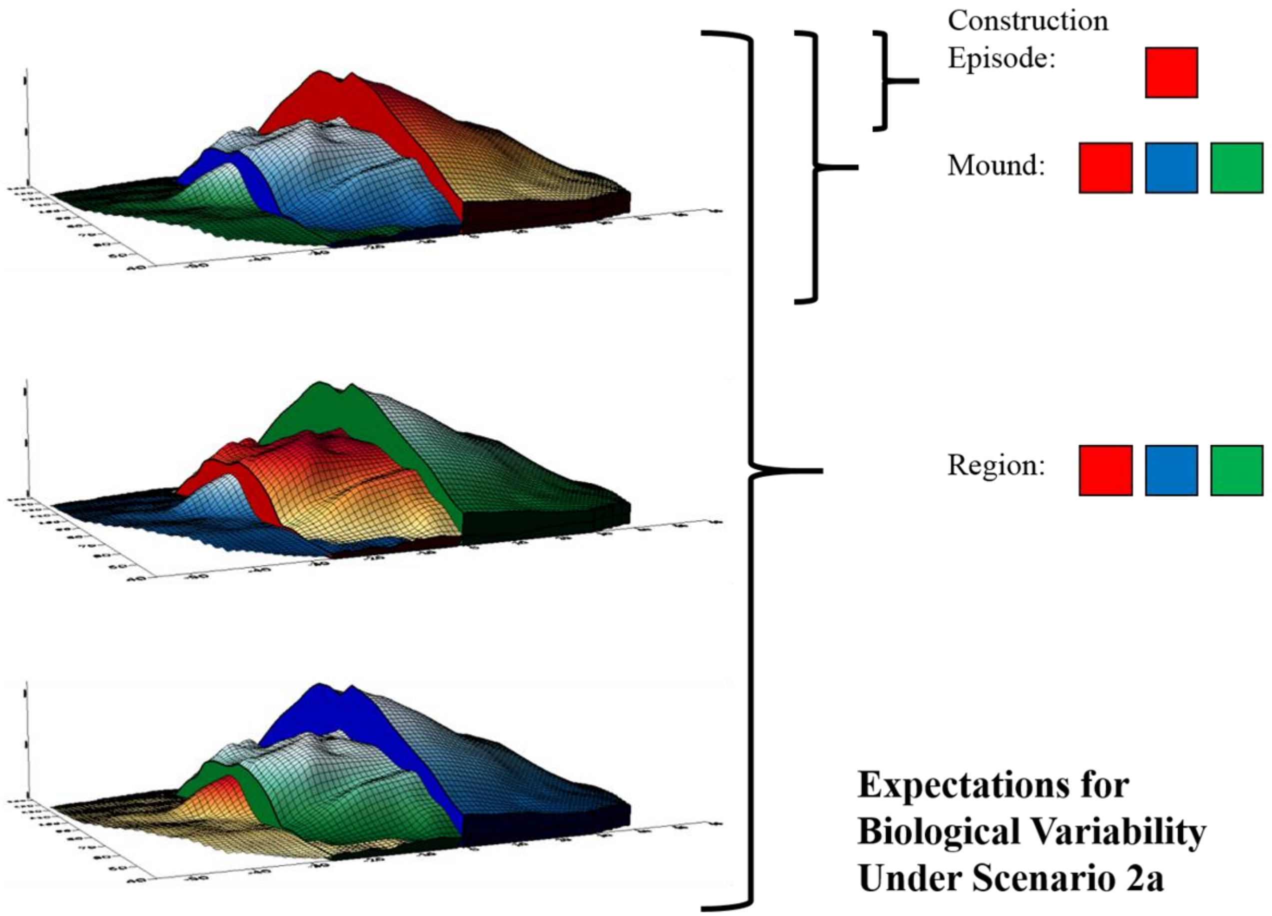


Figure 10. Schematic representation of the expectations for biological variability under Scenario 2a. In this scenario, different construction episodes are the product of distinct, descent-based corporate groups. The biological variability present in a burial sample derived from a distinct construction episode should be less than that present in the burial sample derived from the mound as a whole. In contrast, the biological variability present in a mound's burial sample should be comparable to the amount of variability present in the region.

are geographically stable and that over which many Adena mounds were constructed and successively altered, suggests that different construction episodes within a given mound may be the products of distinct descent-based corporate groups. This would result in a situation in which the amount of biological variability exhibited by the individuals interred within a single construction episode would be less than that exhibited by the entire sample of individuals buried within the mound (see Figure 10 and Table 2).

***Scenario 2b*.**

Multiple descent-based corporate groups drawn from the region as a whole may have interred their dead within the same construction episode of a burial mound. Clay (1991) and Seeman (1986) have suggested similar social dynamics and this scenario would be consistent with an alliance model such as has been proposed for the Scioto Hopewell (e.g., Carr & Case, 2005; Case & Carr, 2008; Greber, 1991, 2005) as well as ethnohistorically documented mortuary practices such as the Feast of the Dead among certain Iroquoian-speaking indigenous societies (e.g., Fenton, 1978; Hewitt, 1895; Tooker, 1964; Trigger, 1969). In this case, the amount of biological variability exhibited by the individuals interred within a single construction episode should approximate that exhibited by the entire burial sample derived from the mound (see Figure 11 and Table 2).

It should be noted that while Scenario 1 can be reliably differentiated from the two variants of Scenario 2 by considering mounds in their entirety, discerning between Scenarios 2a and 2b necessitates making comparisons between data derived from individual construction episodes and data derived from the whole mound. Available

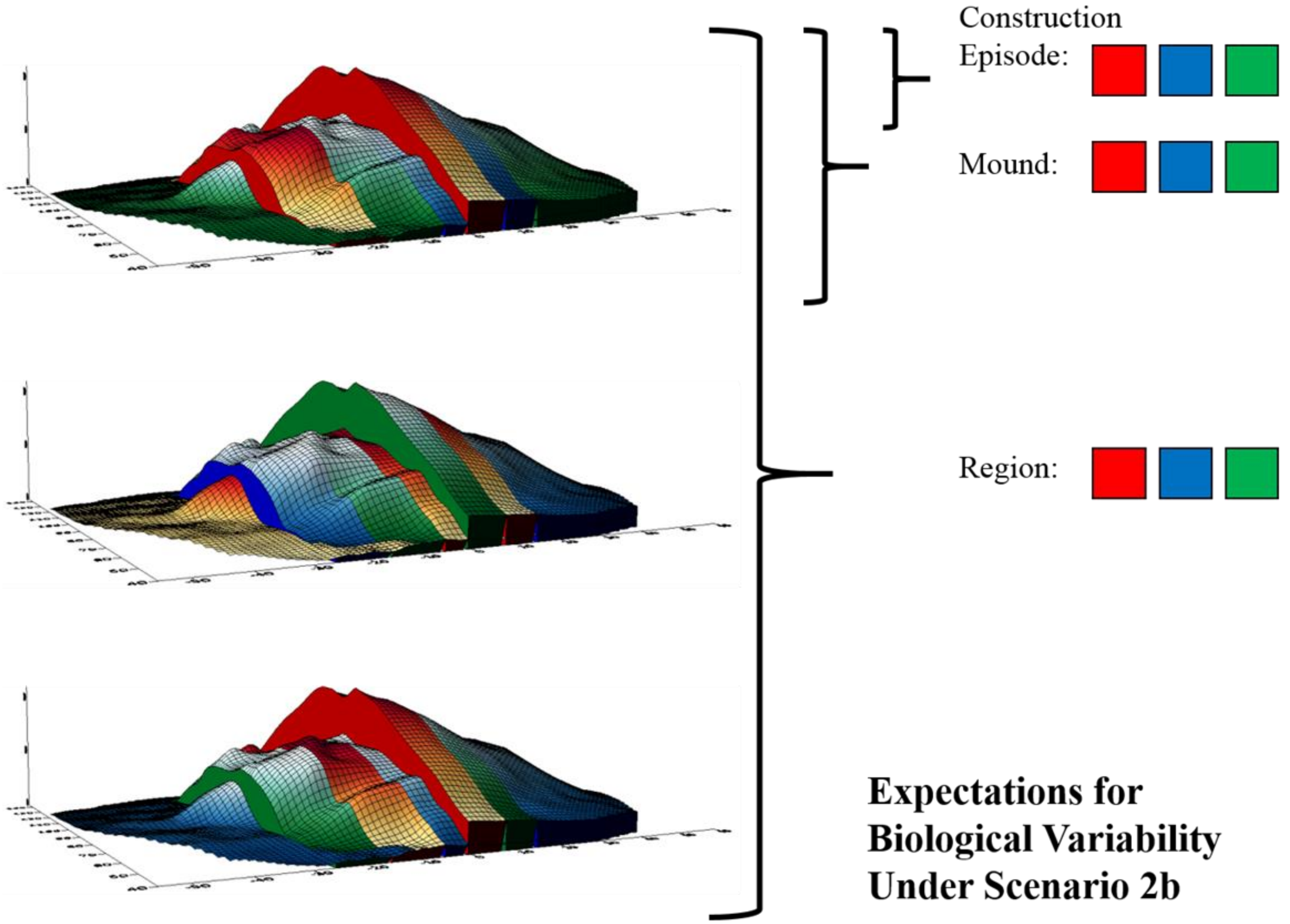


Figure 11. Schematic representation of the expectations for biological variability under Scenario 2b. In this scenario, distinct construction episodes were the products of multiple, descent-based corporate groups. As a result, the amount of biological variability present in a sample of individuals derived from a construction episode should be comparable to that present in samples derived both from the entire mound and from the region as a whole.

skeletal samples sizes and/or simple mound structure preclude such comparisons for many of the mounds included in this research. This problem will be addressed through recourse to the evaluation of the spatial distribution of individuals exhibiting a high degree of phenotypic similarity as well as those burials evincing highly similar mortuary treatments (see below).

Materials and Methods

The scenarios presented above are differentiated from each other based on the spatial patterning of formally similar mortuary practices and the comparison of the relative amounts of biological variability (as assessed through phenotypic variability) exhibited by skeletal populations drawn from multiple spatial scales. To this end, this research relies primarily on three types of information: stratigraphic data, descriptions of mortuary contexts, and cranial and dental phenotypic data. Relevant data was drawn from the published reports, original field notes, and osteological collections resulting from the excavation of 14 burial mounds associated with Adena ceremonialism. The original documentation and skeletal collections derived from these sites are curated at the University of Kentucky’s William S. Webb Museum of Anthropology in Lexington.

Site selection and description.

The mounds included in this research represent the majority of those sites used by Webb in his expansion and revision of Greenman’s (1932) initial trait list (see Webb & Snow, 1974: 13). They were selected based on the availability of detailed descriptions of mortuary contexts and the reported recovery of skeletal remains. To ensure a minimum level of comparability between sites in terms of field documentation, the selection of sites was further limited to those excavated either with the support of Franklin D. Roosevelt's New Deal (i.e., funded through the Federal Emergency Relief Administration, the Works Progress Administration, or the Works Projects Administration, depending on the date of excavation) or those occurring afterward, thereby benefiting from the systematization of field techniques that resulted from government funding and accountability.

Federal funding, however, also meant that the selection of sites for excavation was based largely on which areas of the state were suffering the most from unemployment (Milner & Smith, 1998). As a result, the FERA- and WPA-funded excavations overseen by Webb and included in this research exhibit some degree of spatial clustering since they were often located in the same or in adjacent counties (see Figure 12). At the same time, the mounds included in this research were quite variable in terms of size, complexity, and submound structural features (see Table 3). The Fisher Site (15Fa152), for example, was less than three feet tall at the time of its excavation, was interpreted to have been the result of only one construction episode, and had no submound features. In contrast, the larger of the Wright mounds (15Mm6) stood over 30 feet in height at the time of its excavation, was thought to have been built in four separate episodes, and covered the remains of six circular and one rectilinear paired-post patterns. Such variability in form and complexity predictably translates into disparities in terms of the size of associated burial populations and the amount of available field documentation. Table 4 lists the number of individuals interred within each mound included in the research sample according to the most recent published information as well as the number of pages of original documentation that were located and scanned during data

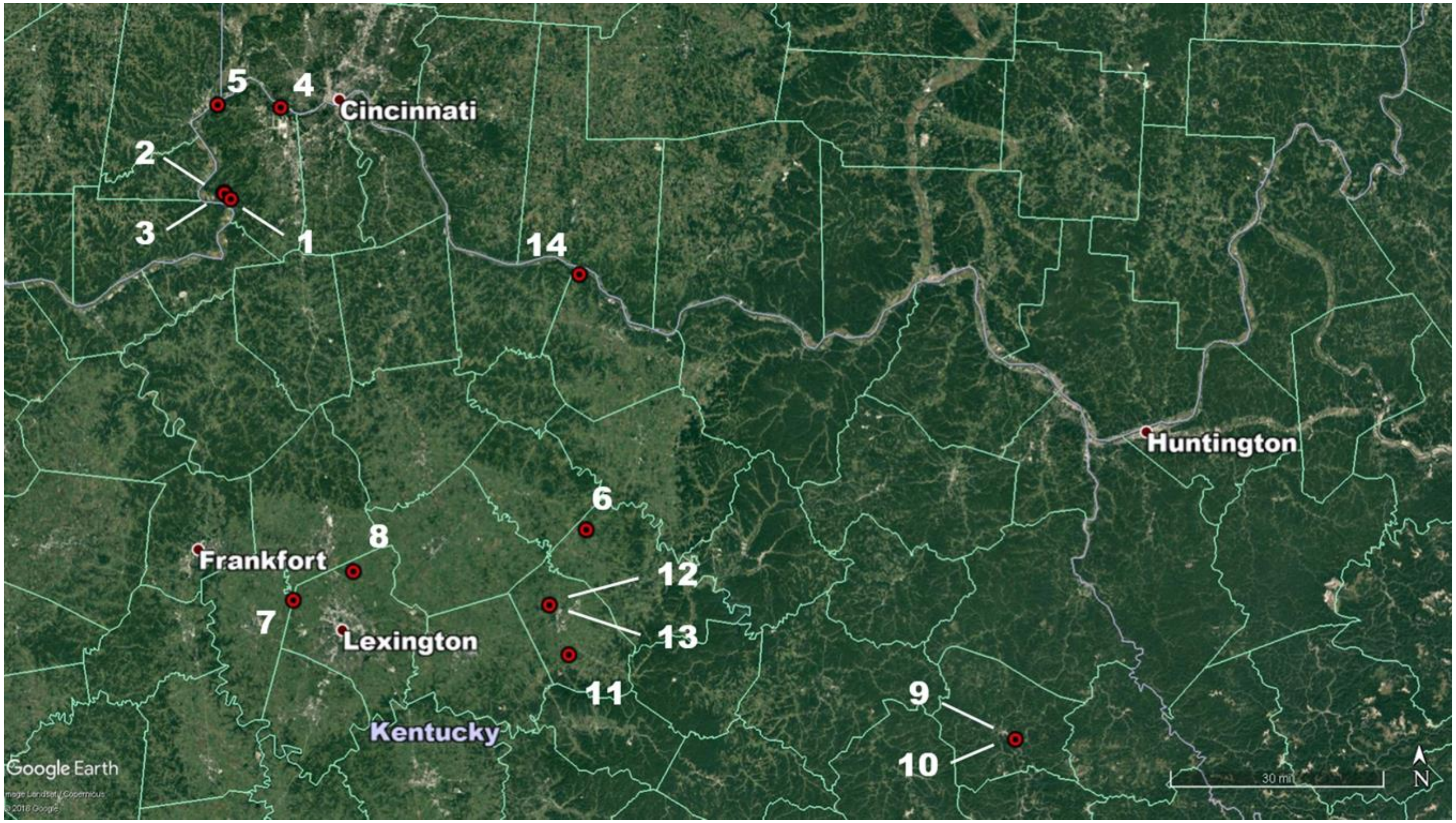
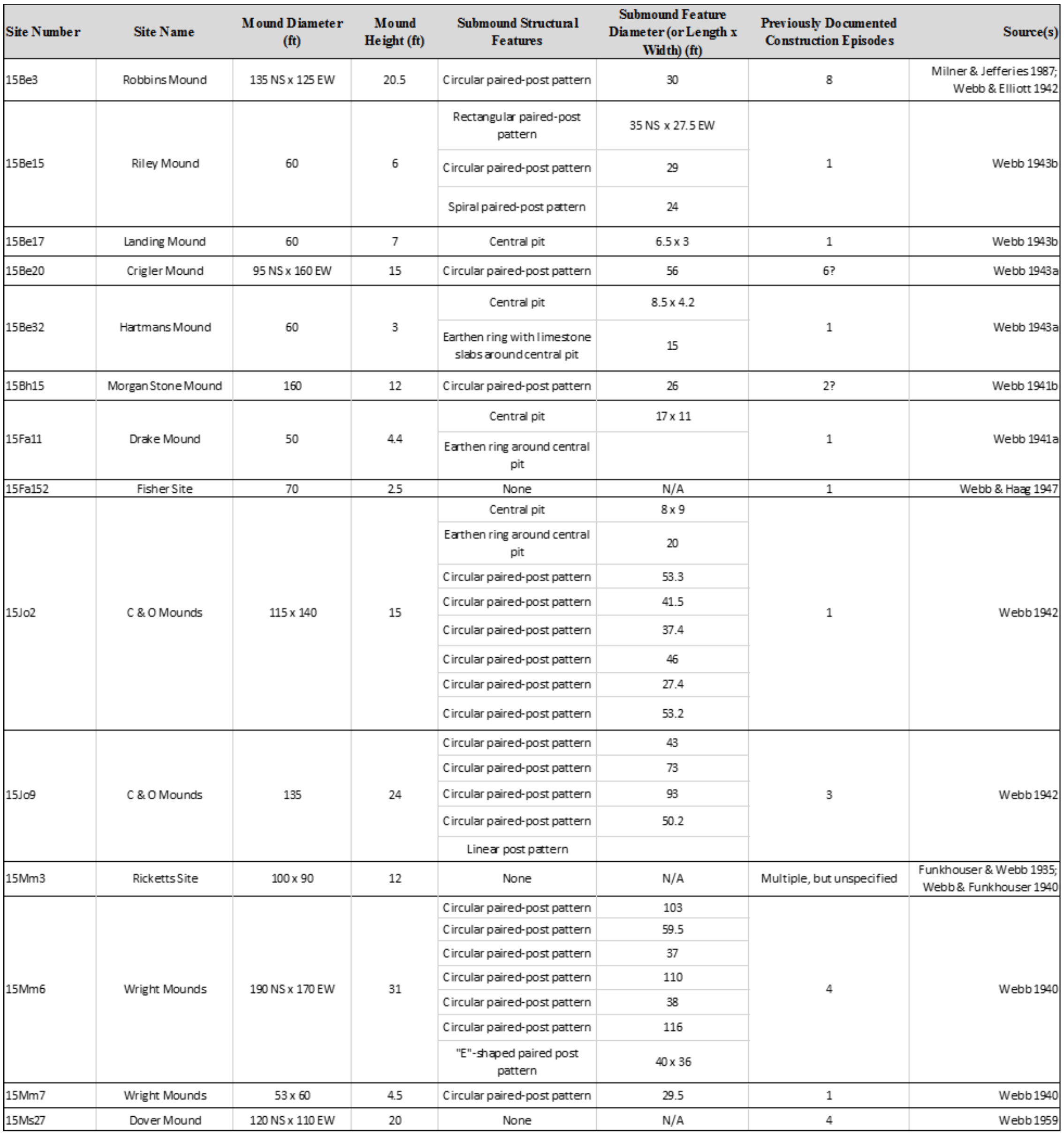


Figure 12. Location of Adena mounds included in the research sample. In Boone County: 1. Robbins Mound (15Be3); 2. Riley Mound (15Be15); 3. Landing Mound (15Be17); 4. Crigler Mound (15Be20); and 5. Hartman Mound (15Be32). In Bath County: 6. Morgan Stone Mound (15Bh15). In Fayette County: 7. Drake Mound (15Fa11); and 8. Fisher Site (15Fa152). In Johnson County: 9. C&O Mounds (15Jo2) and 10. C&O Mounds (15Jo9). In Montgomery County: 11. Ricketts Site (15Mm3); 12. Wright Mounds (15Mm6); and 13. Wright Mounds (15Mm7). In Mason County: 14. Dover Mound (15Ms27)

Table 3

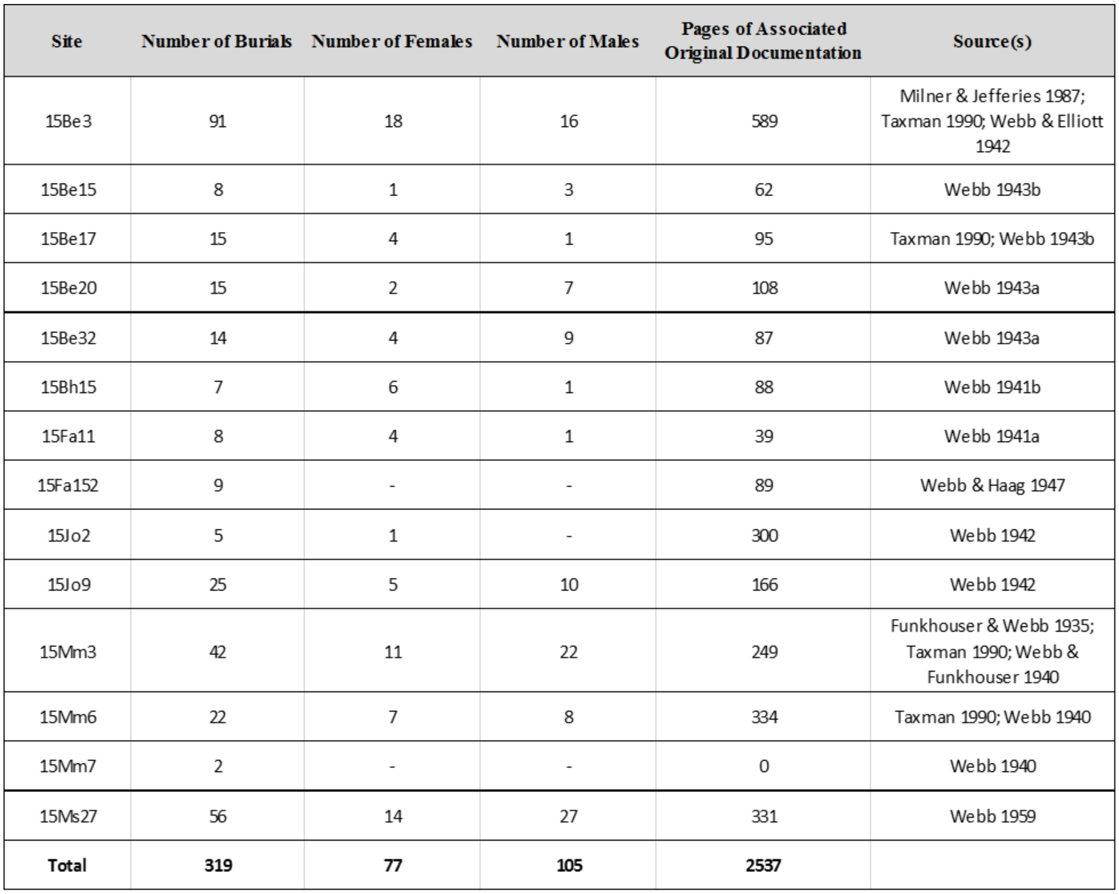
Structural Details of the 14 Adena Mounds included in this Research.



Site Number	Site Name	Mound Diameter (ft)	Mound Height (ft)	Submound Structural Features	Submound Feature Diameter (or Length x Width) (ft)	Previously Documented Construction Episodes	Source(s)
15Be3	Robbins Mound	135 NS x 125 EW	20.5	Circular paired-post pattern	30	8	Milner & Jefferies 1987; Webb & Elliott 1942
15Be15	Riley Mound	60	6	Rectangular paired-post pattern	35 NS x 27.5 EW	1	Webb 1943b
				Circular paired-post pattern	29		
				Spiral paired-post pattern	24		
15Be17	Landing Mound	60	7	Central pit	6.5 x 3	1	Webb 1943b
15Be20	Crigler Mound	95 NS x 160 EW	15	Circular paired-post pattern	56	6?	Webb 1943a
15Be32	Hartmans Mound	60	3	Central pit	8.5 x 4.2	1	Webb 1943a
				Earthen ring with limestone slabs around central pit	15		
15Bh15	Morgan Stone Mound	160	12	Circular paired-post pattern	26	2?	Webb 1941b
15Fa11	Drake Mound	50	4.4	Central pit	17 x 11	1	Webb 1941a
				Earthen ring around central pit			
15Fa152	Fisher Site	70	2.5	None	N/A	1	Webb & Haag 1947
15Jo2	C & O Mounds	115 x 140	15	Central pit	8 x 9	1	Webb 1942
				Earthen ring around central pit	20		
				Circular paired-post pattern	53.3		
				Circular paired-post pattern	41.5		
				Circular paired-post pattern	37.4		
				Circular paired-post pattern	46		
				Circular paired-post pattern	27.4		
				Circular paired-post pattern	53.2		
15Jo9	C & O Mounds	135	24	Circular paired-post pattern	43	3	Webb 1942
				Circular paired-post pattern	73		
				Circular paired-post pattern	93		
				Circular paired-post pattern	50.2		
				Linear post pattern			
15Mm3	Ricketts Site	100 x 90	12	None	N/A	Multiple, but unspecified	Funkhouser & Webb 1935; Webb & Funkhouser 1940
15Mm6	Wright Mounds	190 NS x 170 EW	31	Circular paired-post pattern	103	4	Webb 1940
				Circular paired-post pattern	59.5		
				Circular paired-post pattern	37		
				Circular paired-post pattern	110		
				Circular paired-post pattern	38		
				Circular paired-post pattern	116		
				"E"-shaped paired post pattern	40 x 36		
15Mm7	Wright Mounds	53 x 60	4.5	Circular paired-post pattern	29.5	1	Webb 1940
15Ms27	Dover Mound	120 NS x 110 EW	20	None	N/A	4	Webb 1959

Table 4

Variation in Mound Documentation



Site	Number of Burials	Number of Females	Number of Males	Pages of Associated Original Documentation	Source(s)
15Be3	91	18	16	589	Milner & Jefferies 1987; Taxman 1990; Webb & Elliott 1942
15Be15	8	1	3	62	Webb 1943b
15Be17	15	4	1	95	Taxman 1990; Webb 1943b
15Be20	15	2	7	108	Webb 1943a
15Be32	14	4	9	87	Webb 1943a
15Bh15	7	6	1	88	Webb 1941b
15Fa11	8	4	1	39	Webb 1941a
15Fa152	9	-	-	89	Webb & Haag 1947
15Jo2	5	1	-	300	Webb 1942
15Jo9	25	5	10	166	Webb 1942
15Mm3	42	11	22	249	Funkhouser & Webb 1935; Taxman 1990; Webb & Funkhouser 1940
15Mm6	22	7	8	334	Taxman 1990; Webb 1940
15Mm7	2	-	-	0	Webb 1940
15Ms27	56	14	27	331	Webb 1959
Total	**319**	**77**	**105**	**2537**	

collection for this research (excluding plan, contour, or profile maps of the mounds themselves).

Mound (re)construction and chronology.

Although the two scenarios discussed above can be differentiated from each other using mound-level comparisons, discerning between the two variations of Scenario 2 necessitates the ability to assign members of a mound's burial population to the specific construction episode within which they were interred. Despite a clear recognition that some Adena mounds had been built in multiple stages (e.g., Webb, 1940,1959; Webb & Elliott, 1942), Webb had a tendency to discuss individual mounds as a single site, essentially compressing multiple episodes of construction into one, albeit protracted, event (although see Webb, 1940 for one instance in which certain burials were assigned to specific construction episodes). Perhaps as a result of this tendency toward compression, the spatial data presented in his published reports are typically, although not always, limited to a plan map of a mound and its associated features (see Table 5). While three-dimensional proveniences are often provided for individual burials, the surface elevations to which such proveniences refer are typically absent from the published reports. The privileging of plan maps over profiles combined with the decoupling of the provenience system from a fixed vertical anchorage renders the published data insufficient for the reconstruction of mound stratigraphy.

Previous work, however, has indicated that the original field documentation includes sufficient information to permit analyses of mound structure and construction sequence. Using a series of 20 profile maps generated during the excavation of the larger

Table 1

Spatial Information per Mound

Site Name and Number	Published Spatial Data	Spatial Data Used in Reconstructions
15Be3	4 mound profiles	22 mound profiles
	Plan map of mound and associated features	Surface stake elevations
	Plan map of paired-post structure	Burial Proveniences
	Reconstructed surfaces of eight different episodes of construction	
15Be15	Plan map of post structures and associated features	4 mound profiles
		Contour map
		Surface stake elevations
		Burial Proveniences
15Be17	Plan map of mound and associated features	2 mound profiles
		Contour map
		Surface stake elevations
		Burial Proveniences
15Be20	Plan map of mound and associated features	23 mound profiles
	Plan map of paired-post structure	Surface stake elevations
		Burial Proveniences
15Be32	N/A	7 mound profiles
		Surface stake elevations
		Burial Proveniences
15Bh15	Contour map of mound with overlay of associated features	8 mound profiles
	Plan map of paired-post structure	Contour map
		Burial Proveniences
15Fa11	6 mound profiles	7 mound profiles
	Plan map of central pit and associated features	Surface stake elevations
		Burial Proveniences
15Fa152	Plan map of the excavation and associated features	Surface stake elevations
		Burial Proveniences
15Jo2	Plan map of paired-post structures and associated features	N/A
15Jo9	Plan map of paired-post structures and associated features	11 mound profiles
		Contour map
		Burial Proveniences
15Mm3	Plan map of mound and associated features	Surface stake elevations
		Burial Proveniences
15Mm6	Contour map of mound and vicinity	4 mound profiles
	Contour map of mound with overlay of associated features	Contour map
	Plan map of paired-post structures	Surface stake elevations
		Burial Proveniences
15Mm7	Contour map of mound and vicinity	2 mound profiles
		Burial Proveniences
15Ms27	Schematic profile	7 mound profiles
		Contour map
		Surface stake elevations
		Burial Proveniences

of the Robbins mounds (15Be3), Milner and Jefferies (1987) measured the elevations of major fill episodes at intervals of 2.5 feet across each profile and used the resulting data to demonstrate the existence of eight major stages in the construction of this large burial mound. Thirty years later, Henry (2017) utilized a Geographic Information System to partition the Robbins burial population into the eight construction episodes identified by Milner and Jefferies (1987) and provided descriptions of diachronic changes in the mortuary practices undertaken at this location. Together, the results of these studies suggest that the reconstruction of mound stratigraphy is not only feasible but also has the potential to elucidate previously unrecognized spatiotemporal patterning in the mortuary practices attributed to Adena. Given these observations as well as the importance of mound stratigraphy for differentiating between the variants of Scenario 2 as presented above, mound reconstruction was undertaken for all mounds in the research sample except the smaller of the C&O mounds (15Jo2) (see below).

For the reconstruction of mound stratigraphy and three-dimensional structure, the most reliable sources of information are the profile maps generated during the course of excavation. This data source is far from perfect, however, since the recording of mound profiles and the structural divisions that they delineated was, at least for the larger mounds, a continuous process of interpretation. The excavation of the larger Robbins mound (15Be3), for example, necessitated that it be terraced in order to comply with safety regulations. This excavation strategy resulted in many of the profiles from this mound being constructed by piecing together more than 15 different profile maps. Changes in the character of clays or soils used for mound construction that were initially considered to be of structural importance were later found to be isolated anomalies, and so the profile maps included in the original field notes are often the product of an iterative revision process (Webb & Elliott, 1942). Although this was not the case for smaller and less complex mounds, other complications arose in the forms of inclement weather and compressed excavation schedules. While the original profile maps remain the best sources of information for the reconstruction of the Adena mounds included in this research, it is important to recognize that they are still an abstraction and, as such, are likely subject to some degree of error.

Stratigraphic data collection and analysis.

Although the original profile maps are curated at the University of Kentucky, many of them were unable to be located during the period in which data collection was undertaken. Much of the original field documentation for these mounds, however, had been previously transferred to microfilm and so, when original profile maps could not be located, digital photographs were taken of their microfilm projections. Using Adobe Photoshop Elements 11, the resulting images were then altered to enhance contrast and readability and manually aligned and combined into single panoramic images for each mound profile. While this method of data collection was less than ideal, it was considered to be the best remaining option given the unavailability of the original profiles and constraints imposed by both time and equipment. The spatial data employed in the reconstruction of each mound is provided in Table 5.

The Fiji distribution of ImageJ (Schindelin et al., 2012; Schneider et al., 2012) was used for all measurements of mound elevation and for measurement calibration. Using the available scans and constructed images of mound profiles, elevations were recorded for each individual mound layer at intervals of 1.25 feet. Additional measurements of elevation were recorded at the points of intersection between mound layers as well as at major points of inflection within a given layer's curvature, thereby providing a more accurate reconstruction of mound surface contours than the methodology used by Milner and Jefferies (1987). As profile maps were originally recorded on graph paper and with a marked scale, the grid on the graph paper itself was used to calibrate measurements. To ameliorate any distortions introduced as a result of the data collection protocol, measurement calibration was checked at intervals of 2.5 feet and adjusted as necessary any time the measured distance differed from the actual distance by more than 0.03 feet. All measured elevations used for mound reconstruction should therefore be accurate to within 0.9 inches of the elevations recorded on the original profile maps. Measured elevations were not converted to the metric system as this would unnecessarily complicate the process of mound reconstruction and introduce an additional source of measurement error.

All measurements were stored as three dimensional coordinates in Excel spreadsheets (one spreadsheet per mound, one worksheet per surface), with *x*-*y*-coordinates derived from the mound's excavation grid and *z*-coordinates given by the elevations measured as described above. The Kriging procedure operationalized within Golden Software's Surfer 15 was used to generate three-dimensional surfaces from the sets of coordinates pertaining to specific mound layers, and mound surfaces were plotted both individually and sequentially in order to evaluate the construction sequence for a given mound. Individual burials were then plotted within these reconstructions using proveniences derived from the original burial forms. Polygons were drawn around each individual skeleton (or group of individuals in the case of some multiple burials) and the resulting vertices were used as coordinates to define a surface representing the plane of the burial. These surfaces were calculated and plotted in the manner described above for mound surfaces. Final attribution of a burial to a specific construction episode was based on evaluation of their placement within the mound, the recorded depth of the tomb in which they were interred (where applicable), and consideration of the interpretations made by the original excavators.

In cases where prior disturbance of mound contours had occurred (e.g., looting pits) this protocol was adjusted and elevations were only measured where considered to be reasonably in line with intact mound contours, relying on the gridding method to extrapolate missing measurements. In some cases, profiles were either unreadable or missing in their entirety. When this occurred, mound surfaces were extrapolated from surface stake elevations and the constructed surface was used to estimate missing measurements along a profile. For example, if the location of a burial referenced a surface stake elevation along the 85-foot profile, but data was only available for the 80- and 90-foot profiles, the extant data was used to generate a surface and that surface was then used to estimate the elevations along the 85-foot profile. For certain mounds (e.g., the Fisher mound and the larger of the C&O mounds), the only usable spatial information came from the recorded surface elevations of the stakes used to establish the excavation grid, thereby precluding the mapping of discrete construction episodes. The coordinates marking stake locations, however, were sufficient for plotting the relative locations of burials and permitting the evaluation of their distribution within these mounds. While in most cases the resulting reconstructions are in good agreement with both original and published information, this is not always the case. For example, Burial 1 from the larger C&O mound (Jo9.1) is listed by Webb (1942: 320) to be "at a depth of 16.5 feet," whereas the elevation of this burial is estimated to be 10.3 feet above the established baseline by the methodology used here. Based on the available field documentation, it is believed that, in this case, Webb's published description may be the result of a typographic error.

In some cases, burials could simply not be mapped. Burials 20 and 24 from the larger C&O mound (Jo9.20 and Jo9.24) had proveniences that were tied to reference stakes for which there was no available elevation and for which none could be reasonably estimated. Burials 21-23 and 25 from the same mound (Jo9.21, Jo9.22, Jo9.23, and Jo9.25) have locations that were estimated, as the only available information pertaining to their provenience was provided in the published report for this site, where their locations are described as "within the village midden" under various reference stakes (Webb, 1942: 328). These cremations were therefore plotted as 2-ft squares centered on the *x*-*y*-coordinates associated with their reference stake and given an elevation that placed them just above the mound floor. None of the burials from the smaller C&O mound (15Jo2) were able to be mapped as the pit with which they were associated lay outside of the grid for which there was available spatial information. As a result, and since these burials can reasonably be interpreted as deriving from the same construction episode, 15Jo2 was not reconstructed since doing so would have contributed nothing to the current analysis. Burial 2 from the smaller of the Wright mounds (Mm7.2) was also unable to be mapped due to a lack of adequate spatial anchoring.

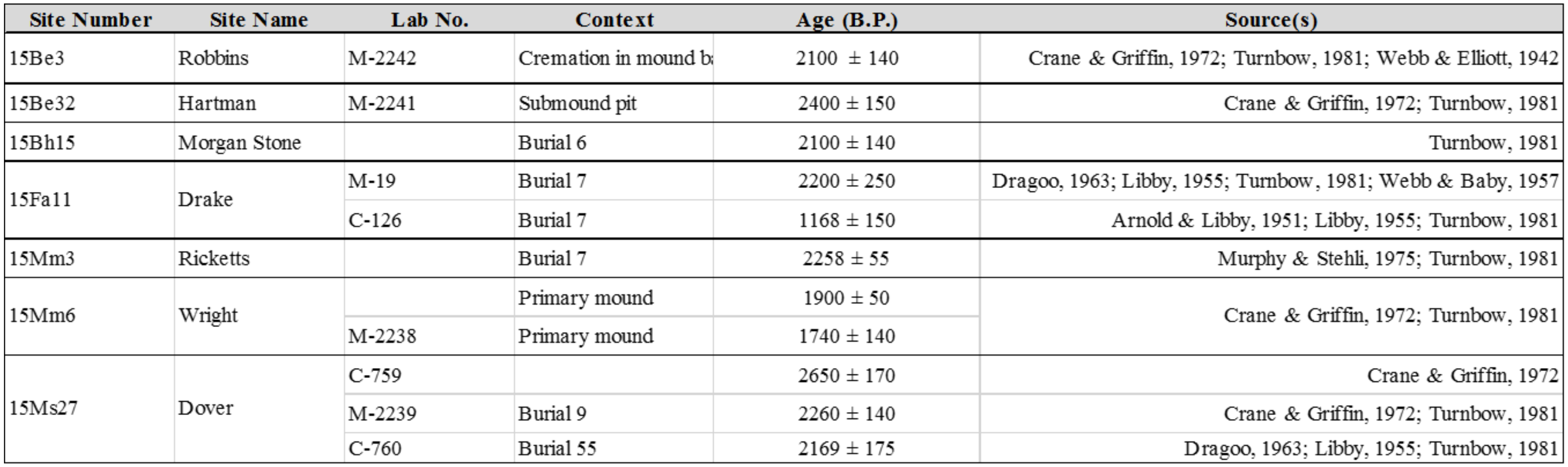
The Ricketts mound (15Mm3) presented its own suite of reconstruction complications. This is at least in part due to the fact that it was formally excavated twice – once in 1934 (Funkhouser & Webb, 1935) and again in 1939 (Webb & Funkhouser, 1940). Although the grid systems used in these two periods of excavation are alleged to be reconcilable (Webb & Funkhouser, 1940: 212), no linkage between them was discovered during the course of the present research. Due to this unfortunate circumstance, none of the burials recovered during the 1934 excavations can be assigned a provenience relative to the mound surface and can only be attributed to the lowermost four feet of the mound. Their horizontal positions relative to one another are depicted in the frontispiece of the original report (Funkhouser & Webb, 1935), but this spatial distribution can neither be assigned elevations nor anchored to the excavation grid that was employed during the second visit to the mound. As a result, the reconstruction of the Ricketts mound undertaken here only includes the surface of the mound and the locations of the burials as documented during the 1939 excavations.

Radiometric dating.

As discussed above, one of the advantages of the approach developed in the current research is that evaluation of the degree to which a particular mound conforms to the expectations of either of the scenarios under investigation neither assumes nor requires the contemporaneity of different mounds. This is not to say, however, that information regarding the chronological placement of individual mounds or the length of time over which a mound was constructed and altered is irrelevant. Establishing plausible mound contemporaneity will lend legitimacy to comparisons made between both formally

Table 6

Uncorrected Radiocarbon Dates from Previously Submitted Samples



Site Number	Site Name	Lab No.	Context	Age (B.P.)	Source(s)
15Be3	Robbins	M-2242	Cremation in mound b	2100 ± 140	Crane & Griffin, 1972; Turnbow, 1981; Webb & Elliott, 1942
15Be32	Hartman	M-2241	Submound pit	2400 ± 150	Crane & Griffin, 1972; Turnbow, 1981
15Bh15	Morgan Stone		Burial 6	2100 ± 140	Turnbow, 1981
15Fa11	Drake	M-19	Burial 7	2200 ± 250	Dragoo, 1963; Libby, 1955; Turnbow, 1981; Webb & Baby, 1957
		C-126	Burial 7	1168 ± 150	Arnold & Libby, 1951; Libby, 1955; Turnbow, 1981
15Mm3	Ricketts		Burial 7	2258 ± 55	Murphy & Stehli, 1975; Turnbow, 1981
15Mm6	Wright		Primary mound	1900 ± 50	Crane & Griffin, 1972; Turnbow, 1981
		M-2238	Primary mound	1740 ± 140	
15Ms27	Dover	C-759		2650 ± 170	Crane & Griffin, 1972
		M-2239	Burial 9	2260 ± 140	Crane & Griffin, 1972; Turnbow, 1981
		C-760	Burial 55	2169 ± 175	Dragoo, 1963; Libby, 1955; Turnbow, 1981

After Applegate (2008:456-458 (Table 5.26)) and Hays (1994:48 (Table 2)).

similar mortuary contexts and phenotypically similar individuals deriving from separate mounds. Further, an understanding of the span of time represented by the mounds in the research sample will allow for further evaluation of the validity of the assumption of stability in terms of regional biological variability and contribute to our overall understanding of Adena chronology.

Since the inception of radiocarbon dating, a number of samples derived from the mounds in the research sample have been submitted for evaluation (see Table 6). Despite this, the chronology for these Adena sites remains poorly understood. This is, in part, due to the fact that many of these samples were submitted when radiocarbon dating was still a relatively new technique and laboratories were using the now abandoned carbon black method (Griffin 1974: xv). Further, the majority of these dates were obtained prior to 1975 and, while allowing for the formation of a rough chronological sequence, the wide margins of error associated with these dates allow for the possibility of alternative chronologies. In addition, and despite the fact that many mounds appear to have been constructed in multiple stages, series of dates from any given mound are either absent (e.g., the larger Robbins mound, 15Be3), unrepresentative (e.g., the larger Wright mound, 15Mm6), or problematic (e.g., the Dover Mound, 15Ms27). Resolution of these internal mound chronologies can provide estimates for how long different mounds were in use while the submission of new samples for radiometric dating from the sites included in the research sample will increase the resolution of and potentially revise the extant Adena chronology.

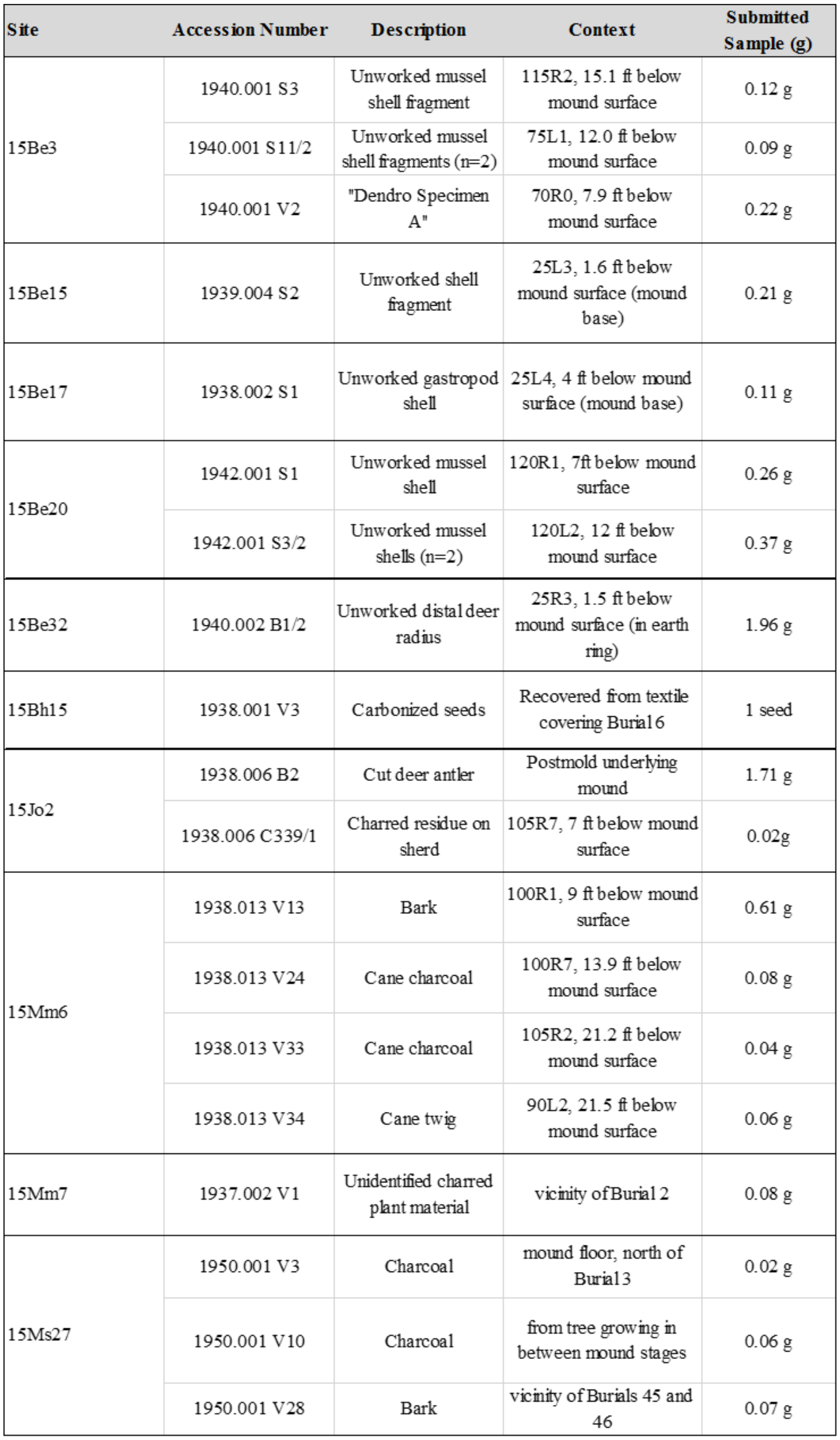
To this end, and in accordance with the policies of the William S. Webb Museum of Anthropology that prohibit destructive analyses of human bone or grave goods, 19 samples were selected from museum collections and submitted to the Woods Hole Oceanographic Institution’s National Ocean Sciences Accelerator Mass Spectrometry facility (NOSAMS) for radiocarbon dating. Accelerator mass spectrometry dating (AMS) has two major advantages over earlier radiometric techniques. First, AMS provides more precise estimates of age, frequently with error estimates of less than 40 years. Second, AMS uses much smaller samples of organic material than earlier techniques, which is an important consideration in the undertaking of any destructive analysis. Samples were selected in order to achieve two different goals: to obtain absolute dates for as many sites as possible and to obtain series of dates where sufficient material from secure stratigraphic contexts was available. Within this guiding framework, preference was given to samples consisting of materials which are likely to give the best dates (e.g., seeds or plant remains). Less desirable materials (e.g., mussel shell) were selected when better options were unavailable. Table 7 provides a description of the samples submitted as well as the contexts from which they derive. This selection of samples will provide new absolute dates for 10 of the 14 sites in the research sample (including five mounds for which no dates are currently available) as well as a series of three absolute dates from the larger Robbins mound (15Be3), two from the Crigler mound (15Be20), two from the smaller C&O mound (15Jo2), four from the larger Wright mound (15Mm6), and three dates from the Dover mound (15Ms27).

Assessing formal similarity in mortuary practices.

Body treatment, tomb form, and the kinds and quantities of grave goods associated with Adena mortuary practices have long been used to make inferences regarding the

Table 7

Samples Submitted for AMS Radiocarbon Dating



Site	Accession Number	Description	Context	Submitted Sample (g)
15Be3	1940.001 S3	Unworked mussel shell fragment	115R2, 15.1 ft below mound surface	0.12 g
	1940.001 S11/2	Unworked mussel shell fragments (n=2)	75L1, 12.0 ft below mound surface	0.09 g
	1940.001 V2	"Dendro Specimen A"	70R0, 7.9 ft below mound surface	0.22 g
15Be15	1939.004 S2	Unworked shell fragment	25L3, 1.6 ft below mound surface (mound base)	0.21 g
15Be17	1938.002 S1	Unworked gastropod shell	25L4, 4 ft below mound surface (mound base)	0.11 g
15Be20	1942.001 S1	Unworked mussel shell	120R1, 7ft below mound surface	0.26 g
	1942.001 S3/2	Unworked mussel shells (n=2)	120L2, 12 ft below mound surface	0.37 g
15Be32	1940.002 B1/2	Unworked distal deer radius	25R3, 1.5 ft below mound surface (in earth ring)	1.96 g
15Bh15	1938.001 V3	Carbonized seeds	Recovered from textile covering Burial 6	1 seed
15Jo2	1938.006 B2	Cut deer antler	Postmold underlying mound	1.71 g
	1938.006 C339/1	Charred residue on sherd	105R7, 7 ft below mound surface	0.02g
15Mm6	1938.013 V13	Bark	100R1, 9 ft below mound surface	0.61 g
	1938.013 V24	Cane charcoal	100R7, 13.9 ft below mound surface	0.08 g
	1938.013 V33	Cane charcoal	105R2, 21.2 ft below mound surface	0.04 g
	1938.013 V34	Cane twig	90L2, 21.5 ft below mound surface	0.06 g
15Mm7	1937.002 V1	Unidentified charred plant material	vicinity of Burial 2	0.08 g
15Ms27	1950.001 V3	Charcoal	mound floor, north of Burial 3	0.02 g
	1950.001 V10	Charcoal	from tree growing in between mound stages	0.06 g
	1950.001 V28	Bark	vicinity of Burials 45 and 46	0.07 g

sociopolitical structure of Adena societies. Greenman, after drawing a parallel between the use of red pigment on the tibiae of the individual interred in the Coon mound and ethnohistoric accounts of Choctaw burial practices, goes on to state that

> Taking into consideration the facts that the Coon Mound contained the remains of only one individual, and that an elaborately constructed tomb was covered with thirty feet of earth, the conclusion that the individual represented was a leader of some kind among his people is probably not far from the truth. (1932: 410)

Webb, too, noted that the individuals given mound burial were a select portion of the population and, from this as well as the amount of effort involved in the construction of log tombs and the subsequent placing of earth, suggested that such individuals must have held a high social status within their society (Webb & Snow, 1974: 71, 170). In contrast, Webb held cremations to be fortuitously preserved burials of commoners (Webb & Snow, 1974: 171-172). Dragoo hypothesized that the elaboration of mortuary practices exhibited by sites that he characterized as Late Adena was the result of the rise of a "ruling class" (1963: 277).

These suppositions and their underlying logic are precursors of the energy expenditure hypothesis that was formalized by Tainter (1977) and drawn on, alongside the work of Peebles and Kus (1977), by Shryock (1987) in his assertion that the mortuary remains from the larger Wright mound (15Mm6) indicate a ranked society. Shryock (1987), in fact, concluded that Adena sociopolitical organization was best characterized as a simple chiefdom (*sensu* Steponaitis, 1978). Mainfort (1989) noted that Shryock's

(1987) analysis ignored eight of the 22 burials present in the Wright mound and argued that many of the features characterized by Shryock as tombs intended for individual interments were more likely to have been mortuary processing crypts that were reused over time. Arguing that age-at-death seems to have been the determining factor for mound interment at Wright, Mainfort (1989) concluded that Adena societies were characterized by a hierarchy of achieved, not ascribed, statuses. McConaughy (1990), suggested that the bias toward adult males exhibited by the burial population of most mounds combined with the interment of exotic goods accompanying a relatively small number of individuals is more consistent with ascribed status. Further, he viewed the presence of dismembered remains or isolated skulls as “sacrificial burials” and concluded that their occurrence indicates that Adena societies were ranked. These conclusions, however, are questionable in light of Mainfort’s (1989) arguments as well as the fact that a reanalysis of the skeletal population from the larger Robbins mound (15Be3) found that males and females were interred in nearly equal numbers (Milner & Jefferies, 1987).

Where the works discussed above use variability in mortuary practices to approach the topic of internal divisions within Adena sociopolitical organization, other researchers have used mortuary variability as a means of addressing the frequency and intensity of group interaction. Hays (1994), investigating manifestations of the Adena mortuary program in the Upper Scioto River Valley of central Ohio, noted that the degree of formal variability exhibited by mound interments located along larger drainages was much greater than that exhibited by interments from mounds located in smaller, more peripheral drainages. Hays (1994) suggested that the stability in mortuary practices that characterized the smaller drainages resulted from group isolation and that, in contrast, more frequent interaction with other groups would result in greater diversity of burial form and attendant ritual. Focusing on Adena mounds in Kentucky, Henry (2013) has argued that formal variability in terms of mound structure and tomb construction reflects a heterarchical leadership structure and that increased group interaction would have resulted in a greater breadth of knowledge and experience that could be drawn on when engaging in mortuary practices and, consequently, a greater variety of forms that burials could take. In other words, the mortuary practices of corporate groups who frequently interacted with other groups would exhibit more variability than the mortuary practices of corporate groups who were relatively insular.

The work of both Hays (1994) and Henry (2013) implicitly suggests that formal similarity of the interments from separate mounds can, amongst other things, be attributed to frequent interaction between the groups responsible for those interments. The use of single-trait comparisons (e.g., Henry, 2013), however, may be misleading in that, as Binford (1971) has warned, the same artifact or behavior may have different meanings for different groups. A number of scholars have therefore emphasized the analytical importance of the context in which artifacts are deposited and recovered (e.g., Anderson, 1969; Brown, 2000; Walker, 1995, 2008). Drawing upon her work among Algonquian and Numic speaking peoples, for example, Zedeño (2009, 2013) has suggested that the associations that an object has with other objects or with certain places can fundamentally alter its qualities. In comparison with the investigation of the spatial distribution of single traits, then, focusing on the repeated occurrence of a constellation of burial traits is more likely to indicate a shared understanding of meaning and, consequently, shared practices resulting from group interaction. For this reason, the analysis presented below emphasizes the co-associations between kinds and characteristics of grave furniture, body treatment, and depositional context among Adena burials.

Mortuary data collection and analysis.

The architecture of individual graves as well as the artifacts included in them is typically described within the published site reports. Such descriptions, however, are often sufficiently ambiguous as to undermine any detailed comparisons. For this reason, both published descriptions of burial features and the original field documentation created during their excavation were used to gather information concerning grave architecture (the use of clay, timber, bark, etc.), the treatment and placement of individuals within graves (single or multiple interments, body positioning, cremation, reburial, etc.), and the number, kinds, and placement of artifacts recovered from mortuary contexts. When discrepancies arose between field records and published reports, the published descriptions were given priority in terms of the association of individuals with specific burial features as these represented the considered interpretation and synthesis of the notes of the excavators. Similarly, preference was given to the published reports regarding the description of artifacts as laboratory analysis tended to correct misidentifications of objects made during excavation. In general, small numbers of flint flakes or other debitage as well as small, isolated potsherds were taken to be incidental inclusions in fill unless compelling contextual evidence suggested otherwise. In contrast, information regarding the placement of artifacts was drawn preferentially from the original records as these often provided more detailed descriptions and/or annotated plan maps of individual burials. Information gathered was entered into an Excel spreadsheet and used to compile four data sets: one comprising architectural traits of individual graves; one recording the treatment of individuals in terms of body position, orientation, and the placement of artifacts relative to the body; one concerned with the form, material, and quantity of artifacts in each grave; and the fourth combining the first three. Data were partitioned in this way in order to facilitate the identification of shared practices pertaining to tomb construction and body treatment separately from those pertaining to grave accoutrements while still permitting evaluation and comparison of the entire suite of archaeologically recognizable behaviors that resulted in each interment.

As the resulting data sets were composed of both categorical (e.g., flexed, extended supine, extended prone) and interval data (e.g., 3 projectile points, 2 copper bracelets), the dissimilarity coefficient of Gower (1971) as implemented in the ‘daisy’ function included in the ‘cluster’ package for the R statistical environment (Maechler et al., 2013) was used to create dissimilarity matrices for all burials included in this research for which information was available (one matrix of pairwise dissimilarities between individuals for each of the four data sets described above). Following this, the resulting distance matrices were subjected to *k*-medoids clustering using the Partitioning Around Medoids (PAM) algorithm (Kaufman & Rousseeuw, 1987). *K*-medoids is a method of clustering based on partitioning that, for these analyses, initially chooses *k* burials (i.e., medoids) from the data set to serve as each cluster’s center. The algorithm is run iteratively, changing the burials assigned as medoids and reassigning cluster membership until *k* medoids have been selected that minimize the sum of pairwise dissimilarities between the medoids and the other burials assigned to their respective clusters. This method is considered advantageous for the purposes of this research for several reasons. First, in centering clusters on actual observed burials, *k*-medoids clustering makes the interpretation of clusters more intuitive. Second, it is robust to noise and outliers. Third, this technique can be used with distance measures other than Euclidean distances – a necessary feature given the nature of the data involved. Since there was no reason to assume an optimal number of clusters before analysis, silhouette widths (Rousseeuw, 1987) were used to evaluate the fit of a number of different cluster solutions. The spatial distributions (in terms of mound and construction episode) of both burials falling within the same cluster and pairs of burials with small inter-individual distance measures were then evaluated in order to determine how well they conformed to the expectations of the two scenarios described above.

Assessing biological variability.

Early physical anthropology studies concerning Adena involved the collection, description, and measurement of skeletal remains (Milner & Smith, 1986, 1998). Particular emphasis was placed on the description and measurement of crania, often resulting in the meticulous reconstruction of fragmentary specimens (although less effort was made regarding the accurate placement of the dentition) (e.g., Webb, 1940; Webb & Elliott, 1942; Webb & Snow, 1945). Due in part to the influence of Hooton on Snow, this emphasis was in line with the prevalent research interests in physical anthropology at the time, especially efforts to establish linkages between physical “types” and material culture (Armelagos, et al., 1982; Buikstra, 1979). Consideration of Adena cranial shape led to speculation concerning the geographic origin of Adena populations and it was hypothesized that Adena groups migrated into the Ohio Valley from somewhere near the Gulf of Mexico. Hopewell, it was then argued, arose from the interactions (both biological and cultural) of this migrant population with those peoples already residing in the region (Webb & Snow, 1945). Such suppositions were quickly dismissed (e.g., Dragoo, 1963), but questions of population origin and gene flow remained central to the few formal biological distance studies that have been conducted using Adena skeletal remains.

Biological distance (or biodistance) analyses use phenotypic data from the skeleton as a proxy for genetic information in order to reconstruct the patterns and effects of gene flow, migration, and/or genetic drift in past populations (Buikstra et al., 1990; Stojanowski & Schillaci, 2006). As articulated by Stojanowski and Schillaci, the theoretical premise upon which biodistance analyses are based is that "populations that exchange mates become more phenotypically similar over time and those that do not become more dissimilar at a rate determined by their effective population size" (2006: 50-51). As these researchers note, this premise entails a number of assumptions. First, allele frequencies among neighboring populations located in similar environments will be affected by the processes of gene flow and genetic drift, provided mutation rates and the effects of natural selection are held constant. Second, archaeological skeletal samples are accurate reflections of past populations. Third, changes in allele frequencies will produce skeletal phenotypic changes that are in some way quantifiable. Fourth, the effects of the environment on skeletal traits within the study sample are either minimal or random. Finally, genetic inheritance of skeletal traits is additive, and closely related individuals will exhibit phenotypic similarities (Stojanowski & Schillaci, 2006). Within this framework, biodistance analyses have been applied to a broad range of anthropological questions and used over a wide variety of spatial and temporal scales.

Although biodistance analyses can be undertaken using postcranial remains (e.g., Bondioli et al., 1986; Case et al., 1998; Gejvall & Henschen, 1968; Velemìnksỳ & Dobisiková, 2005), they more typically employ information pertaining to the size and shape of the cranium (e.g., Alt & Vach, 1992; Bartel, 1981; Buikstra, 1972, 1977, 1980; Byrd & Jantz, 1994; Howells, 1973, 1989, 1995; Konigsberg, 1990; Lane, 1977; Lane & Sublett, 1972; Larsen et al., 1995; Schillaci & Stojanowski, 2005; Strouhal, 1992) or the dentition (e.g., Adachi et al., 2003; Corruccini & Shimada, 2002; Howell & Kintigh, 1996; Jacobi, 1996; Kelley, 1989; Stojanowski, 2001, 2003,2005; Turner, 1985, 1986; Vach & Alt, 1993). This preference is, in part, due to an understanding of the heritabilities of such phenotypic characteristics. Heritability, or “the proportion of the total phenotypic variance that is associated with genetic variance in a specific sample with a specific genetic composition and environmental context” (Vitzthum, 2003: 541), should not be interpreted as the degree to which the expression of a given phenotype is genetically determined but, rather, should be understood as a measure of “whether or not there is any genetic variation in a specific sample upon which natural selection could act” (Vitzthum, 2003: 544). While heritability estimates will by definition be specific to the sample from which they are made, most heritability estimates for phenotypic characteristics of the cranium are in the vicinity of $h^2 = 0.55$ (Stojanowski & Schillaci, 2006). Further, numerous studies have demonstrated that the analysis of phenotypic traits can produce results consistent with those derived from genetic data or expected from documented pedigrees (e.g., Adachi et al., 2003; Matsumura & Nishimoto, 1996; Shinoda & Kanai, 1999; Shinoda et al., 1998; Spence, 1996; Velemìnksỳ & Dobisiková, 2005).

The use of phenotypic characteristics of the cranium and dentition as proxies for genetic information, however, is neither simple nor straightforward. Regarding the dentition, recent work using mouse models has led to the development of the patterning cascade model for tooth morphogenesis (e.g., Jernvall 2000; Jernvall & Jung 2000). Briefly, this model suggests that tooth morphogenesis is accomplished by iterative signaling cascades in which embryonic signaling centers in the developing tooth, called enamel knots, spatially regulate the differential proliferation of cells in the inner enamel epithelium and the neural crest-derived mesenchyme. The differing speeds at which these tissues grow causes folding of the epithelium and, consequently, determines cusp number and shape (Jernvall 2000; Jernvall & Jung 2000; Thesleff et al. 2001). Importantly, since this is an iterative process, small changes to this patterning cascade, either from changes in genotype or environmental disruption of the developmental process, can affect multiple dental characters simultaneously, thereby reducing character independence (Jernvall & Jung 2000; Kangas 2004; Moormann et al. 2013; Salazar-Ciudad & Jernvall 2010). The applicability of this model to human dentition seems to be confirmed in that it has been used to accurately describe the occurrence of morphological variants of the tooth crown (e.g., Hunter et al. 2010; Moormann et al. 2013) and predict postcanine tooth size (Evans et al., 2016) as well as to explain dental differences in monozygotic twin pairs where, ostensibly, genotype and environment are shared (Townsend et al. 2003, 2005). Recent research concerning cranial morphology suggests that aspects of cranial shape are likewise differentially affected by both environmental and genetic variables (e.g., Harvati & Weaver 2006; Roseman & Weaver 2004; von Cramon-Taubadel 2009, 2011). For example, while biological distance matrices based on aspects of cranial morphology (e.g., the shape of the temporal bone) are highly correlated with distance matrices based on neutral genetic loci (e.g., Harvati & Weaver 2006; von Cramon-Taubadel 2009, 2011), the unconsidered use of cranial morphology to infer population history can be problematic because environmental selection pressures can, over time, bring about convergent or divergent phenotypes regardless of shared ancestry (Roseman & Weaver 2004). The expression of both metric and non-metric traits can also be affected by age, sex, activity, and pathology (Saunders & Rainey 2008); therefore, traits under consideration for use in a biological distance analysis must be evaluated for the presence of such associations. In summary, while phenotypic traits reflect underlying genetic variability, they do not do so in a simple or predictable fashion. There is not a one-to-one correspondence between genotype and phenotype. Therefore, the archaeological use of phenotypic data to infer biological affinity should be cautious, considered, and rely heavily on depositional context.

Prior biodistance analyses of Adena populations are few in number, probably owing in part to the fragmentary state of much of the recovered skeletal material. In Ohio, such studies have focused on the relationship of Adena populations to other archaeological populations in the region. Using both measurements and nonmetric variations of the cranium, Sciulli and colleagues have demonstrated that Ohio Adena populations are the product of and contribute to long-term biological continuity in the region, thus confirming that neither the rise of Adena ceremonialism nor the development of Hopewell resulted from any large-scale migration of populations into the area (Sciulli et al., 1984; Sciulli & Mahaney, 1986). Taxman (1990, 1994), using the same suite of cranial nonmetric traits employed by Sciulli and colleagues (1984), documented the presence of significantly greater morphological variation between Adena populations in Kentucky and those in Ohio than existed within the Kentucky populations. Based on this observation, Taxman (1990, 1994) has argued that the Ohio River presented a substantial barrier to mate-exchange between Adena populations on either side of it. Based upon the spatial distribution of styles of bone pin, Jefferies (2004) has argued that some form of social boundary existed in the vicinity of the Ohio River during the Archaic Period. Taxman's (1990, 1994) findings may therefore represent the biological consequences of longstanding patterns of interregional interaction. Finer-scale patterns of group interaction, such as are the topic of the current research, have yet to be addressed.

Skeletal data collection, pretreatment, and analysis.

Although osteological data derived from individuals interred in Adena mounds were frequently included in the published reports, the accuracy of individual age and sex assessments has been called into question (Milner & Jefferies, 1987; Taxman, 1994). As the expression of both metric and non-metric traits used within biodistance analyses can be affected by age, sex, and pathology, all available sets of skeletal remains (*n* = 278, see Table 8) were evaluated and any information pertinent to the estimation of sex and/or age-at-death was recorded. Estimations of age-at-death were based on dental development, eruption, and wear (Smith, 1991); epiphyseal fusion (Albert & Maples, 1995; Baker et al., 2005; Scheuer & Black, 2000; Sherwood, 2015; Shirley & Jantz,

Table 8

Phenotypic Data Recorded

Site	Sets of Skeletal Remains Observed	Cranial Nonmetric Data Recorded	Temporal Bone Morphometric Data Collected	Dental Nonmetric Data Collected	Cervicometric Data Collected
15Be3	85	29	24	17	23
15Be15	4	1	2	1	1
15Be17	12	9	8	5	5
15Be20	16	1	1	5	3
15Be32	17	4	3	3	5
15Bh15	7	4	4	3	3
15Fa11	0	0	0	0	0
15Fa152	15	0	0	3	3
15Jo2	0	0	0	0	0
15Jo9	22	0	0	1	0
15Mm3	51	19	18	14	17
15Mm6	22	14	13	13	15
15Mm7	0	0	0	0	0
15Ms27	27	8	7	7	8
Total	**278**	**89**	**80**	**72**	**83**

2011); and age-related changes of the symphyseal face of the pubic bone (Hartnett, 2010a), the sternal rib (Kunos et al., 1999; Hartnett, 2010b), the auricular surface of the ilium (Osborne et al., 2004), and the acetabulum (Calce, 2012). The presence, extent, and location of osteophytic lipping associated with arthritis was also recorded. Final estimates of age-at-death represent composites of all available age indicators for any given individual. Where remains were too fragmentary to permit observation of skeletal age indicators, reference was made to the original burial recording forms as well as to Snow's unpublished notes in order to determine whether it could reasonably be assumed that the remains represented an individual who had attained skeletal maturity. In all such cases, the generic label of "Adult" was applied.

The estimation of sex was carried out in step-wise fashion. Where the morphological characteristics of the pubic bone described by Phenice (1969) were observable and/or where cranial morphology was both internally consistent and unambiguous according to standard protocols (Buikstra & Ubelaker, 1994), the estimation of sex was straightforward and considered to be certain. Using these individuals, a linear discriminant analysis was carried out using the 'lda' function in the 'MASS' package for the R statistical environment (Venables & Ripley, 2002) in order to find the best-fit function for the estimation of sex based on cervical diameters of the mandibular canine. The resulting discriminant function correctly classified all nine known females and 21 out of 22 known males, a misclassification rate of 3.2%. Using a leave-one-out cross-validation procedure resulted in a misclassification rate of 12.9%, although this still suggests that using the cervical dimensions of the mandibular canine can provide an accurate estimation of biological sex approximately 87% of the time. This discriminant function was then used to estimate sex for all individuals for whom mandibular canine cervical measurements were available and the estimates produced were considered alongside other available morphological evidence. One of the advantages of this method is that, as part of its output, the discriminant function provides the probability that the individual belongs to the group to which it has been assigned. For the purposes of this research, if this probability exceeded 75%, then the estimate produced by the discriminant function was considered to be confident. If the probability was between 65% and 75%, then sex was estimated as “probable” or, if in agreement with other available morphological information, as confident. If the probability was less than 65% and in conflict with other morphological indicators of sex, then the remains were re-evaluated and an estimation was reached based on the balance of the evidence. Drawing inspiration from the work of Wilbur (1998), three linear dimensions of the talus (maximum length, trochlea length, and trochlea width) were recorded for all individuals for whom this element was available. The talus was selected in preference to other skeletal elements due to the relatively high number of intact tali present in the osteological collections used in this research. A second linear discriminant analysis was carried out using those individuals where the estimation of sex was considered to be confident based either on unambiguous morphology or the cervical measurements of the mandibular canine in order to find the best-fit function for the estimation of sex based on dimensions of the talus. The resulting discriminant function correctly classified all but one individual, a female, for a misclassification rate of 3.3%. Cross-validation raised this to 10%. This second function was then used to estimate sex for all individuals for whom talus measurements were available and sex had yet to be confidently assigned. The sex estimates produced by this function and their associated probabilities were then deployed as described above. The estimations of sex produced in this research were thus preferentially made based on Phenice's (1969) characteristics and/or unambiguous and internally consistent cranial morphology, then by cervical dimensions of the mandibular canine, and finally by measurements of the talus. In all cases, the final estimation of sex was based on the balance of all available evidence. The observations used for all revised estimates of sex and age-at-death are provided in Appendix B.

In order to ameliorate the effects of small samples sizes, it was considered desirable to capture as much phenotypic variation as possible from the available osteological remains. To do this, four different data sets were compiled for all observable individuals: the presence and expression of cranial nonmetric traits, temporal bone morphometrics, buccolingual and mesiodistal diameters of the cemento-enamel junction, and morphological characteristics of the dentition. In addition, the occurrence of "rare" morphological variants (Alt et al., 1997) was recorded for use as supporting evidence when evaluating inter-individual phenetic similarity.

Cranial nonmetric traits.

A total of 89 individuals were complete enough to permit assessment for the presence and form of expression of a suite of 28 cranial nonmetric traits (see Tables 8 and 9). In addition, the skeletal remains recovered from the Fisher Site (15Fa152) that had been fashioned into artifacts were evaluated for the presence of applicable nonmetric traits (e.g., superior sagittal sulcus for the cranial vault bowls). Trait identification and scoring procedures followed the descriptions provided by Hauser and De Stefano (1989) and

Table 9

Cranial Nonmetric Traits Recorded

Trait	Scoring	Trait	Scoring
Metopic Suture	0 = absent, 1 = partial, 2 = complete	Pterygo-alar Bridge	0 = absent, 1 = trace, 2 = incomplete, 3 = complete
Supraorbital Structures	scored by position (m = medial, l = lateral), number, and category (f = foramen, n = notch)	Auditory Torus	0 = absent, 1 = present
Infraorbital Suture	0 = absent, 1 = present	Tympanic Dehiscence	0 = absent, 1 = trace, 2 = medium, 3 = completely open
Infraorbital Foramina	scored by number present	Parietal Foramen	0 = absent, 1 = small, 2 = medium, 3 = large, 4 = excessive
Zygomatico-facial Foramina	scored by number present	Ossicles at Lambda	scored by number present
Accessory Lesser Palatine Foramina	scored by number present	Lambdoidal Ossicles	scored by number present
Palatine Torus	0 = absent, 1 = present	Mastoid Foramen	scored by position (t = temporal bone, s = suture, o = occipital bone) and number present
Anterior Ethmoid Foramen	0 = sutural, 1 = extrasutural	Condylar Canal	scored by number present
Posterior Ethmoid Foramen	scored by number present	Condylar Facets	scored as 1 if double facet is present
Nasal Foramina	scored by number present	Precondylar Tubercle	0= absent, 1 = trace, 2 = medium, 3 = large
Foramen Ovale	0 = complete, 1 = incomplete	Divided Hypoglossal Canal	scored by expression (0=absent, 1=partial, 2=complete) and location (i = internal surface, c = within canal)
Foramen Spinosum	0 = complete, 1 = incomplete	Superior Sagittal Sulcus	0 = flexes right, 1 = flexes left, 2 = bifurcates
Frontal Temporal Articulation	0 = absent, 1 = present	Mylohyoid Bridge	scored by expression (0 = absent, 1 = partial, 2 = complete) and location (g = in groove, f = at foramen)
Pterygo-spinous Bridge	0 = absent, 1 = trace, 2 = incomplete, 3 = complete	Mental Foramina	scored by number present

individuals were used as the unit of analysis. Where both sides were observable, the side of maximum trait expression was recorded. Where only one side was observable, trait expression for that side was recorded. This was done in an effort to maximize the available sample size and an algorithm presented by Konigsberg (1987: 104-105) was used to correct for the bias introduced by this scoring procedure.

To assess the degree of intra-observer error during data collection, 20 individuals were randomly selected and re-scored for all 28 traits. The reliability between the two sets of measurements was assessed using Cohen's kappa as implemented in the 'psych' package for the R statistical environment (Revelle, 2018). All traits that were not reliably scored were removed from further analysis. Following this, the effects of age-at-death and sex on the expression of cranial nonmetric traits in this sample as well as trait independence was evaluated using contingency tables. After pretreatment, inter-individual biological distances were calculated using the dissimilarity coefficient of Gower as implemented in the 'daisy' function included in the 'cluster' package for the R statistical environment (Maechler et al., 2013) and the resulting distance matrix was subjected to a principal coordinates analysis.

Temporal bone morphometrics.

The three-dimensional location of a suite of 22 ectocranial landmarks was recorded using a Microscribe 3DX portable digitizer for 80 individuals (see Tables 8 and 10). Crania or fragmentary crania were mounted on a ring stand in order to keep them from shifting position during data acquisition and the digitizer was positioned on a stable surface. Although landmark data would have ideally been collected from the same side bone for

Table 10

Temporal Bone Landmarks

Temporal Bone Landmarks
Intersection of the infratemporal crest and sphenosquamosal suture
Most lateral point on the margin of foramen ovale
Most anterior point on the articular surface of the articular eminence
Most inferior point on the entoglenoid process
Most inferior point on the medial margin of the articular surface of the articular eminence
Midpoint of the lateral margin of the articular surface of the articular eminence
Center of articular eminence
Deepest point within mandibular fossa
Most inferior point on the postglenoid process
Point on anterior margin of tympanic element that is closest to carotid canal
Apex of the petrous part of the temporal bone
Most posterolateral point on the margin of the carotic canal entrance
Most lateral point on the vagina of the stylid process (whether process is present or absent)
Most lateral point on the margin of the stylomastoid foramen
Most lateral point on the jugular fossa
Center of the inferior tip of the mastoid process
Most inferior point on the external acoustic porus
Most inferolateral point on the tympanic element of the temporal bone
Point of inflection where the braincase curves laterally into the supraglenoid gutter, in coronal plane of mandibular fossa
Point on lateral margin of zygomatic process of the temporal bone at the position of the postglenoid process
Auriculare
Porion

Landmark selection and definition follows the protocols provided by Lockwood and colleagues (2002).

each individual, the fragmentary nature of the skeletal remains precluded this possibility and data was acquired from whichever side was more intact. Landmark definitions and data collection protocol were modeled after the descriptions provided by Lockwood and colleagues (2002). Morphometric data were not collected for any individuals who were not considered to be skeletally adult.

Temporal bone morphometric data were subjected to a generalized Procrustes analysis (GPA) using the ‘gpagen’ function in the ‘geomorph’ package for the R statistical environment (Adams et al., 2018). GPA residuals were extracted using the ‘GpaResiduals’ function in the ‘Evomorph’ package for the R statistical environment (Cabrera & Giri, 2016) and evaluated for their association with age-at-death by calculating the Pearson correlation coefficients between residuals and point estimates of age-at-death. Given human sexual dimorphism, sex bias was assumed and accounted for by standardizing GPA residuals within each sex. Following standardization, GPA residuals were subjected to principal components analysis (PCA). To assess the effects of intra-observer error on the acquisition of landmark data, 20 individuals were randomly selected for a second set of measurements. This second set of data was also submitted to GPA and principal component scores were extracted from this second set of GPA residuals. Euclidean distances were calculated between the principal component scores resulting from repeated sets of measurements from the same individual and these were compared to the Euclidean distances between principal component scores derived from different individuals.

Dental nonmetric data.

The permanent dentition of 72 individuals was scored using the Arizona State University Dental Anthropology System, using trait definitions and scoring procedures provided by Turner and colleagues (1991) (see Table 5.7). In addition, morphological variants of the tooth crown were noted when observable in otherwise unusable dentitions (e.g., due to extreme wear, antemortem tooth loss, etc.). In general, root traits were unobservable due to dentition having been cemented into alveolar sockets during reconstruction. Further, the generalized heavy tooth wear and/or chipping of the dentition that characterized the Adena skeletal collections made many morphological traits difficult or impossible to observe.

Trait independence as well as the effects of age-at-death and sex on the expression of dental morphological traits were evaluated using contingency tables. A second set of observations was made on a randomly selected sample of 20 individuals for the purpose of assessing the effects of intraobserver error. Differences between the two sets of observations for these individuals was assessed using Cohen’s kappa as implemented in the ‘psych’ package for the R statistical environment (Revelle, 2018). As with the cranial nonmetric data, inter-individual biological distances were calculated using the dissimilarity coefficient of Gower as implemented in the ‘daisy’ function included in the ‘cluster’ package for the R statistical environment (Maechler et al., 2013) and the resulting distance matrix was subjected to a principal coordinates analysis.

Cervicometric data.

Measurements of the cemento-enamel junction (CEJ) were taken using Hillson-Fitzgerald dental calipers for 83 individuals (see Table 5.7). These measurements were taken according to the protocols presented by Hillson and colleagues (2005) and consisted of buccolingual and mesiodistal diameters of the CEJ of the pole teeth. For the maxilla, these include the central incisor, canine, third premolar, and first molar. For the mandible, the lateral incisor is preferred. Although used less frequently than maximum crown diameters for biodistance analyses, cervical measurements have been shown to be strongly correlated to these more common measurements and to reconstruct similar patterns of biological affinity (Hillson et al., 2005; Stojanowski, 2007). Measurements were taken bilaterally where possible and averaged prior to further analyses, following the recommendation of Stojanowski and colleagues (2017). When only one side was measurable, these measurements were used. This was done in an effort to maximize the available sample size.

Age bias was assessed by calculating the Pearson correlation coefficients between cervical measurements and point estimates of age. Given documented sexual dimorphism of the human dentition, sex bias was assumed and accounted for by standardizing recorded measurements within each sex. To assess the effects of intraobserver error, a second set of measurements was taken for a random sample of 20 individuals. Intraobserver error was evaluated using paired-sample *t*-tests for both the aggregate data and by tooth class. After pretreatment, missing data were imputed using bootstrapping, additive regression, and predictive mean matching as implemented in the ‘aregImpute’ function included in the ‘Hmisc’ package for the R statistical environment. The resulting complete data matrix was then subjected to a PCA.

Assessing the fit of biological data to the expectations of the proposed scenarios. For each of the four primary types of data discussed above, principal coordinate or principal component scores were extracted for each individual. In order to compare phenotypic variability at multiple scales (i.e., construction episode, mound-level, and regional) bootstrap resampling was used to generate 95% confidence intervals for sample standard deviations of principal coordinate or principal component scores. This was executed for each construction episode or mound with at least five individuals for whom data was available. These confidence intervals were then compared to the average standard deviations calculated from equivalently sized samples selected randomly from the entire mound in which a construction episode is located as well as from the entire regional burial sample. This methodology is adapted from that used by Stojanowski (2005). In addition, the principal coordinate or principal component scores extracted from each individual were subjected to a *k*-medoids clustering analysis using the PAM algorithm with optimal clustering solutions chosen based on silhouette widths (see above). The spatial distributions (both within and between mounds) of individuals included in the same cluster as well as those individuals exhibiting relatively greater phenetic similarity were then evaluated.

The primary difference between the scenarios presented earlier in this chapter has to do with the degree to which both formal similarity in mortuary contexts and phenotypic similarity between individuals adhere to or diverge from an isolation-by-distance model. To provide a more nuanced evaluation of this, inter-individual distance matrices based on geographical separation were created. These were then compared to matrices of pairwise dissimilarities between individual burial contexts and inter-individual phenetic distances as calculated from the four sets of biological data described above by using the Mantel test of matrix correlation (Mantel, 1967). Positive correlations are expected if the geographic distributions of formally similar mortuary contexts and phenetically similar individuals follow an isolation-by-distance model (i.e., meet the expectations of the scenario in which mounds function as territorial markers), whereas no correlations are expected if spatial distributions do not adhere to such a model (i.e., if mounds are better characterized as persistent places and were consequently engaged with by multiple descent-based corporate groups).

The degree and patterning of phenotypic variance within a skeletal sample is considered to result primarily from two factors: 1) the number of co-resident groups who interred their dead at any given scale and 2) patterns of post-marital residence. Since it is the former factor that is of primary interest in differentiating between the alternative scenarios presented above, it is preferable that any phenotypic variability contributed by post-marital residence patterns be controlled for. Ideally, since patterns of post-marital residence are known to change through time (Kelly 1995: 273), the pattern present in each separate construction episode could be determined using variance-covariance matrix determinant ratios (Konigsberg 1988; Konigsberg & Buikstra 1995). Unfortunately, available sample sizes prohibit this approach. As a substitute measure of control, the analyses discussed below were run in three separate iterations: 1) for males only, 2) for females only, and 3) for all observable individuals. If post-marital residence patterns remained constant over the time period under consideration, this approach should allow for its detection and consideration when interpreting the results presented in the following chapter.

CHAPTER 6

RESULTS

Introduction

This chapter presents the results of the stratigraphic reconstructions, radiocarbon dating, osteological analyses, and comparisons of phenotypic and mortuary variability that were described in Chapter 5. The chapter begins with a summary of the reanalysis of the osteological collections derived from the mounds included in the research sample. Building on the analysis of the skeletal remains, the results of data cleaning and pretreatment for the metric and nonmetric phenotypic data are presented. These are followed by a summary of the results of the stratigraphic reconstructions that form the framework for the finer-scale comparisons of phenotypic variability that are needed to differentiate between the two variations of Scenario 2 discussed in Chapter 5. The results of mound reconstruction are accompanied by the presentation of the radiocarbon dates obtained in the course of this research. The chapter then presents the results of the comparisons of phenotypic variation at multiple scales, the cluster analyses carried out on both phenotypic and mortuary data, and the Mantel tests used to assess the degree to which the different datasets are consistent with an isolation-by-distance model. The chapter concludes with a discussion of how these results conform to the expectations for each of the scenarios presented in Chapter 5.

Reassessment of the Osteological Collections

Reanalysis of the osteological collections derived from the mounds included in the present research led to the assignment of 371 identification numbers. This number exceeds the number individuals described in the published reports (n=319). This inflation is the result of both the separation of previously unidentified commingled remains as well as the data collection protocol employed, in which all individuals for whom published descriptions were available were assigned an identification number and any remains that could not be confidently matched to the published descriptions and/or photographs were given a new identification number. While this process produced a situation in which fragmentary remains were potentially assigned two different numbers, it ensured that the morphological and metric skeletal data recorded for each individual were not taken from commingled remains.

Based as they were on both the physical collections and the published descriptions, several identification numbers refer to individuals for whom no skeletal remains were encountered during data collection. Of the 371 identification numbers used, only 284 were associated with at least some (typically very fragmentary) skeletal material. Re-analysis of these remains produced revised estimates of sex for 131 individuals and estimates of age-at-death with defined ranges (e.g., “18-23” rather than “Adult”) for 127 individuals. An additional 42 individuals were estimated to be skeletally mature adults, but osteological information enabling the reliable construction of a narrower age range for these individuals was unavailable. While age categories constructed using standard protocols (Buikstra & Ubelaker, 1994) were used for subsequent analyses, age categories were constructed as follows for the purpose of summarization:

Category	**Age**
Infant	≤ 3
Child	4-12
Adolescent	13-17
Young Adult	18-35
Middle Adult	36-55
Old Adult	≥ 56
Adult	≥ 18

Individuals were assigned to a category based on the midpoint of their estimated age range. It should be noted that this construction differs from standard protocols (Buikstra & Ubelaker, 1994), but the definitions used here are derived from the age categories used in the published Adena site reports (Webb & Snow, 1974:247, Table I) and are given preference in order to facilitate comparison with earlier estimates of age-at-death (see Addendum below). Summaries by site of revised estimates of sex and age-at-death are presented in Tables 11 and 12, respectively, and detailed information pertaining to the revisions made for each individual is included in Appendix B.

Fifty-three of the 131 individuals for whom revised estimates of sex were produced were considered to be either female or probable females, or 40.5% of the analyzable sample. In terms of age-at-death, 124 out of 169 individuals were estimated to

Table 11

Revised Estimates of Sex, Separated by Site

		Number of Females		Number of Males		
Site Name	**Site Number**	**Females**	**Probable Females**	**Males**	**Probable Males**	**Total**
Robbins	15Be3	21	6	14	1	42
Riley	15Be15			2	1	3
Landing	15Be17	1		5		6
Crigler	15Be20			4		4
Hartman	15Be32	2	2	4		8
Morgan Stone	15Bh15	2	2	1	1	6
Drake	15Fa11					
Fisher	15Fa152			3		3
C & O	15Jo2					
C & O	15Jo9			1		1
Ricketts	15Mm3	7	2	18	5	32
Wright	15Mm6	4	1	10		15
Wright	15Mm7					
Dover	15Ms27	2	1	7	1	11
Total		**53**		**78**		**131**

Table 12

Revised Estimates of Age-at-Death, Separated by Site

Site Name	Site Number	Infant	Child	Adolescent	Young Adult	Middle Adult	Old Adult	Adult	Total
Robbins	15Be3	3	5	5	13	11	2	12	51
Riley	15Be15				3				3
Landing	15Be17	1		1	3	3			8
Crigler	15Be20		2	1		1		2	6
Hartman	15Be32	1	1	1	3			4	10
Morgan Stone	15Bh15		1		3			3	7
Drake	15Fa11								
Fisher	15Fa152	2		1				3	6
C & O	15Jo2								
C & O	15Jo9			1				1	2
Ricketts	15Mm3	3	1	9	14	9	3	3	42
Wright	15Mm6		1	2	6	3	3	5	20
Wright	15Mm7								
Dover	15Ms27		2	1	2			9	14
Total		**10**	**13**	**22**	**47**	**27**	**8**	**42**	**169**

be skeletally mature adults, or 73.4% of the analyzable sample. Of those adults for whom more precise estimates of age-at-death could be made, 57.3% were estimated to be young adults, 32.9% were estimated to be middle adults, and 9.8% were estimated to be old adults. Of the 45 sub-adults for whom revised age-at-death estimates were produced, 48.9% were adolescents, 28.9% were children, and 22.2% were classified as infants. These revised estimates of sex and age-at-death represent significant departures from those presented in Webb and Snow's (1945) synthesis (see Addendum below).

Data Cleaning and Pretreatment

Following the methodologies outlined in the previous chapter, metric and morphological traits were evaluated for their independence from the revised estimates of sex and age-at-death and assessed for the presence of trait interdependence as well as the degree of intraobserver error incorporated into trait scoring and/or measurement. This process led to a gradual reduction in the size of the datasets employed in this research. The results of this data cleaning and pretreatment are presented below for each of the four kinds of biological data collected: cranial nonmetric traits, temporal bone morphometrics, dental morphological traits, and measurements of the cemento-enamel junction.

Cranial nonmetric data.

Given that some cranial nonmetric traits were scored as categorical variables while others were scored on binary, ordinal, or interval scales (see Table 9), intraobserver error was assessed using Cohen's kappa (Cohen, 1960) to evaluate the degree of agreement between initial scoring and re-scoring carried out for 20 randomly selected individuals.

Kappa values can range from asymptotically approaching -1 (indicating perfect disagreement between observers), through zero (no agreement), and can achieve a maximum value of 1 (indicating perfect agreement). Kappa values for the scoring of the majority of traits were unexpectedly low, indicating poor agreement between the initial assessment and the reassessment of trait expression. Investigation of the individuals selected for the intraobserver error study revealed that four of these individuals had crania that were recorded as being highly fragmentary. Removal of these individuals from comparison resulted in substantially improved kappa values, and all traits with a kappa value exceeding 0.70, indicative of substantial agreement (Fleiss, 1981; Landis & Koch, 1977), were retained for further analysis. In addition, traits with a kappa value of at least 0.65 were considered to be borderline and retained if the majority of discrepancies in their scoring were the result of a trait being scored in one instance and marked as unobservable in the other. All other traits were discarded (see Table 13).

The independence of trait expression from sex and age-at-death was assessed using an extension of Fisher's exact test due to the data's widespread violations of Cochran's rules. Complex traits were broken into their components for these evaluations. For example, the scoring procedure used for supraorbital structures entails the scoring of the number and location of both supraorbital foramina and supraorbital notches and was thus decomposed into four separate traits – the number of supraorbital foramina, the location of supraorbital foramina, the number of supraorbital notches, and the location of supraorbital notches. A similar expansion was made for mylohyoid bridging, separating this trait into bony bridges located adjacent to the mandibular foramen and those located more distally along the mylohyoid groove. Of the traits retained for further analysis, the

Table 13

Summary of Cranial Nonmetric Trait Screening

Trait	Status	Reason
Metopic Suture	Discarded	No variation in sample
Supraorbital Foramen	**Retained**	
Supraorbital Foramen Location	Discarded	Trait interdependence
Supraorbital Notch	Discarded	Trait interdependence
Supraorbital Notch Location	Discarded	Trait interdependence
Infraorbital Suture	**Retained**	
Infraorbital Foramina	**Retained**	
Zygomatico-facial Foramina	Discarded	Intraobserver error
Accessory Palatine Foramina	Discarded	Intraobserver error
Palatine Torus	Discarded	Intraobserver error
Anterior Ethmoid Foramen	Discarded	Intraobserver error
Poterior Ethmoid Foramen	Discarded	Too few individuals
Nasal Foramen	Discarded	Too few individuals
Bregmatic Bone	Discarded	No variation in sample
Coronal Ossicles	Discarded	Intraobserver error
Epipteric Bone	Discarded	No variation in sample
Foramen Ovale	**Retained**	
Foramen Spinosum	Discarded	Intraobserver error
Pterygo-spinous Bridge	Discarded	Intraobserver error
Pterygo-alar Bridge	Discarded	Intraobserver error
Frontal Temporal Articulation	Discarded	No variation in sample
Parietal Notch Bone	Discarded	No variation in sample
Auditory Torus	Discarded	Age-associated
Tympanic Dehiscence	**Retained**	
Parietal Foramen	**Retained**	
Ossicles at Lambda	Discarded	Intraobserver error
Lambdoidal Ossicles	Discarded	Intraobserver error
Ossicles at Asterion	Discarded	Intraobserver error
Mastoid Foramen	Discarded	Intraobserver error
Mastoid Foramen Location	Discarded	Intraobserver error
Condylar Canal	**Retained**	
Condylar Facets	Discarded	No variation in sample
Precondylar Tubercle	Discarded	Trait interdependence
Divided Hypoglossal Canal	**Retained**	
Divided Hypoglossal Canal Location	Discarded	Trait interdependence
Superior Sagittal Sulcus	**Retained**	
Mylohyoid Bridge (Mandibular Foramen)	**Retained**	
Mylohyoid Bridge (Mylohyoid Groove)	Discarded	Sex-associated
Mental Foramen	Discarded	Trait interdependence

Table 14

Cranial Nonmetric Trait Interdependence

Trait 1	**Trait 2**	**Fisher's Exact p-value**
Number of supraorbital foramina	Location of supraorbital foramina	$2.36e^{-16}$
Number of supraorbital foramina	Number of supraorbital notches	$2.60e^{-06}$
Number of supraorbital foramina	Location of supraorbital notches	$1.62e^{-06}$
Foramen Ovale	Precondylar Tubercle	0.036
Parietal Foramina	Mental Foramina	0.021
Divided Hypoglossal Canal	Location of Divided Hypoglossal Canal	$3.19e^{-13}$

null hypothesis that trait expression and sex are independent was rejected for the formation of a bony bridge along the mylohyoid groove (*p*-value = 0.015), with males exhibiting this trait more frequently and with greater degrees of expression. The null hypothesis of independence between trait expression and age-at-death was rejected for the presence of an auditory torus (*p*-value = 0.008) as this trait was only observed in middle-aged individuals. These two traits were thus removed from all further analyses (see Table 13).

The interdependence of traits was also assessed using an extension of Fisher's exact test. The null hypothesis for trait independence was rejected for the pairs of traits presented in Table 14. The member of each pair of traits exhibiting interdependence that was observable on a greater number of individuals was retained for subsequent analyses; the other member of each pair was discarded. Removal of these traits as well as all traits that exhibited no variability among the individuals assessed resulted in a data matrix of 13 cranial nonmetric traits scored across 88 individuals. This matrix, however, was only 52.4% complete and was consequently culled through the removal of traits that were observable for less than 30% of the individuals in the sample as well as individuals for whom fewer than 50% of the retained traits could be observed. The final data matrix was 74.7% complete and consisted of 10 cranial nonmetric traits scored across 59 individuals. A summary of trait retention and removal is presented in Table 13.

Temporal bone morphometric data.

Results of the intraobserver error analysis for temporal bone morphometric data indicate that the author was not able to reliably record these measurements. Repeated measurements were processed as described in the previous chapter, with missing values imputed using a random forest algorithm before submitting measurements to a generalized Procrustes analysis (GPA) and extracting GPA residuals. These residuals were then submitted to a principal components analysis and 11 rotated components were extracted. Euclidean distances between repeated sets of measurements were calculated from the principal component scores and, in all cases, the resulting distance was greater than an equivalent distance calculated between at least one other individual. This suggests that landmark coordinates were not reliably measured, likely due in large part to the fragmentary nature of the osteological remains used in this analysis. Fragmentary temporal bones were difficult to secure in place during landmark acquisition and it is possible that small shifts in position occurred during data collection, thereby introducing noise into the measurements. The degree of intraobserver error that has been documented in this data suggests that any results derived from their use would be spurious. Consequently, further analysis of this data was not undertaken.

Dental morphological data.

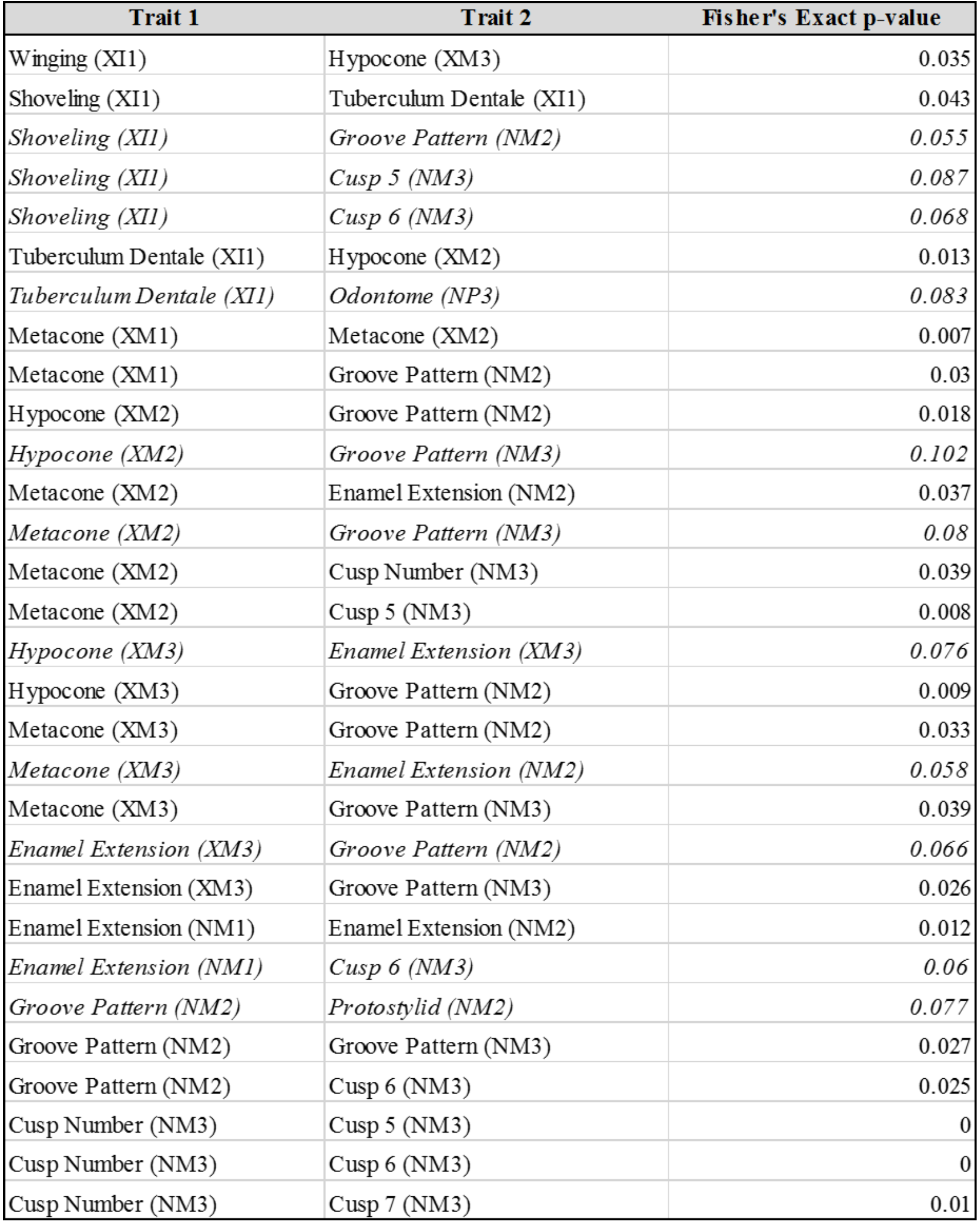
All dental morphological traits that were observable for less than 30% of individuals or exhibited no variation among the individuals assessed were removed from consideration prior to variable pretreatment. As scoring procedures resulted in variables that are categorical, binary, and ordinal, Cohen's kappa was used to provide an initial assessment of the agreement between initial trait scores and the re-scoring carried out for 20 randomly selected individuals. All resulting kappa scores were unexpectedly low. Evaluation of the disagreements indicated that the low kappa scores were largely due to instances in which the initial scoring of a trait's expression and its reassessment differed by a single grade. As a substitute measure of intraobserver error, a ratio was constructed of the number of times that paired assessments for a trait differed by more than one grade of expression to the total number of paired assessments made for that trait. All traits for which this ratio exceeded 0.1 were removed from subsequent analyses. Although arbitrarily selected, this threshold ensures that the repeated scoring of all traits retained for subsequent analyses was in close agreement for at least 90% of the available observations.

Due to the data's violation of Cochran's rules, the independence of dental morphological trait expression from both sex and age-at-death was assessed using an extension of Fisher's exact test. The null hypothesis that trait expression is independent of sex was rejected for three traits: the expression of an interruption groove on the mesiolingual border of the maxillary lateral incisor (more common in females, *p*-value = 0.03), the presence of an enamel extension on the maxillary first molar (more common in males, *p*-value = 0.011), and the presence of peg-shaped or reduced maxillary third molars (more common in females, *p*-value = 0.027). The null hypothesis that trait expression is independent of age-at-death was rejected for only one trait – protostylid expression on the mandibular first molar was more common among younger individuals (*p*-value = 0.03). This result is likely to represent the progressive effacement of this trait due to dental attrition and abrasion. All four traits for which independence from sex or age-at-death could not be verified were removed from subsequent analyses.

Trait interdependence was likewise assessed using an extension of Fisher's exact test. Results indicate a complex pattern of association and are presented in Table 15. Significant and near-significant associations were considered in selecting variables for removal, and a balance was sought between maximizing the number of independent traits retained, providing equal representation of both the maxillary and the mandibular dentition, and retaining traits for which a large number of individuals had been scored. A summary of trait retention and removal is presented in Table 16. These 13 traits were scored across 52 individuals, resulting in a final data matrix that was 80.3% complete. The general pattern of traits selected corresponds to the degree to which the osteological collections were affected by dental wear, with the majority of traits being scored on the postcanine dentition and/or morphological characteristics that are less easily effaced. Although recent work suggests that heritability estimates for morphological variants of the postcanine dentition exceed those for the anterior dentition (Stojanowski et al., 2018, 2019), the heavy reliance of this dataset on morphological traits of the mandibular third molar may adversely affect the validity of the results.

Table 15

Dental Morphological Trait Interdependence

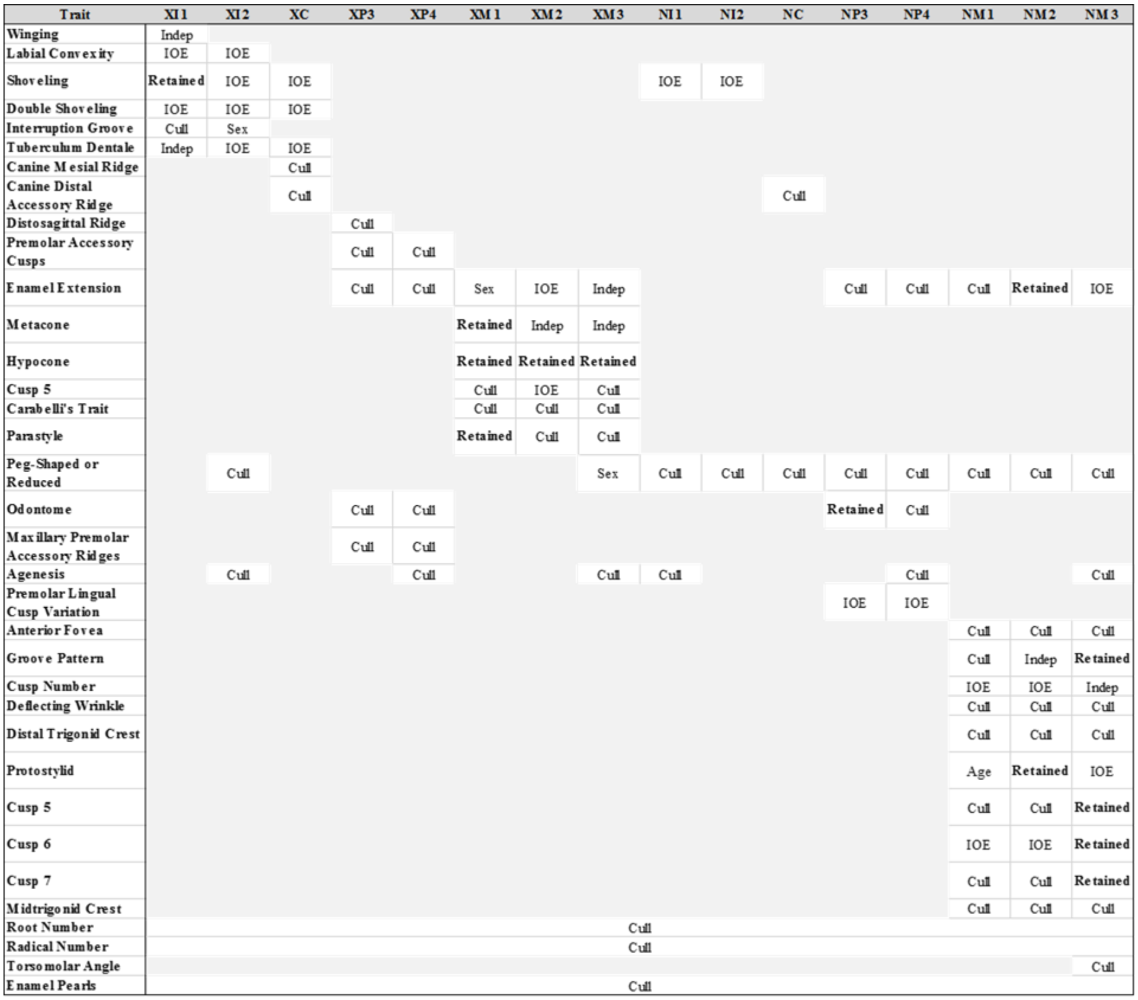


Trait 1	Trait 2	Fisher's Exact p-value
Winging (XI1)	Hypocone (XM3)	0.035
Shoveling (XI1)	Tuberculum Dentale (XI1)	0.043
Shoveling (XI1)	*Groove Pattern (NM2)*	*0.055*
Shoveling (XI1)	*Cusp 5 (NM3)*	*0.087*
Shoveling (XI1)	*Cusp 6 (NM3)*	*0.068*
Tuberculum Dentale (XI1)	Hypocone (XM2)	0.013
Tuberculum Dentale (XI1)	*Odontome (NP3)*	*0.083*
Metacone (XM1)	Metacone (XM2)	0.007
Metacone (XM1)	Groove Pattern (NM2)	0.03
Hypocone (XM2)	Groove Pattern (NM2)	0.018
Hypocone (XM2)	*Groove Pattern (NM3)*	*0.102*
Metacone (XM2)	Enamel Extension (NM2)	0.037
Metacone (XM2)	*Groove Pattern (NM3)*	*0.08*
Metacone (XM2)	Cusp Number (NM3)	0.039
Metacone (XM2)	Cusp 5 (NM3)	0.008
Hypocone (XM3)	*Enamel Extension (XM3)*	*0.076*
Hypocone (XM3)	Groove Pattern (NM2)	0.009
Metacone (XM3)	Groove Pattern (NM2)	0.033
Metacone (XM3)	*Enamel Extension (NM2)*	*0.058*
Metacone (XM3)	Groove Pattern (NM3)	0.039
Enamel Extension (XM3)	*Groove Pattern (NM2)*	*0.066*
Enamel Extension (XM3)	Groove Pattern (NM3)	0.026
Enamel Extension (NM1)	Enamel Extension (NM2)	0.012
Enamel Extension (NM1)	*Cusp 6 (NM3)*	*0.06*
Groove Pattern (NM2)	*Protostylid (NM2)*	*0.077*
Groove Pattern (NM2)	Groove Pattern (NM3)	0.027
Groove Pattern (NM2)	Cusp 6 (NM3)	0.025
Cusp Number (NM3)	Cusp 5 (NM3)	0
Cusp Number (NM3)	Cusp 6 (NM3)	0
Cusp Number (NM3)	Cusp 7 (NM3)	0.01

Traits in italics have associations that are nearly significant and are included here because they factored into decisions made as to which traits should be removed from subsequent analyses. Tooth for which each trait was scored is indicated in parentheses; X=maxillary, N=mandibular, I=incisor, C=canine, P=premolar, M=molar, and numerals indicate tooth position.

Table 16

Summary of Dental Morphological Trait Selection



Trait	XI1	XI2	XC	XP3	XP4	XM1	XM2	XM3	NI1	NI2	NC	NP3	NP4	NM1	NM2	NM3
Winging	Indep															
Labial Convexity	IOE	IOE														
Shoveling	**Retained**	IOE	IOE						IOE	IOE						
Double Shoveling	IOE	IOE	IOE													
Interruption Groove	Cull	Sex														
Tuberculum Dentale	Indep	IOE	IOE													
Canine Mesial Ridge			Cull													
Canine Distal Accessory Ridge			Cull								Cull					
Distosagittal Ridge				Cull												
Premolar Accessory Cusps				Cull	Cull											
Enamel Extension				Cull	Cull	Sex	IOE	Indep				Cull	Cull	Cull	**Retained**	IOE
Metacone						**Retained**	Indep	Indep								
Hypocone						**Retained**	**Retained**	**Retained**								
Cusp 5						Cull	IOE	Cull								
Carabelli's Trait						Cull	Cull	Cull								
Parastyle						**Retained**	Cull	Cull								
Peg-Shaped or Reduced		Cull						Sex	Cull	Cull	Cull	Cull	Cull	Cull	Cull	Cull
Odontome				Cull	Cull							**Retained**	Cull			
Maxillary Premolar Accessory Ridges				Cull	Cull											
Agenesis		Cull			Cull			Cull	Cull				Cull			Cull
Premolar Lingual Cusp Variation												IOE	IOE			
Anterior Fovea														Cull	Cull	Cull
Groove Pattern														Cull	Indep	**Retained**
Cusp Number														IOE	IOE	Indep
Deflecting Wrinkle														Cull	Cull	Cull
Distal Trigonid Crest														Cull	Cull	Cull
Protostylid														Age	**Retained**	IOE
Cusp 5														Cull	Cull	**Retained**
Cusp 6														IOE	IOE	**Retained**
Cusp 7														Cull	Cull	**Retained**
Midtrigonid Crest														Cull	Cull	Cull
Root Number	Cull															
Radical Number	Cull															
Torsomolar Angle																Cull
Enamel Pearls	Cull															

X=maxillary, N=mandibular, I=Incisor, C=Canine, P=Premolar, M=Molar, and numerals indicate tooth position. "Cull" indicates traits removed due to low observability, "IOE" indicates traits removed due to high intraobserver error, "Sex" indicates traits removed for their lack of independence from biological sex, "Age" indicates traits removed for their lack of independence from age-at-death, and "Indep" indicates traits removed to alleviate trait interdependence. Retained traits are bolded and labeled "Retained."

Cervicometric data.

Intraobserver error for cervicometric data was assessed using paired-sample t-tests for the aggregate data and for each tooth class. Only one set of repeated measurements, buccolingual cervical diameters of the maxillary canines, exhibited significant differences (t = -2.164, d.f. = 28, p-value = 0.039), and this set of measurements was removed from all subsequent analyses of cervicometric data. During the analysis of intraobserver error, it was discovered that the repeated measurements of one individual, Be3.64, were in substantial disagreement and, given the greater number of measurements present in the repeated set, may represent two different dentitions. Since these discrepancies could neither be investigated nor resolved, this problem was addressed by removing this individual from all cervicometric analyses.

Age-at-death can be used as a proxy measure for the progressive effects of dental wear and the accumulation of dental calculus. Age bias within the cervicometric data was assessed by calculating Pearson correlation coefficients between cervical diameters and point estimates of age-at-death, calculated as the midpoint of the age range provided by the revised estimates of age-at-death. Any individual for whom a constrained age range was not available was excluded from this analysis. In all cases, the absolute value of the calculated correlation coefficient was less than 0.31, and no correlations were significant ($\alpha = 0.05$). This suggests that measurements of the cemento-enamel junction of the permanent dentition are relatively unaffected by dental wear and calculus.

After the removal of buccolingual cervical measurements of the maxillary canine, the resulting dataset was partitioned into three datasets for further analysis: maxillary cervicometric data, mandibular cervicometric data, and cervicometric data derived from both dental arcades. These datasets were then culled by removing individuals for whom less than 70% of relevant measurements had been recorded. This constraint was made as a compromise between the desire to include as many individuals as possible in subsequent analyses and the need to minimize the loss of resolution resulting from the imputation of missing values. The final maxillary data matrix includes 58 individuals measured across seven variables (88.9% complete prior to the imputation of missing values), while the final mandibular data matrix included 66 individuals measured across eight variables (91.7% complete prior to the imputation of missing values). The final data matrix using measurements from both dental arcades included 50 individuals measured across all 15 of the retained variables and was 90.3% complete prior to the imputation of missing values. Subsequent analyses were carried out for all three cervicometric datasets (maxillary, mandibular, and full dentition).

Internal and Absolute Chronologies

The results of the reconstructions of mound stratigraphy and three-dimensional structure are presented in Appendices C through O and include both sequential mound surfaces as well as the original and revised estimates of the demographic characteristics of the individuals included within each episode of interment. This change in phrasing – from “construction episode” to “episode of interment” or “interment episode” – is intentional as the process of mound reconstruction and the radiocarbon dates obtained from the submitted samples have demonstrated the difficulty of unambiguously defining an episode of construction. Associated groups of interments as well as minor episodes of fill deposition can be readily identified, but without an associated series of radiocarbon dates derived from secure contexts the grouping of these alterations in mound structure into discrete construction episodes is imprecise if not impossible. For example, several groups of interments may be separable stratigraphically, but without absolute dates associated with each one it is difficult to determine whether they represent distinct episodes of construction or a single extended construction episode. “Interment episode” or “episode of interment” is therefore considered to be a more precise term and will be used throughout the remainder of this dissertation, especially as this change in phrasing does not affect the structure of the test implications developed in the previous chapter.

A summary of the results of mound reconstruction is presented in Table 17. The number of identifiable interment episodes per mound ranged from one to nine (two episodes of interment within the Robbins mound (15Be3) are likely the result of either errors in the original documentation or displacement from their original context due to looting and are therefore considered to be spurious). The number of individuals interred in each episode ranges from one to 19, with an average of approximately six individuals per episode of interment. Where sample size permitted, such interment episodes form the basis for discerning between Scenario 2a and Scenario 2b as described in the previous chapter.

Absolute dates from the samples submitted for radiocarbon dating are presented in Table 18 and Figure 13. Dates were calibrated with OxCal v. 4.3.2 (Bronk-Ramsey, 2017) using the IntCal13 atmospheric curve (Reimer et al., 2013). Six samples returned dates that were earlier than anticipated. Of these, five (1940.001 S3, 1940.001 S11/2, 1939.004 S2, 1942.001 S3/2, and 1942.001 S1) are freshwater mussel and produce dates from five hundred to a thousand years earlier than the dates derived from samples of

Table 17

Summary of Mound Reconstruction

Site	Interment Episode	Number of Individuals	Site	Interment Episode	Number of Individuals
Robbins (15Be3)	1	5	Fisher (15Fa152)	1	2
	2	3		2	7
	3	2	C & O (15Jo2)	1	5
	4	6	C & O (15Jo9)	1	19
	5	11		2	1
	6	18		3	2
*	7	1		4	1
	8	19	Ricketts (15Mm3)	1	4
	9	14		2	4
	10	8		3	8
*	11	1		4	5
Riley (15Be15)	1	2		5	4
	2	6	Wright (15Mm6)	1	1
Landing (15Be17)	1	15		2	3
Crigler (15Be20)	1	3		3	1
	2	1		4	8
	3	2		5	6
	4	7		6	1
Hartman (15Be32)	1	1		7	1
	2	4	Wright (15Mm7)	1	2
	3	3	Dover (15Ms27)	1	18
Morgan Stone (15Bh15)	1	1		2	17
	2	6		3	12
Drake (15Fa11)	1	8			

Asterisks mark episodes of interment that likely result from either errors in the original documentation or disturbance due to looting.

Table 18

AMS Radiocarbon Results

Lab Number	Site Name	Site Number	Sample	Reconstructed Context	Material	Radiocarbon Date (B.P.)	Calibrated Age (2 Sigma)	Probability
OS-131185	Robbins	15Be3	1940.001 S3	Interment Episode 4	Mollusc (Freshwater)	3520 ± 20	1914 - 1770 cal BCE	0.954
OS-131186	Robbins	15Be3	1940.001 S11/2	Interment Episode 4	Mollusc (Freshwater)	3150 ± 30	1500 - 1383 cal BCE	0.877
							1340 - 1311 cal BCE	0.077
OS-131036	Robbins	15Be3	1940.001 V2	Interment Episode 8	Charcoal	2100 ± 20	182 - 52 cal BCE	0.954
OS-131187	Riley	15Be15	1939.004 S2	Interment Episode 1	Mollusc (Freshwater)	2570 ± 15	800 - 771 cal BCE	0.954
OS-131351	Landing	15Be17	1938.002 S1	Prior to Interment Episode 1	Mollusc (Terrestrial)	1940 ± 20	17 - 125 cal CE	0.954
OS-131188	Crigler	15Be20	1942.001 S3/2	Interment Episode 1	Mollusc (Freshwater)	3130 ± 20	1447 - 1380 cal BCE	0.793
							1341 - 1309 cal BCE	0.161
OS-131352	Crigler	15Be20	1942.001 S1	Between Interment Episodes 2 & 3	Mollusc (Freshwater)	3300 ± 20	1626 - 1520 cal BCE	0.954
OS-132137	Hartman	15Be32	1940.002 B1/2	Interment Episode 2	Bone	3030 ± 25	1391 - 1337 cal BCE	0.25
							1322 - 1211 cal BCE	0.704
OS-131037	Morgan Stone	15Bh15	1938.001 V3	Interment Episode 1	Plant/Wood	2050 ± 20	160 - 133 cal BCE	0.062
							116 cal BCE - 4 cal CE	0.892
OS-132138	C & O	15Jo2	1938.006 B2	Postmold under mound	Bone	2190 ± 20	360 - 273 cal BCE	0.607
							262 - 193 cal BCE	0.347
OS-131189	C & O	15Jo2	1938.006 C339/1	Mid-mound	Other	2290 ± 20	403 - 357 cal BCE	0.885
							281 - 257 cal BCE	0.069
OS-131172	Wright	15Mm6	1938.013 V33	Interment Episode 2	Plant/Wood	1970 ± 25	40 cal BCE - 78 cal CE	0.954
OS-131171	Wright	15Mm6	1938.013 V24	Interment Episode 4	Plant/Wood	2040 ± 20	151 - 147 cal BCE	0.005
							111 cal BCE - 22 cal CE	0.949
OS-131173	Wright	15Mm6	1938.013 V34	Interment Episode 4	Plant/Wood	2040 ± 20	151 - 147 cal BCE	0.005
							111 cal BCE - 22 cal CE	0.949
OS-131170	Wright	15Mm6	1938.013 V13	Interment Episode 7	Plant/Wood	2020 ± 20	88 - 76 cal BCE	0.022
							56 cal BCE - 30 cal CE	0.905
							37 - 50 cal CE	0.028
OS-131174	Wright	15Mm7	1937.002 V1	Interment Episode 1	Plant/Wood	2080 ± 20	167 - 46 cal BCE	0.954
OS-131038	Dover	15Ms27	1950.001 V3	Interment Episode 1	Charcoal	2060 ± 20	164 - 128 cal BCE	0.129
							121 - 19 cal BCE	0.793
							12 - 1 cal BCE	0.032
OS-131040	Dover	15Ms27	1950.001 V28	Interment Episode 1	Plant/Wood	2090 ± 20	171 - 50 cal BCE	0.954
OS-131039	Dover	15Ms27	1950.001 V10	Undetermined	Charcoal	2150 ± 20	352 - 298 cal BCE	0.276
							228 - 222 cal BCE	0.009
							211 - 111 cal BCE	0.669

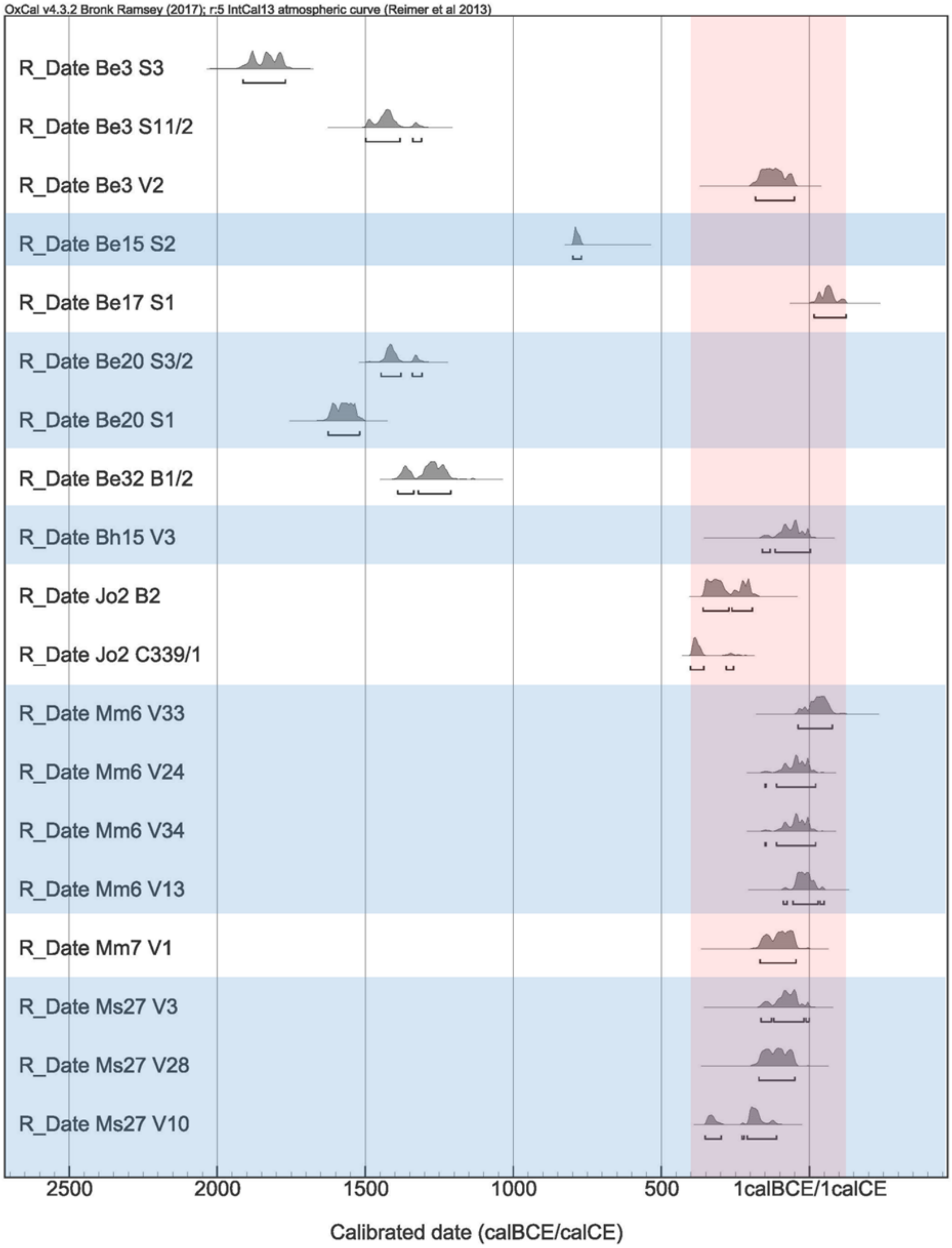


Figure 13. Calibrated radiocarbon dates from samples submitted as part of this research. Samples are grouped by site with the stratigraphically earliest date at the top and stratigraphically latest date at the bottom. Vertical red band indicates the constrained range of dates into which the majority of dates fall.

charcoal or plant remains. The two shell dates from the Robbins mound (1940.001 S3 and 1940.001 S11/2) are more than a thousand years older than the charcoal derived date from the same mound and the two shell dates from the Crigler mound (1942.001 S3/2 and 1942.001 S1) are remarkably similar in age to those from the Robbins mound. This suggests the possibility that these dates are the product of a freshwater reservoir effect in which carbonates dissolved from ancient limestone deposits are incorporated into the shells of freshwater mussels, thereby producing anomalously old dates (McKee, 2007). While the author is unaware of any systematic investigation into the magnitude of this effect for the Ohio Valley, freshwater mussel dates have been documented to range from several centuries to well over a thousand years older than charcoal dates derived from the same depositional context in Indiana (Crane & Griffin, 1964), Tennessee (McKee, 2007), and Mississippi (Peacock & Feathers, 2009). Until such a reservoir effect is better understood for the Ohio Valley and can be corrected for, the dates derived from freshwater mussel shell included in this research should be considered problematic. The sixth sample (1940.002 B1/2) is a fragment of unworked deer bone that was included in the fill of the earthen ring surrounding the central grave underlying the Hartman mound (15Be32). This fill was interpreted by Webb (1943a) to be composed of the earth removed during the excavation of the central pit. The depositional context of this sample is therefore not secure: while it may have been incorporated into the earth ring at the time of mound construction and thereby provide an accurate date, it may also have been incidentally included in the earth ring as part of the excavated fill of the central grave, thereby pre-dating the construction of the mound. The fact that the bone is unworked suggests the latter scenario may be more likely. The date provided by this sample is therefore also considered to be problematic. All of the remaining samples returned dates whose calibrated two sigma ranges fall between 403 cal BCE and 125 cal CE (see Figure 13).

In an effort to assess the span of time over which some mounds were constructed and altered, series of radiocarbon dates were obtained for the Robbins mound (15Be3, n=3), the Crigler mound (15Be20, n=2), the smaller of the C & O mounds (15Jo2, n=2), the larger Wright mound (15Mm6, n=4) and the Dover mound (15Ms27, n=3). Unfortunately, two of the three dates obtained from Robbins and both dates obtained from Crigler are considered to be problematic (see above). The remaining series of dates all exhibit stratigraphic inversions. This may be the result of mapping errors, imprecise recording of the provenience of the samples submitted for dating, or the disturbance of earlier mound fill during subsequent episodes of interment. As a result, coherent, absolute, internal chronologies for these mounds could not be constructed. The general consistency of dates derived from the same mound, however, suggests their utility in situating these sites within a regional temporal sequence.

Comparisons of Phenotypic Variability

Three different categories of comparisons of phenotypic variability were made: mound to region comparisons, interment episode comparisons, and sex-specific comparisons. Mound to region comparisons were made primarily to determine whether a given mound is more consistent with the test expectations of Scenario 1 (i.e., mounds functioned as territorial markers) or Scenario 2 (where mounds are characterized as persistent places). Under a scenario in which mounds served a territorial function, it can be expected that the amount of biological variability exhibited by the burial sample derived from a single mound will be significantly less than the amount of biological variability exhibited by a burial sample derived from the entire region. In contrast, if a mound's interments were derived from multiple descent-based corporate groups (as would be expected in either variation of the scenario in which mounds are characterized as persistent places), then the amount of biological variability exhibited by a mound's burial sample should not be statistically different from that exhibited by the region as a whole.

Interment episode comparisons were made primarily to determine whether a given mound is more consistent with one of the two variants of Scenario 2 – where multiple descent-based corporate groups were engaged in the construction of the same mound, either sequentially or simultaneously. If multiple groups interred their dead in a mound sequentially (i.e., if different interment episodes represent the actions of distinct groups), then the amount of biological variability exhibited at the level of the interment episode should be less than that exhibited by a burial sample derived from the mound as a whole and, consequently, less than that exhibited by a burial sample drawn from the entire region. If, on the other hand, multiple descent-based corporate groups interred their dead within the same interment episode, then the amount of biological variability exhibited by the burial sample from a specific interment episode should not be significantly different from that exhibited by a burial sample derived from the entire mound and may also be comparable to the amount of biological variability present at the regional scale. Under the expectations of the territorial hypothesis, the amount of phenotypic variability exhibited by the burial sample derived from an interment episode should be comparable to that derived from the mound itself and significantly less than that derived from the entire region.

Where sample sizes permitted, sex-specific comparisons of phenotypic variability were made. This was done in an effort to identify and control for sex-specific mobility such as might result from post-marital residence patterns. For example, if males were the more mobile sex, then it could be expected that the males interred in any given mound would exhibit more phenotypic variability than the females from the same mound. If this patterning were to apply to all mounds in the research sample, then it can be accounted for and taken into consideration when evaluating the relative amounts of biological variability present in the burial samples derived from multiple spatial scales. Even if consistent patterning cannot be identified, the information derived from sex-specific comparisons of phenotypic variability can lend itself to a more nuanced interpretation of results.

While an analysis combining all five phenotypic datasets (cranial nonmetric, dental nonmetric, maxillary, mandibular, and full dentition cervicometrics) is possible, it was not undertaken as the amount of overlap between the datasets would further reduce the already small sample sizes and permit a smaller number of comparisons.

First principal component or dimension of variation.

Initial comparisons of phenotypic variability were based on the standard deviation of either the first principal component scores (for cervicometric data) or the first dimension of variation extracted from a principal coordinates analysis (for cranial and dental nonmetric data). The first principal component (or dimension of variation) was chosen because it accounts for the most variability within the data of any single principal component (or dimension of variation). For cervical measurements, the first principal component explains 30% of the variation in the maxillary data, 22% of the variation in the mandibular data, and 26% of the variation in data from the full dentition. For the cranial and dental nonmetric data, the first dimension of variation accounts for 19.8% and 18.5% of the total variation exhibited by these datasets, respectively. In principal component analysis, the first principal component is often associated with an overall size effect. Given documented sexual dimorphism in the human dentition, this could result in the segregation of individuals based on biological sex. As a precaution against this possibility, all cervical measurements were standardized within sex prior to carrying out the principal component analysis. Any remaining variation in size should not be related to biological sex and is therefore relevant to comparisons of phenotypic variability. Inspection of the resulting component loadings for the cervicometric datasets indicate that, in all three cases, the first principal component is capturing both size and shape information.

Comparisons of mound to region.

Comparisons of the amount of phenotypic variability exhibited by a mound's burial sample to the amount of regional phenotypic variability were possible for a total of five mounds. The results of these comparisons are presented in Table 19 and visualized in Figure 14. The amount of phenotypic variability exhibited by the burial samples derived from both Robbins (15Be3) and Landing (15Be17) was statistically indistinguishable from that of the region. For Ricketts (15Mm3), the variability in four out of the five

Table 19

Mound to Region Comparisons, PC1

Site	Data	n	SD	95% Confidence Interval for SD		Mean SD from Region
Robbins (15Be3)	Cranial Nonmetric	18	0.1522427	0.09678061	0.188043026	0.1782373
Robbins (15Be3)	Dental Nonmetric	10	0.2003996	0.100891	0.267703857	0.161004
Robbins (15Be3)	Maxillary Cervicometric	13	1.134524	0.586444755	1.476144188	0.9665666
Robbins (15Be3)	Mandibular Cervicometric	19	1.017778	0.658725304	1.29450099	0.9735848
Robbins (15Be3)	Full Cervicometric	13	0.8852299	0.515119191	1.125769317	0.9645261
Landing (15Be17)	Cranial Nonmetric	6	0.2350946	0.009157989	0.319402557	0.1712253
Ricketts (15Mm3)	Cranial Nonmetric	14	0.1700158	0.100889734	0.209857564	0.1761866
Ricketts (15Mm3)	Dental Nonmetric	11	0.1378819	0.082637139	0.169059032	0.1586735
Ricketts (15Mm3)	Maxillary Cervicometric	13	0.9563055	0.492832163	1.203881251	0.9665666
Ricketts (15Mm3)	Mandibular Cervicometric	14	0.9589876	0.64794309	1.165710739	0.9689143
Ricketts (15Mm3)	**Full Cervicometric**	**11**	**0.4001533**	**0.216744222**	**0.504073095**	**0.9721815**
Wright (15Mm6)	Cranial Nonmetric	9	0.1862684	0.087725962	0.239909017	0.1746431
Wright (15Mm6)	**Dental Nonmetric**	**11**	**0.112414**	**0.069655817**	**0.139235342**	**0.1586735**
Wright (15Mm6)	**Maxillary Cervicometric**	**12**	**0.631299**	**0.331520069**	**0.841590272**	**0.9574333**
Wright (15Mm6)	Mandibular Cervicometric	12	1.35892	0.761218327	1.668291304	0.9651281
Wright (15Mm6)	Full Cervicometric	11	1.399685	0.815407898	1.668477992	0.9721815
Dover (15Ms27)	Dental Nonmetric	5	0.1517879	0.030541987	0.169755205	0.1550443
Dover (15Ms27)	Maxillary Cervicometric	8	0.8762433	0.513003357	1.005440364	0.9530165
Dover (15Ms27)	**Mandibular Cervicometric**	**7**	**0.6958617**	**0.355177855**	**0.83327597**	**0.9465361**
Dover (15Ms27)	Full Cervicometric	7	0.9448457	0.216865043	1.298708641	0.9473274

Bolded values represent significant results.

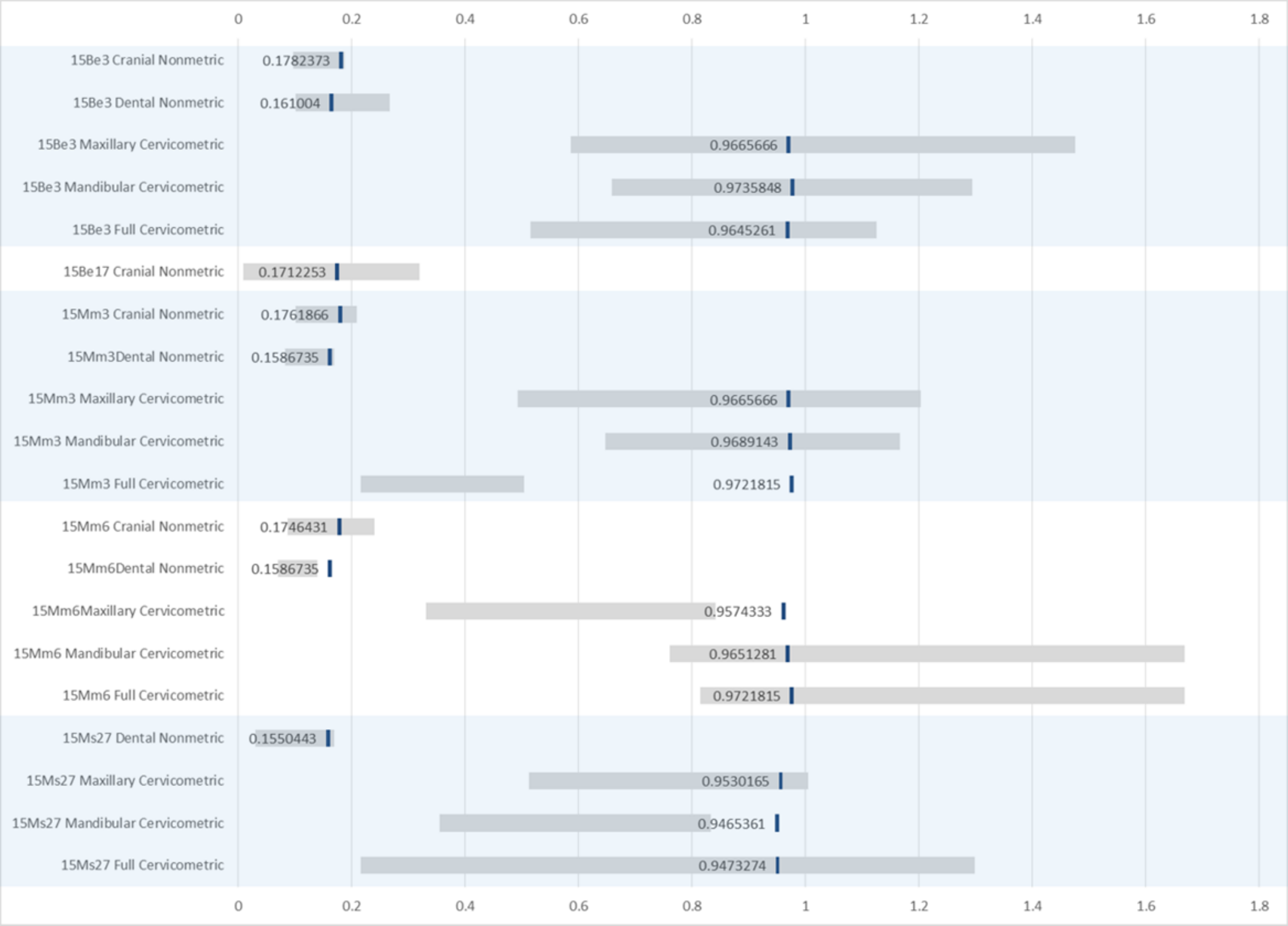


Figure 14. Visualization of the results of mound to region comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the mean standard deviation calculated for

phenotypic datasets was not distinguishable from that of the region, while the variation exhibited by the full suite of cervical measurements was significantly less than regional variation for the same data. Wright exhibits a more complex pattern, where the amount of variation exhibited by the dental nonmetric and maxillary cervicometric datasets was significantly less than regional variation for these data while, simultaneously, the amount of variability exhibited by cervical measurements of the mandibular and full dentitions exceeded regional variability for these data. For Dover, only the mandibular cervicometric dataset exhibited significantly less variability than the region. The other three datasets, however, are trending in the same direction.

Interment episode comparisons.

Sample sizes were sufficient to enable comparisons of the amount of phenotypic variability at the scale of a single episode of interment in four cases: the sixth and eighth interment episodes of the Robbins mound (15Be3) and the fourth and fifth interment episodes of the Wright mound (15Mm6). Comparisons were made of the amount of phenotypic variability exhibited by the individuals included in an interment episode to the degree of phenotypic variability present in the mound from which the interments derived as well as to the amount of regional phenotypic variability (see Table 20 and Figures 15 and 16).

Interment episode comparisons based on the standard deviation of first principal component scores (or their analogue for the nonmetric datasets) yield somewhat conflicting patterns. The sixth interment episode at Robbins is comparable in terms of phenotypic variability to both its source mound and the region. The eighth interment

Table 20

Interment Episode Comparisons

Site	IE	Data	n	SD	95% Confidence Interval for SD		Mean Mound SD	Mean Region SD
Robbins (15Be3)	6	Cranial Nonmetric	6	0.176367	0.027923026	0.239965126	0.1395192	0.1712253
Robbins (15Be3)	6	Mandibular Cervicometric	5	1.209605	0.284661079	1.183726523	0.9245078	0.9143695
Robbins (15Be3)	8	Cranial Nonmetric	5	0.137983	0.022911836	0.175311897	0.1412208	0.1686527
Robbins (15Be3)	**8**	**Mandibular Cervicometric**	**5**	**0.65669**	**0.039663651**	**0.725193856**	**0.9245078**	**0.9143695**
Wright (15Mm6)	**4**	**Maxillary Cervicometric**	**5**	**0.46341**	**0.14878632**	**0.579307041**	0.5613781	**0.9199131**
Wright (15Mm6)	4	Mandibular Cervicometric	5	1.722436	0.646556464	2.111870286	1.240893	0.9143695
Wright (15Mm6)	4	Full Cervicometric	5	1.82559	0.522764375	2.171591988	1.277743	0.9227689
Wright (15Mm6)	5	Maxillary Cervicometric	5	0.735883	0.163201713	0.942353401	0.5613781	0.9199131
Wright (15Mm6)	**5**	**Dental Nonmetric**	**5**	**0.10734**	**0.022240599**	**0.143339691**	0.1029295	**0.1550443**

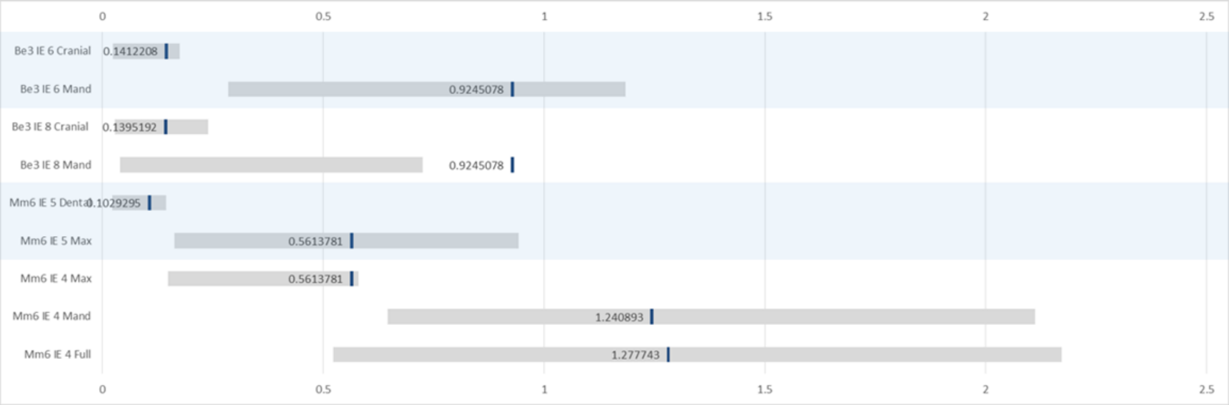


Figure 15. Visualization of the results of interment episode to source mound comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the mean standard deviation calculated for the source mound.

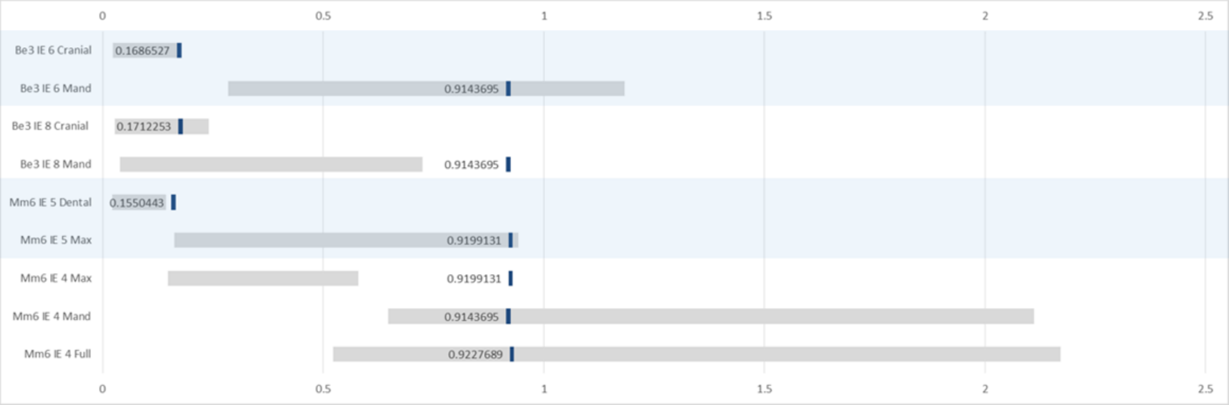


Figure 16. Visualization of the results of interment episode to region comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the mean standard deviation calculated for the region.

episode at Robbins, however, is significantly less variable than the Robbins mound as a whole in terms of mandibular cervicometrics while statistically indistinguishable from its source mound with regards to cranial nonmetric variability. The fourth interment episode at Wright exhibits less phenotypic variability among cervical measurements of the maxillary dentition than its source mound, and this difference becomes significant when compared to regional variability in maxillary cervicometrics. The other two datasets for this interment episode, mandibular and full dentition cervical measurements, appear to be more phenotypically variable than both the source mound and the region. Thus, the fourth interment episode at Wright echoes the results from the mound as a whole. The fifth interment episode at Wright does not significantly differ from its source mound, but exhibits less variability than the region for both maxillary cervical measurements and dental nonmetrics (the difference is significant in the case of the latter).

Sex-specific comparisons.

Comparisons were made by mound for each sex (see Table 21 and Figure 17), as well as between sexes at both the regional (see Table 22 and Figure 18) and site level (see Table 23 and Figure 19). Sex-specific comparisons of phenotypic variability based on the standard deviation of the first principal component scores indicate that females interred at Wright (15Mm6) are significantly less phenotypically variable than their regional counterparts. In contrast, females interred at Robbins (15Be3) tend to exhibit more phenotypic variability than the regional average for females (with the exception of the cranial nonmetric dataset), but this difference is not significant. Males interred at both

Table 21

Sex-Specific Comparisons

Site	Sex	Data	n	SD	95% Confidence Interval of SD		Mean SD from Region
Robbins	M	Cranial Nonmetric	7	0.155712	0.072819946	0.188110099	0.159345
Robbins	M	Mandibular Cervicometric	5	0.775661	0.169338095	1.083411742	1.001937
Landing	**M**	**Cranial Nonmetric**	**5**	**0.07278**	**0.005817896**	**0.09328235**	**0.153279**
Ricketts	M	Cranial Nonmetric	10	0.195124	0.120381158	0.23809346	0.1596742
Ricketts	M	Dental Nonmetric	6	0.177753	0.053571354	0.209195424	0.1406925
Ricketts	M	Maxillary Cervicometrics	9	0.856852	0.324335149	1.177170073	0.8004062
Ricketts	M	Mandibular Cervicometrics	10	1.021587	0.642691333	1.224106501	1.015518
Ricketts	**M**	**Full Cervicometrics**	**7**	**0.44252**	**0.199048837**	**0.586250947**	**1.005087**
Wright	M	Cranial Nonmetric	6	0.218276	0.074367171	0.276678336	0.1550294
Wright	M	Dental Nonmetric	6	0.114761	0.052471144	0.15032547	0.1406925
Wright	M	Maxillary Cervicometrics	7	0.762441	0.369693699	0.982616779	0.8032037
Wright	M	Mandibular Cervicometrics	8	1.631152	0.953819965	1.989774339	1.004892
Wright	M	Full Cervicometrics	7	1.685183	0.881709844	1.943658508	1.005087
Dover	M	Maxillary Cervicometrics	5	0.865387	0.15028202	1.044392344	0.7970543
Robbins	F	Cranial Nonmetric	11	0.155862	0.046837179	0.207563384	0.1970787
Robbins	F	Dental Nonmetric	8	0.21781	0.094738286	0.285536849	0.1702242
Robbins	F	Maxillary Cervicometrics	12	1.158047	0.556402313	1.545017728	1.086236
Robbins	F	Mandibular Cervicometrics	14	1.113135	0.631070361	1.466895885	0.8903486
Robbins	F	Full Cervicometrics	12	0.921972	0.525661177	1.185808431	0.9040219
Wright	**F**	**Dental Nonmetric**	**5**	**0.09644**	**0.029729777**	**0.118822592**	**0.1667147**
Wright	**F**	**Maxillary Cervicometrics**	**5**	**0.28047**	**0.047212209**	**0.332831428**	**1.02577**

Comparison of sex-specific phenotypic variability per mound to regional phenotypic variability of the same sex. Bolded values represent significant results.

Figure 17. Visualization of the results of sex-specific comparisons of phenotypic variability between mound and regional samples. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the sex specific mean standard deviation calculated for the region. “F” denotes comparisons between females and “M” denotes comparisons between males.

Table 22

Regional Between-Sex Comparisons

Sex	Data	n	SD	95% Confidence Interval of SD		Mean SD of Opposite Sex from Region
F	Cranial Nonmetric	24	0.204482	0.13691953	0.2498876	0.1614442
M	Dental Nonmetric	22	0.152342	0.100353434	0.188130988	0.1732047
M	**Maxillary Cervicometric**	**28**	**0.85581**	**0.600343889**	**1.067304186**	**1.104981**
F	Mandibular Cervicometrics	30	0.927343	0.652751484	1.161962029	1.041215
M	Full Cervicometrics	23	1.084417	0.769564325	1.304729802	0.9114804

Bolded values represent significant results.

Table 23

Mound-Level Between-Sex Comparisons

Site	Sex	Data	n	SD	95% Confidence Interval of SD		Mean SD of Opposite Sex
Robbins	M	Cranial Nonmetric	7	0.155712	0.072032504	0.189910636	0.1365635
Robbins	M	Mandibular Cervicometric	5	0.775661	0.169338095	1.067704635	1.011233
Wright	F	Dental Nonmetric	5	0.096445	0.029729777	0.118505184	0.101076
Wright	**F**	**Maxillary Cervicometrics**	**5**	**0.28047**	**0.053858993**	**0.334496235**	**0.6825719**

Bolded values represent significant results

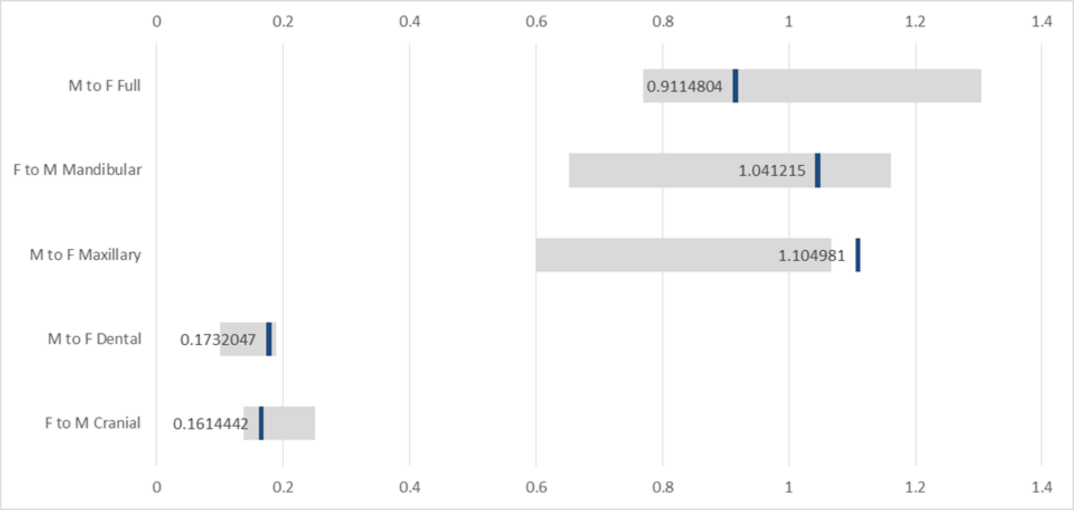


Figure 18. Visualization of the results of between-sex comparisons of phenotypic variability at the regional level. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the mean sex-specific standard deviation calculated for the region. For example, in an “F to M” comparison, the grey bar indicates the 95% confidence interval of the standard deviation for females for that dataset and the dark bar and printed value indicate the mean standard deviation for males for that data set.

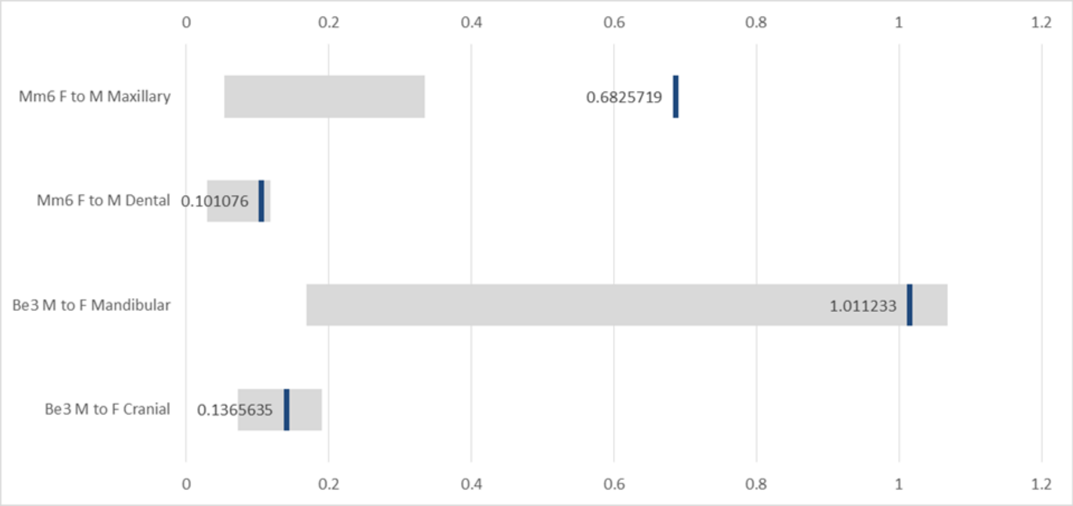


Figure 19. Visualization of the results of between-sex comparisons of phenotypic variability at the site level. Grey bars represent the 95% confidence interval for the standard deviation of either the first principal component (for cervicometric data) or first dimension of variation (for nonmetric data). Dark bars and printed values indicate the mean sex-specific standard deviation calculated for the site. For example, in an “F to M” comparison, the grey bar indicates the 95% confidence interval of the standard deviation for females for that dataset and the dark bar and printed value indicate the mean standard deviation for males for that data set.

Robbins and Dover (15Ms27) exhibit less phenotypic variation than the regional sample of males, but not significantly so. For three out of five phenotypic datasets, males from Wright are more variable than their regional counterparts, but this difference is not significant. Four out of five phenotypic datasets exhibit lower variation than the regional average for males from Ricketts (15Mm3), with the difference attaining significance for cervical measurements from the full dentition. Cranial nonmetric variation among males deriving from the Landing mound is also significantly less than regional variation for this dataset.

Between-sex comparisons of phenotypic variability based on the standard deviation of the first principal component scores (or their equivalent for the nonmetric datasets) indicate that males are more phenotypically variable than females across the region with respect to cervical measurements of the mandibular and full dentitions. In contrast, females exhibit more phenotypic variation than males across the region for cranial and dental nonmetric traits as well as cervical measurements of the maxillary dentition (this latter difference is significant). Further, females interred at Wright exhibit less phenotypic variation than their male counterparts. This difference is significant with regards to maxillary cervicometrics. In contrast, males from Robbins are less phenotypically variable than females from the same site, although this difference is not significant.

Summary.

The degree to which the results of the comparisons of phenotypic variability presented above are consistent with the expectations of either Scenario 1 (the territorial hypothesis) or the two variants of Scenario 2 (where a single mound is the product of the actions of multiple descent-based corporate groups, either sequentially or simultaneously) are presented in Table 24. Without exception, all comparisons derived from the Robbins mound (15Be3) are consistent with the expectations of Scenario 2. For interment episode six, both analyses produced results consistent with Scenario 2b, in which multiple groups interred their dead within the same interment episode. For interment episode eight, the results of the two analyses permitted by sample size are split between Scenarios 2a and 2b, sequential and simultaneous involvement of multiple groups. For the Landing mound (15Be17), results of the two analyses permitted by sample size are divided between Scenario 1 and Scenario 2, with individuals from the entire mound producing a sample that is consistent with the two variants of a scenario of multiple group participation and the males-only comparison producing results consistent with a territorial hypothesis. With the exception of two analyses (comparisons based on cervical measurements of the full dentition for the mound burial sample and for males only), the results derived from the Ricketts site (15Mm3) are consistent with the expectations of Scenario 2. The Wright mound (15Mm6) analyses produce a more complex set of results, with comparisons based on dental nonmetric data and maxillary cervicometrics producing results consistent with Scenario 1 for the entire mound, both interment episodes, and the comparison of females interred at Wright to the regional sample of females. In contrast, comparisons based on all datasets produce results consistent with Scenario 2 for males interred at

Table 24

Implications of Variability Comparisons, PC1

Site / Data	Phenotypic Variability Comparisons			Scenario 1	Scenario		
	IE < Source Mound	IE < Region	Mound < Region		2	2a	2b
Robbins (15Be3)							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Robbins IE 6							
Cranial NM	No	No	No		X		X
Mandibular Cervicometrics	No	No	No		X		X
Robbins IE 8							
Cranial NM	No	No	No		X		X
Mandibular Cervicometrics	Yes	Yes	No		X	X	
Robbins Females							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Robbins Males							
Cranial NM			No		X		
Mandibular Cervicometrics			No		X		
Landing (15Be17)							
Cranial NM			No		X		
Landing Males							
Cranial NM			Yes	X			
Ricketts (15Mm3)							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			Yes	X			
Ricketts Males							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			Yes	X			
Wright (15Mm6)							
Cranial NM			No		X		
Dental NM			Yes	X			
Maxillary Cervicometrics			Yes	X			
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Wright IE 4							
Maxillary Cervicometrics	No	Yes	Yes	X			
Mandibular Cervicometrics	No	No	No		X		X
Full Cervicometrics	No	No	No		X		X
Wright IE 5							
Dental NM	No	Yes	Yes	X			
Maxillary Cervicometrics	No	No	Yes	X			
Wright Females							
Dental NM			Yes	X			
Maxillary Cervicometrics			Yes	X			
Wright Males							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Dover (15Ms27)							
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			Yes	X			
Full Cervicometrics			No		X		
Dover Males							
Maxillary Cervicometrics			No		X		

Wright as compared to their regional counterparts. The differences between which analyses support which hypotheses at the level of the mound and for each construction episode is therefore likely driven by the demographic compositions of the respective burial samples in terms of sex. Lastly, and with the exception of comparisons based on cervical measurements of the mandibular dentition (which produces results consistent with Scenario 1), results of the comparisons of data derived from the individuals interred at Dover are most consistent with Scenario 2. This statement should be qualified, however, by the observation that all of the comparisons of phenotypic variability from Dover indicate that this population is less variable than the region, but the only difference that achieves statistical significance is that derived from comparison of the mandibular cervicometrics.

The results of the between-sex comparisons can be used to clarify some of the patterning described above. At the Wright mound, females are less variable than males for both maxillary cervicometric and dental nonmetric data (significantly so in the case of the former), suggesting that the pattern of results described above is, indeed, a product of the demographic composition of the samples being compared. Given that, regionally, females are more variable than males in regards to cervical measurements of the maxillary dentition, it is tempting to suggest that females interred at Wright are drawn from a smaller population than males and that the complexity of the results from the Wright burial sample is the result of these contrasting patterns. No such sex-specific patterning is evident at Robbins, however, which suggests that two different processes resulted in each mound’s sample of interments. These results (and those presented above), should be interpreted cautiously, however, as they are based upon comparisons that take into account no more than 30% of the variability in each phenotypic dataset.

Centroid Size.

In order to incorporate more principal components (for the metric data) or dimensions of variation (for the nonmetric data) into phenotypic comparisons, centroid size was used as an alternative index of variability. Centroid size is effectively a measure of dispersion of a set of *n*-dimensional points. For example, the first five principal component scores for an individual can be conceptualized as a 5-dimensional point. A sample of individuals would then result in a sample of 5-dimensional points and the centroid size of that sample can be calculated as an index of their dispersion through 5-dimensional space. Using a resampling strategy identical to that described for the comparisons of sample standard deviations in Chapter 5, the comparison of centroid sizes therefore allows the incorporation of a greater amount of the variability in each dataset and produces more robust comparisons. Parallel analysis (Horn, 1965), as implemented in the "hornpa" package for the R statistical environment, was used to compare the magnitude of eigenvalues produced through the principal component analyses of cervicometric data to the magnitude of eigenvalues that can be produced from a randomly generated matrix of equivalent dimensions to these datasets. Components having eigenvalues whose magnitudes exceeded those that could be produced by chance alone were retained. The first three principal components (accounting for 70% of the total variation) were used for comparisons of maxillary cervicometric data, whereas the first five principal components were used for cervicometric data from the mandibular and full dentitions (accounting for

87% and 76% of the variability, respectively). Since parallel analysis could not be applied to the nonmetric datasets, sufficient dimensions of variation were selected in order to account for at least 70% of the variability in the dataset. The first five dimensions of variation were used for cranial nonmetric data (71.7% of the total variability in this data), and the first six dimensions (74.2% of the total variability) were used for the dental nonmetric data.

Comparisons of mound to region.

Results of centroid size comparisons between mound-level burial samples and the regional burial sample are presented in Table 25 and Figure 20. The amounts of phenotypic variation exhibited by all observable datasets from Robbins (15Be3), Landing (15Be17), and Ricketts (15Mm3) do not significantly differ from the amount of variation observed at the regional scale. Individual interred in the Wright mound (15Mm6) are generally less phenotypically variable than the regional burial sample, but this difference is only significant for dental nonmetric data. The burial sample derived from the Dover mound (15Ms27) exhibits significantly less phenotypic variability than the regional sample for dental nonmetric, mandibular cervicometric, and full cervicometric datasets, with data deriving from maxillary cervicometric data trending in the same direction.

Interment episode comparisons.

As with the comparison based on standard deviations above, the phenotypic variability exhibited by individuals included in a single interment episode was compared to the amount of variability present in burial samples derived from both the entire source

Table 25

Mound to Region Comparisons, Centroid Size

Site	Data	n	CS	95% Confidence Interval for CS		Mean CS from Region
Robbins (15Be3)	Cranial Nonmetric	18	1.358874	1.090184347	1.52473871	1.400996
Robbins (15Be3)	Dental Nonmetric	10	1.128169	0.825362897	1.270600034	0.992319
Robbins (15Be3)	Maxillary Cervicometric	13	6.302068	4.478064266	7.536520874	5.894009
Robbins (15Be3)	Mandibular Cervicometric	19	9.499711	7.840658389	10.52324679	9.614462
Robbins (15Be3)	Full Cervicometric	13	7.563343	5.764113062	8.697228698	7.59002
Landing (15Be17)	Cranial Nonmetric	6	0.9092646	0.518091444	1.000650107	0.7559156
Ricketts (15Mm3)	Cranial Nonmetric	14	1.226398	0.980764131	1.351194617	1.227176
Ricketts (15Mm3)	Dental Nonmetric	11	1.013074	0.706480276	1.1757266	1.045591
Ricketts (15Mm3)	Maxillary Cervicometric	13	5.99327	4.525778162	6.801739049	5.894009
Ricketts (15Mm3)	Mandibular Cervicometric	14	8.274928	6.579256024	9.146418387	8.142529
Ricketts (15Mm3)	Full Cervicometric	11	7.585147	4.860622251	9.386329371	6.966616
Wright (15Mm6)	Cranial Nonmetric	9	0.9562078	0.735192545	0.99075301	0.9657229
Wright (15Mm6)	**Dental Nonmetric**	**11**	**0.8949526**	**0.645632698**	**1.033538715**	**1.045591**
Wright (15Mm6)	Maxillary Cervicometric	12	5.386786	3.952075315	6.180741438	5.644362
Wright (15Mm6)	Mandibular Cervicometric	12	7.46346	5.833371792	7.906989603	7.51953
Wright (15Mm6)	Full Cervicometric	11	7.609186	6.127246843	8.122017423	6.966616
Dover (15Ms27)	**Dental Nonmetric**	**5**	**0.4645397**	**0.281744223**	**0.485976319**	**0.6530708**
Dover (15Ms27)	Maxillary Cervicometric	8	4.34232	2.877346537	5.057191391	4.483135
Dover (15Ms27)	**Mandibular Cervicometric**	**7**	**3.898423**	**2.886490245**	**4.063096102**	**5.489826**
Dover (15Ms27)	**Full Cervicometric**	**7**	**4.64057**	**3.042382943**	**5.312033609**	**5.351122**

Bolded values represent significant results

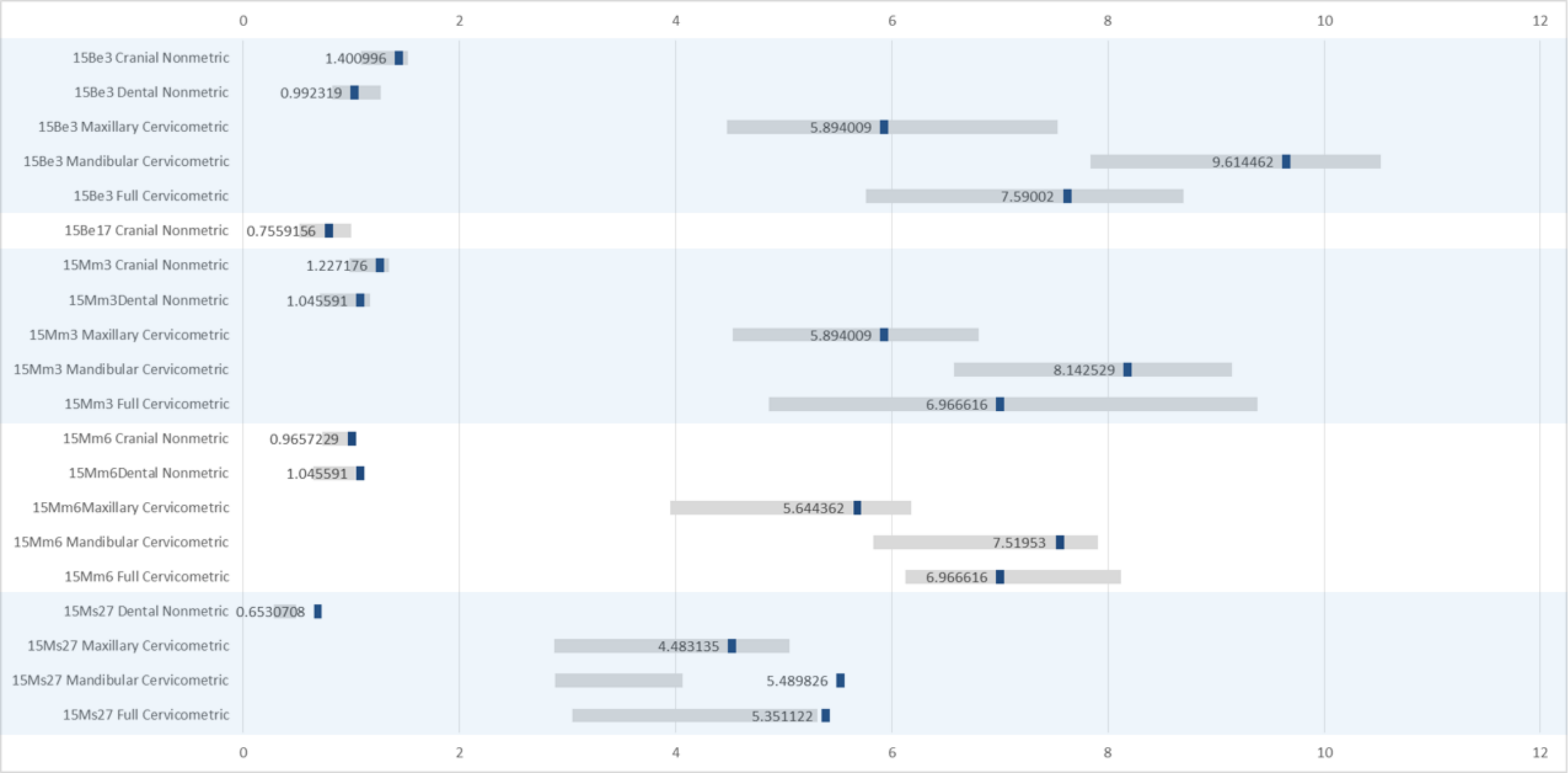


Figure 20. Visualization of the results of mound to region comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the centroid size from the mound burial sample. Dark bars and printed values indicate the mean centroid size calculated for the region.

mound and the region (see Table 26 and Figures 21 and 22). Both the sixth and the eighth interment episodes at Robbins exhibit less phenotypic variation than the Robbins mound as a whole, but this difference is not significant. The fourth interment episode of the Wright mound is not significantly different from its source mound in terms of the variability exhibited by any of the phenotypic datasets for which it was observable. The fifth interment episode at Wright, however, is significantly less variable than the Wright mound as a whole in regards to maxillary cervicometrics. Dental nonmetrics for this interment episode are also less variable than those of the source mound, although this difference does not attain significance. Comparison of burial samples derived from interment episodes to regional burial samples produces more extreme forms of the same patterning. The sixth interment episode at Robbins exhibits significantly less variation than the regional sample for cervical measurements of the mandibular dentition. The fifth interment episode at Wright is significantly less variable than the regional sample across all datasets that could be observed. The eighth episode of interment at Robbins and the fourth episode at Wright both exhibit generally less phenotypic variability than samples derived from the entire region, but these differences are not significant.

Sex-specific comparisons.

Comparisons were made by mound for each sex (see Table 27 and Figure 23), as well as between sexes at both the regional (see Table 28 and Figure 24) and site levels (see Table 29 and Figure 25). Females from Wright are significantly less phenotypically variable than the regional average, while females from Robbins exhibit as much or more phenotypic variability than their regional counterparts. Male samples from Robbins,

Table 26

Interment Episode Comparisons, Centroid Size

Site	IE	Data	n	CS	95% Confidence Interval for CS		Mean Mound CS	Mean Region CS
Robbins (15Be3)	6	Cranial Nonmetric	6	0.7164711	0.469494409	0.778840756	0.7089756	0.7559156
Robbins (15Be3)	**6**	**Mandibular Cervicometric**	**5**	**4.351319**	**2.428391606**	**4.451036772**	4.354142	**4.469593**
Robbins (15Be3)	8	Cranial Nonmetric	5	0.6574612	0.34946783	0.770871211	0.6313133	0.6778812
Robbins (15Be3)	8	Mandibular Cervicometric	5	4.576043	2.319400741	5.337488133	4.354142	4.469593
Wright (15Mm6)	4	Maxillary Cervicometric	5	3.932803	2.020807342	4.496170139	3.078825	3.358709
Wright (15Mm6)	4	Mandibular Cervicometric	5	4.404842	2.538825612	4.898916605	4.287593	4.469593
Wright (15Mm6)	4	Full Cervicometric	5	4.942404	2.737692819	5.52437542	4.540369	4.325464
Wright (15Mm6)	**5**	**Maxillary Cervicometric**	**5**	**2.39962**	**1.38044803**	**2.706301052**	**3.078825**	**3.358709**
Wright (15Mm6)	**5**	**Dental Nonmetric**	**5**	**0.5358911**	**0.303512119**	**0.564487146**	0.5275227	**0.6530708**

Bolded values represent significant results.

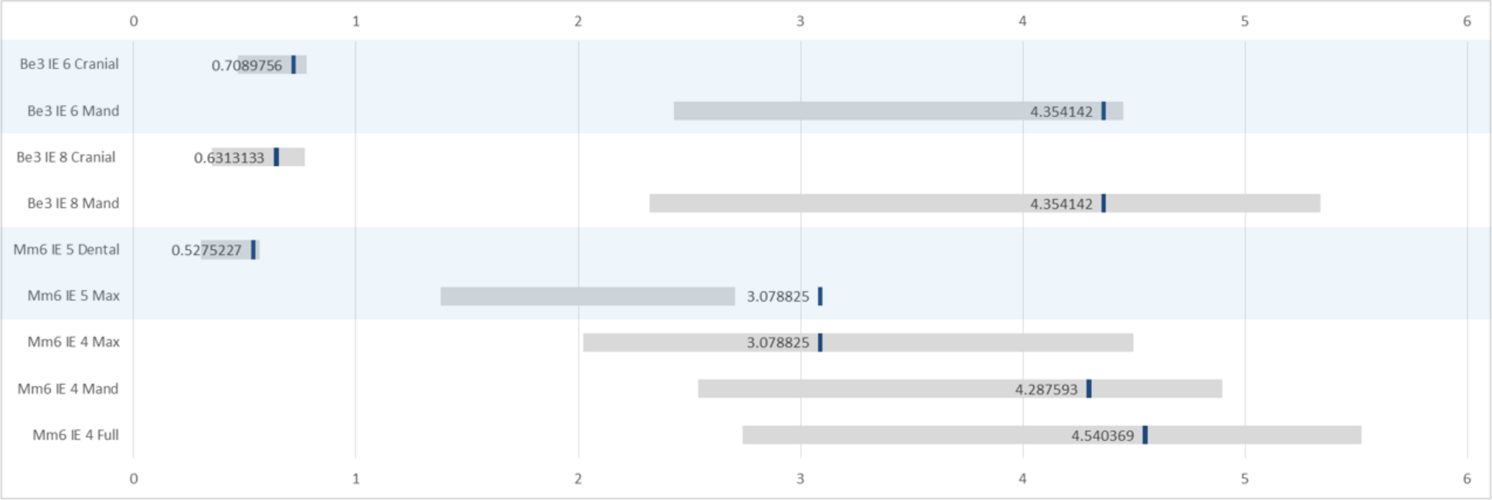


Figure 21. Visualization of the results of interment episode to source mound comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the centroid size for the interment episode. Dark bars and printed values indicate the mean centroid size calculated for the source mound.

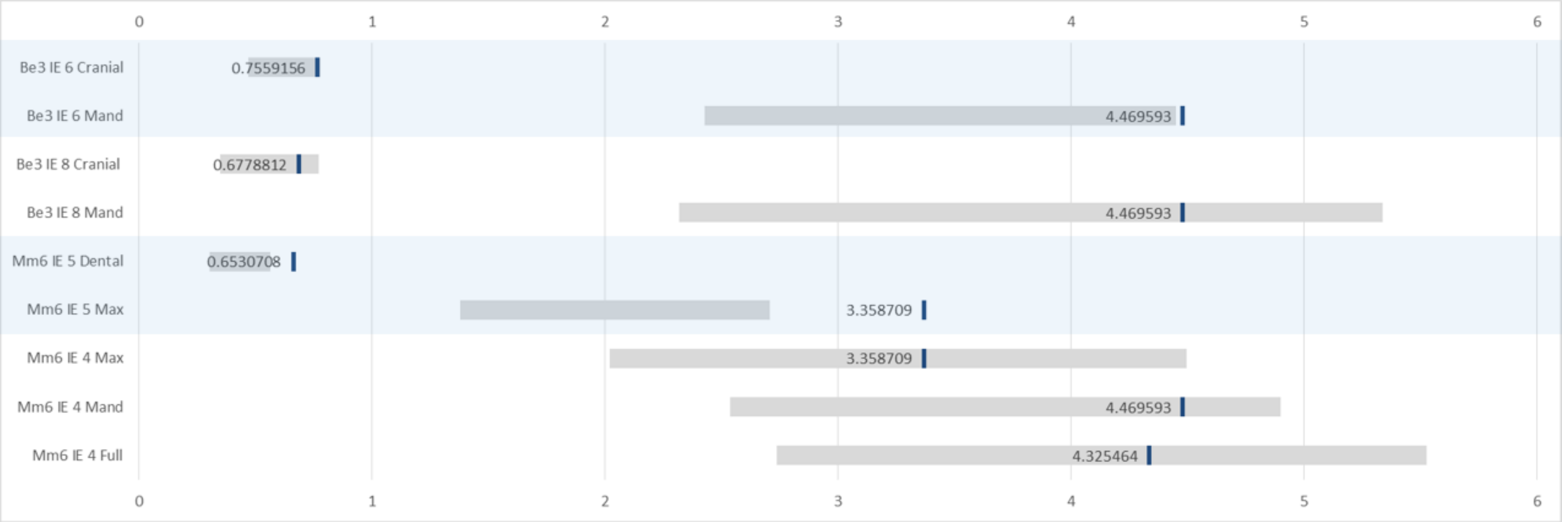


Figure 22. Visualization of the results of interment episode to region comparisons of phenotypic variability. Grey bars represent the 95% confidence interval for the centroid size for the interment episode. Dark bars and printed values indicate the mean centroid size calculated for the regional burial sample.

Table 27

Sex-Specific Comparisons

Site	Sex	Data	n	CS	95% Confidence Interval of CS		Mean CS from Region
Robbins	M	Cranial Nonmetric	7	0.7829675	0.545632651	0.833759256	0.8203821
Robbins	M	Mandibular Cervicometric	5	4.938011	2.520529134	5.164433179	4.709091
Landing	M	Cranial Nonmetric	5	0.6808595	0.415134707	0.737568602	0.6687534
Ricketts	M	Cranial Nonmetric	10	1.10916	0.831061324	1.194887602	1.009185
Ricketts	M	Dental Nonmetric	6	0.790294	0.466751725	0.889295103	0.7249079
Ricketts	M	Maxillary Cervicometrics	9	4.470834	3.03128838	5.188938723	4.438423
Ricketts	M	Mandibular Cervicometrics	10	7.272253	5.517923432	7.968341498	7.074559
Ricketts	M	Full Cervicometrics	7	6.395537	3.011556449	7.869287047	5.848611
Wright	M	Cranial Nonmetric	6	0.7842939	0.50639288	0.809216772	0.7447561
Wright	M	Dental Nonmetric	6	0.7007403	0.435089523	0.845373926	0.7249079
Wright	M	Maxillary Cervicometrics	7	4.506428	2.731204764	5.119716219	3.817019
Wright	M	Mandibular Cervicometrics	8	6.540492	4.96788135	6.701540593	6.219539
Wright	M	Full Cervicometrics	7	6.225684	4.064169252	6.659965841	5.770111
Dover	**M**	**Maxillary Cervicometrics**	**5**	**2.787082**	**1.57333207**	**3.09522199**	**3.126947**
Robbins	F	Cranial Nonmetric	11	1.093396	0.768979939	1.262451945	1.073206
Robbins	F	Dental Nonmetric	8	1.02051	0.686472279	1.148725689	0.8581372
Robbins	F	Maxillary Cervicometrics	12	6.149668	4.148276528	7.329464648	6.052053
Robbins	F	Mandibular Cervicometrics	14	7.876099	6.167513537	8.707986232	7.243617
Robbins	F	Full Cervicometrics	12	7.311395	5.39643095	8.508751786	6.97847
Wright	**F**	**Dental Nonmetric**	**5**	**0.4184734**	**0.214462078**	**0.497470996**	**0.6428563**
Wright	**F**	**Maxillary Cervicometrics**	**5**	**2.807299**	**1.565869808**	**3.249608512**	**3.593934**

Bolded values represent significant results

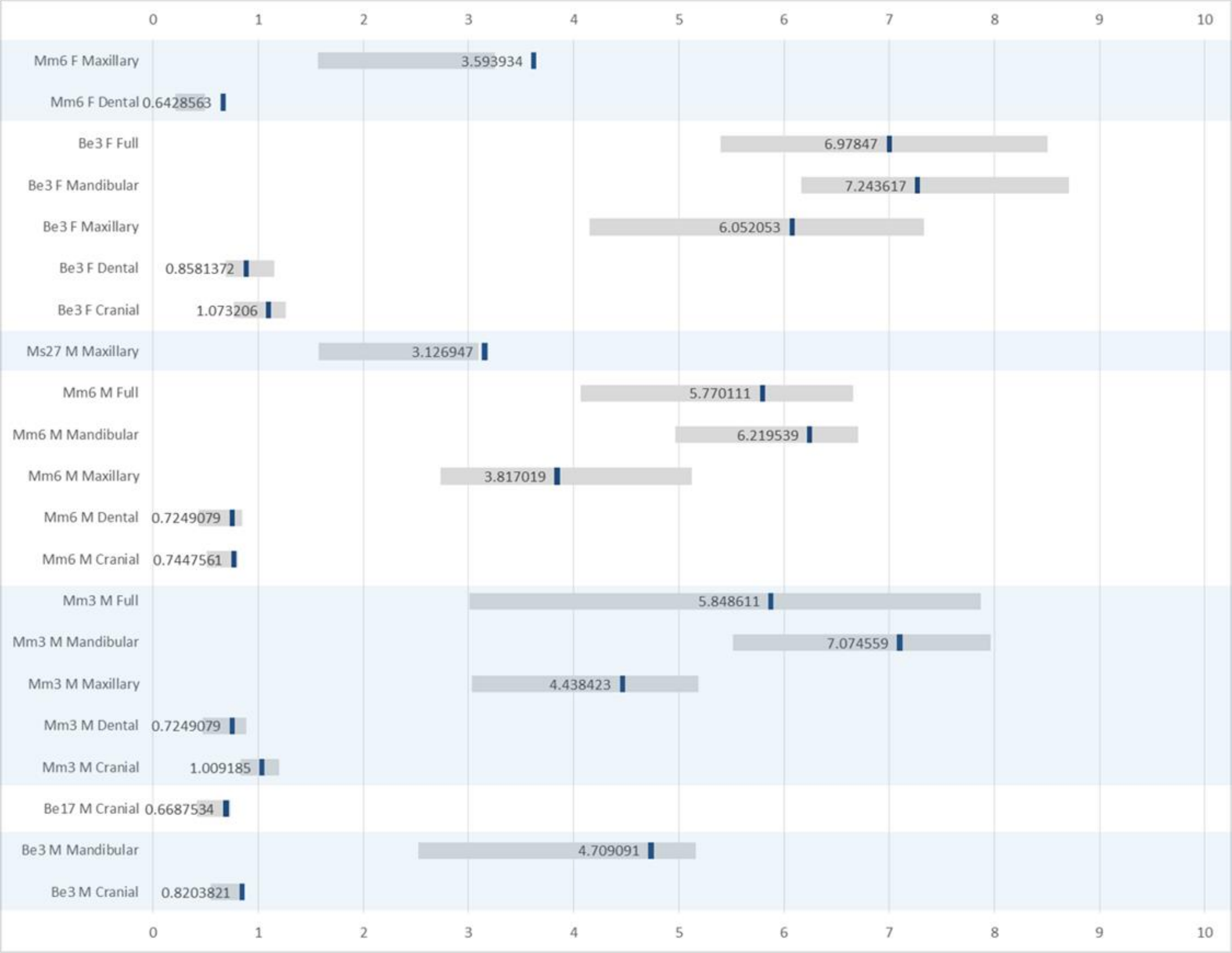


Figure 23. Visualization of the results of sex-specific comparisons of phenotypic variability between mound and regional samples. Grey bars represent the 95% confidence interval for the centroid size. Dark bars and printed values indicate the sex specific mean centroid size calculated for the region. “F” denotes comparisons between females and “M” denotes comparisons between males.

Table 28

Regional Between-Sex Comparisons

Sex	Data	n	CS	95% Confidence Interval of CS		Mean CS of Opposite Sex from Region
F	Cranial Nonmetric	24	1.670191	1.373399484	1.856315449	1.61239
M	Dental Nonmetric	22	1.550736	1.256182156	1.776071037	1.502913
M	**Maxillary Cervicometric**	**28**	**8.352063**	**6.961970405**	**9.256153637**	**9.527043**
F	**Mandibular Cervicometrics**	**30**	**11.12494**	**9.772111478**	**12.14375615**	**12.69503**
M	Full Cervicometrics	23	10.9192	8.727517323	12.94543502	10.11611

Bolded values represent significant results

Table 29

Mound-Level Between-Sex Comparisons

Site	Sex	Data	n	CS	95% Confidence Interval of CS		Mean CS of Opposite Sex
Robbins	M	Cranial Nonmetric	7	0.7829675	0.557033703	0.835542146	0.7952995
Robbins	M	Mandibular Cervicometric	5	4.938011	2.520529134	5.164433179	4.119651
Wright	**F**	**Dental Nonmetric**	**5**	**0.4184734**	**0.214462078**	**0.48645217**	**0.5662602**
Wright	**F**	**Maxillary Cervicometrics**	**5**	**2.807299**	**1.418250449**	**3.297352339**	**3.337948**

Bolded values represent significant results.

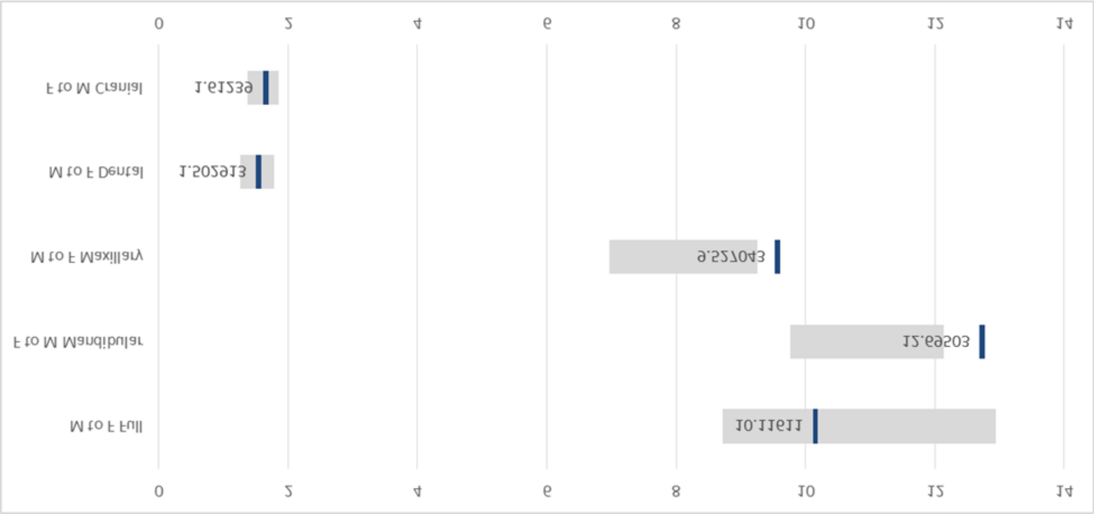


Figure 24. Visualization of the results of between-sex comparisons of phenotypic variability at the regional level. Grey bars represent the 95% confidence interval for the centroid size. Dark bars and printed values indicate the mean sex-specific centroid size calculated for the region. For example, in an "F to M" comparison, the grey bar indicates the 95% confidence interval of the centroid size for females for that dataset and the dark bar and printed value indicate the mean centroid size for males for that data set.

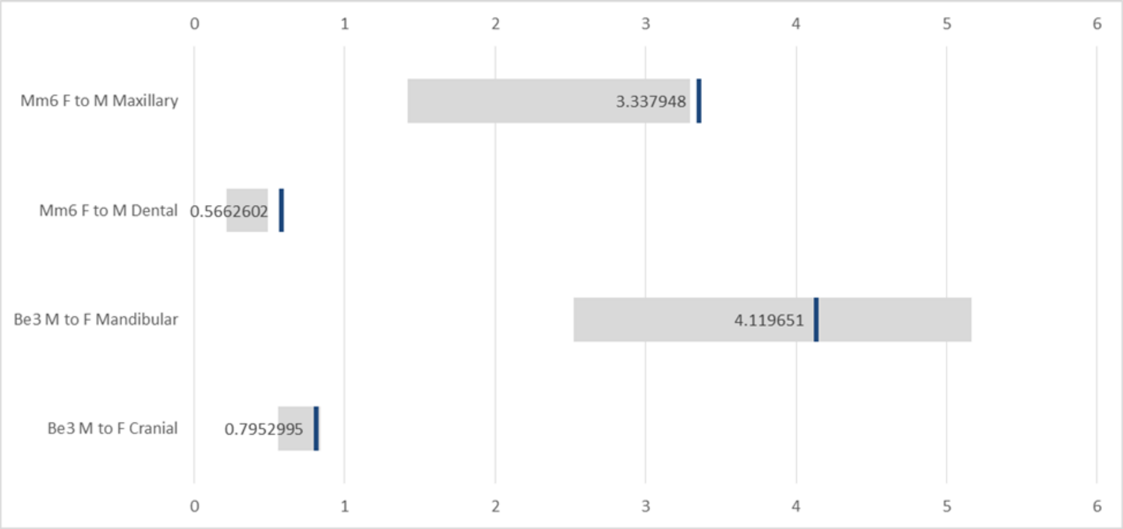


Figure 25. Visualization of the results of between-sex comparisons of phenotypic variability at the site level. Grey bars represent the 95% confidence interval for the centroid size. Dark bars and printed values indicate the mean sex-specific centroid size calculated for that site. For example, in an "F to M" comparison, the grey bar indicates the 95% confidence interval of the centroid size for females for that dataset and the dark bar and printed value indicate the mean centroid size for males for that data set.

Ricketts, and Wright do not significantly differ from the region in their degree of phenotypic variation. Landing, whose males were significantly less variable than the regional average when the comparison was based on standard deviation of scores along the first dimension of variation, is no longer significantly different from the regional male average when the comparison is based on centroid size. In contrast, males from Dover now exhibit significantly less variability among their maxillary cervical measurements than the regional average (this difference was not significant when the comparison was based on the standard deviation of the first principal component scores). These shifts in significance are consistent with the results of the mound-to-region comparisons.

Across the region, females exhibit significantly less phenotypic variation than males for cervical measurements of the mandibular dentition. Males, on the other hand, exhibit significantly less phenotypic variability than females with regards to cervical measurements of the maxillary dentition. For all other phenotypic datasets, males and females do not significantly differ. Females interred at Wright are significantly less phenotypically variable than their male counterparts. In contrast, males from Robbins exhibit less phenotypic variation than females for the cranial nonmetric dataset, but this difference is not significant.

Summary.

The degree to which the results of the comparisons of phenotypic variability based on centroid size are consistent with the expectations of either Scenario 1 (the territorial hypothesis) or the two variants of Scenario 2 (where a single mound is the product of the actions of multiple descent-based corporate groups, either sequentially or simultaneously) are presented in Table 30. Results from the centroid size comparisons pertaining to Robbins (15Be3), Landing (15Be17), and Ricketts (15Mm3) are all consistent with the expectations of Scenario 2 and inconsistent with the expectations of Scenario 1. For Robbins, the results of interment episode comparisons suggest that both interment episodes are consistent with Scenario 2b, or a situation in which multiple groups contributed to a given episode of interment. Results from the Wright mound (15Mm6) are more complex. For comparisons of the entire burial sample from this mound, the majority of the results are consistent with Scenario 2 (dental nonmetric comparisons are more consistent with Scenario 1). The fourth interment episode at Wright is consistent with Scenario 2b while the fifth interment episode at Wright produces results that are consistent with the expectations of both Scenario 1 (for the dental nonmetric data) and Scenario 2a, or sequential mound use by multiple groups (for maxillary cervicometric data). Results from all datasets are consistent with Scenario 2 for Wright males while, in contrast, results from all available datasets for Wright females are consistent with Scenario 1. For Dover (15Ms27), only the maxillary cervicometric dataset is consistent with Scenario 2, whereas the results from the dental nonmetric, mandibular cervicometric and full dentition cervicometric datasets are consistent with Scenario 1, as are the maxillary cervicometric data derived from males interred in this mound.

In general, the results from comparisons of centroid size exhibit more internal consistency than those derived from comparisons of the standard deviation of scores along the first principal component or dimension of variation and this is likely due to their incorporation of a greater amount of the variability included in each dataset.

Table 30

Implications of Variability Comparisons, Centroid Size

Site / Data	Phenotypic Variability Comparisons			Scenario 1	Scenario		
	IE < Source Mound	IE < Region	Mound < Region		2	2a	2b
Robbins (15Be3)							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Robbins IE 6							
Cranial NM	No	No	No		X		X
Mandibular Cervicometrics	No	Yes	No		X		X
Robbins IE 8							
Cranial NM	No	No	No		X		X
Mandibular Cervicometrics	No	No	No		X		X
Robbins Females							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Robbins Males							
Cranial NM			No		X		
Mandibular Cervicometrics			No		X		
Landing (15Be17)							
Cranial NM			No		X		
Landing Males							
Cranial NM			No		X		
Ricketts (15Mm3)							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Ricketts Males							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Wright (15Mm6)							
Cranial NM			No		X		
Dental NM			Yes	X			
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Wright IE 4							
Maxillary Cervicometrics	No	No	No		X		X
Mandibular Cervicometrics	No	No	No		X		X
Full Cervicometrics	No	No	No		X		X
Wright IE 5							
Dental NM	No	Yes	Yes	X			
Maxillary Cervicometrics	Yes	Yes	No		X	X	
Wright Females							
Dental NM			Yes	X			
Maxillary Cervicometrics			Yes	X			
Wright Males							
Cranial NM			No		X		
Dental NM			No		X		
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			No		X		
Full Cervicometrics			No		X		
Dover (15Ms27)							
Dental NM			Yes	X			
Maxillary Cervicometrics			No		X		
Mandibular Cervicometrics			Yes	X			
Full Cervicometrics			Yes	X			
Dover Males							
Maxillary Cervicometrics			Yes	X			

Results of the between-sex comparisons can help to refine the patterning described above. Wright females are significantly less phenotypically variable than Wright males for both the maxillary cervicometric and dental nonmetric datasets. Given that males are significantly less variable than females for cervical measurements of the maxillary dentition on a regional scale, this suggests that Wright females are derived from a smaller population than the males interred at Wright. The conflicting results from the Wright burial sample as a whole may be a result of this sex-specific patterning. In contrast, males interred at Dover exhibit significantly less phenotypic variability than the regional male average for maxillary cervicometrics. While available sample sizes did not allow for their direct comparison to the females interred at Dover, the combined sex sample does not significantly differ from the regional variability in cervical measurements of the maxillary dentition. This indirectly suggests that females interred at Dover are more phenotypically variable than males (which would be expected given regional trends). The combination of these results in comparison to those from other mounds, however, suggests that Dover males may be drawn from a smaller population than Dover females.

Cluster Analyses

Cluster analyses were undertaken for all phenotypic and mortuary datasets for the purpose of exploring the structure of the different datasets and to complement the comparisons of phenotypic variability by enabling the evaluation of the spatial distribution of both phenotypically similar individuals as well as graves resulting from similar mortuary practices. If, consistent with Scenario 1, Adena mounds represent the cumulative actions of a single, descent-based corporate group (or a small number of stably located neighboring groups), then clusters of phenotypically similar individuals and/or pairs of individuals exhibiting the most phenotypic similarity would be expected to be preferentially distributed within one mound or across a series of geographically proximate mounds. In contrast, if mounds were the product of multiple groups interring their dead in the same location either sequentially or simultaneously (consistent with the two variants of Scenario 2), then clusters of phenotypically similar individuals would not be expected to exhibit any geographic bias or restriction – the membership of a given cluster would be distributed among multiple mounds that are located in different areas. For the mortuary data, if clusters of individuals interred in formally similar graves exhibited a restricted geographic distribution, then this might indicate the existence of localized traditions of mortuary practices. Lack of such patterning could, in turn, indicate a system characterized by high variability or, alternatively, a regional mortuary tradition.

K-medoids clustering solutions from k=2 through k=n were evaluated using silhouette widths, where n is the number of individuals in the dataset being clustered. Higher silhouette widths indicate cluster solutions that better match the structure of the data. Cluster solutions exhibiting the highest silhouette widths were selected for further evaluation, as were any cluster solutions with comparable silhouette widths that seemed to simplify the structure of the data. For each of the datasets discussed below, the optimal clustering solution and any alternative solutions of interest are identified before evaluating the distribution of cluster membership among mounds as well as the spatial distribution of those pairs of individuals exhibiting the smallest inter-individual distances. The results of sex-specific cluster analyses for each dataset are then presented in a similar fashion. To facilitate presentation and discussion of the clustering results for both the phenotypic and the mortuary datasets, the mounds included in the research sample were partitioned into five subregions based on their geographic locations: Boone County sites (15Be3, 15Be15, 15Be17, 15Be20, and 15Be32), sites located in Montgomery and Bath counties (15Mm3, 16Mm6, 15Mm7 and 15Bh15), Fayette County sites (15Fa11 and 15Fa152), Mason County sites (15Ms27), and Johnson County sites (15Jo2 and 15Jo9).

Phenotypic data.

Cranial nonmetric data.

For the combined-sex cranial nonmetric data, the optimal clustering solution was identified as k=25, with a simplifying solution at k=4. The distribution of cluster membership for these solutions is presented in Table 31. At the k=25 solution, of the 17 clusters whose membership sizes exceeded one individual, all but four (Clusters 3, 10, 16 and 20) have memberships that are distributed across multiple subregions. Of the remaining 13 clusters, only one (Cluster 7) can be considered to exhibit any geographic bias with four of its five members having been interred within Boone County sites. The membership of the remaining 12 clusters is distributed fairly evenly among mounds located in different subregions. At the k=4 solution, all clusters have members derived from at least two of the three subregions represented by cranial nonmetric data. Of the 21 pairs of individuals who exhibited the smallest inter-individual distance as determined by the cranial nonmetric data, only seven were interred within the same mound and only one pair was buried within the same interment episode. Three of the 14 remaining pairs included individuals who were interred within mounds located within the same

Table 31

Distribution of Cluster Membership for Cranial Nonmetric Data

k=25									
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**2**			1		1			
2	**5**	1				1	3		
3	**3**					1	1	1	
4	**3**			1			2		
5	**2**			1					1
6	**1**			1					
7	**5**	1		1	2			1	
8	**3**			1				2	
9	**1**							1	
10	**2**						1	1	
11	**2**	1						1	
12	**4**	2			1			1	
13	**3**	1			1			1	
14	**3**	1	1				1		
15	**1**	1							
16	**3**	3							
17	**4**	3					1		
18	**3**	1					2		
19	**1**	1							
20	**2**	2							
21	**1**						1		
22	**2**						1		1
23	**1**						1		
24	**1**								1
25	**1**								1
k=4									
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**12**	3	1	2		1	1	3	1
2	**13**	3			1	1	6	1	1
3	**7**	1		1		1	2	2	
4	**27**	11		3	3		5	3	2

subregion, while the other 11 included individuals interred in separate subregions. The distribution of phenotypically similar pairs of individuals interred in different mounds is visualized in Figure 26.

The distribution of sex-specific cluster membership across mounds is presented in Table 32. For females, the optimal clustering solution was identified as *k*=2. However, as this may be an oversimplification of the structure of the data, the cluster solution with the second highest silhouette width (*k*=5) was also investigated. At the *k*=2 cluster solution, Cluster 1 exhibits some geographic bias, with 11 of its 16 members interred in mounds located in Boone County. This pattern is amplified at the *k*=5 solution, where 10 out of the 11 females assigned to Cluster 5 are interred within Boone County mounds and all three members of Cluster 3 are interred in sites located in Montgomery and Bath counties. The remaining clusters in both solutions are distributed among multiple subregions. For males, the optimal clustering solution was determined to be *k*=7. Clusters 2, 5, and 6 appear to be biased toward mounds located in Montgomery County whereas Cluster 3's membership is more heavily derived from Boone County sites. The remaining clusters have memberships that span multiple subregions. Of the eight pairs of females that exhibited relatively small inter-individual distances, three were interred within the same mound and an additional three included individuals who were interred within the same subregion. In contrast, four of the 12 pairs of males exhibiting the smallest inter-individual distances included individuals interred in the same mound and one more included individuals interred in neighboring mounds. The distribution of same-sex pairs of phenotypically similar individuals is visualized in Figure 26.

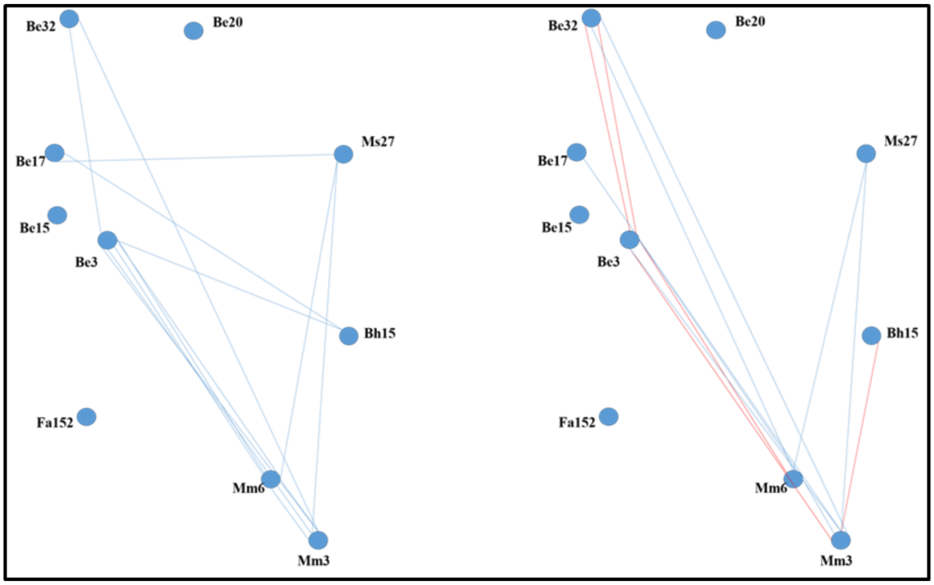


Figure 26. Distribution of pairs of individuals exhibiting the smallest inter-individual distances as determined by cranial nonmetric data (left). For within-sex pairs (right), blue lines indicate paired males and red lines indicate paired females.

Table 32

Sex-Specific Cluster Membership, Cranial Nonmetric Data

				Females k=2				
Cluster	**n**	**Be3**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**16**	9		2	1	1	2	1
2	**8**	2	1		2	2	1	
				Females k=5				
Cluster	**n**	**Be3**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**5**				1		3	1
2	**3**				1	2		
3	**4**	2	1		1			
4	**1**	1						
5	**11**	8		2		1		
				Males k=7				
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be32**	**Mm3**	**Mm6**	**Ms27**
1	**5**			1		2	1	1
2	**5**			1		3	1	
3	**7**	2	1	2		1		1
4	**6**	1		1	1	2	1	
5	**3**					2	1	
6	**6**	1			1	2	2	
7	**2**					1		1

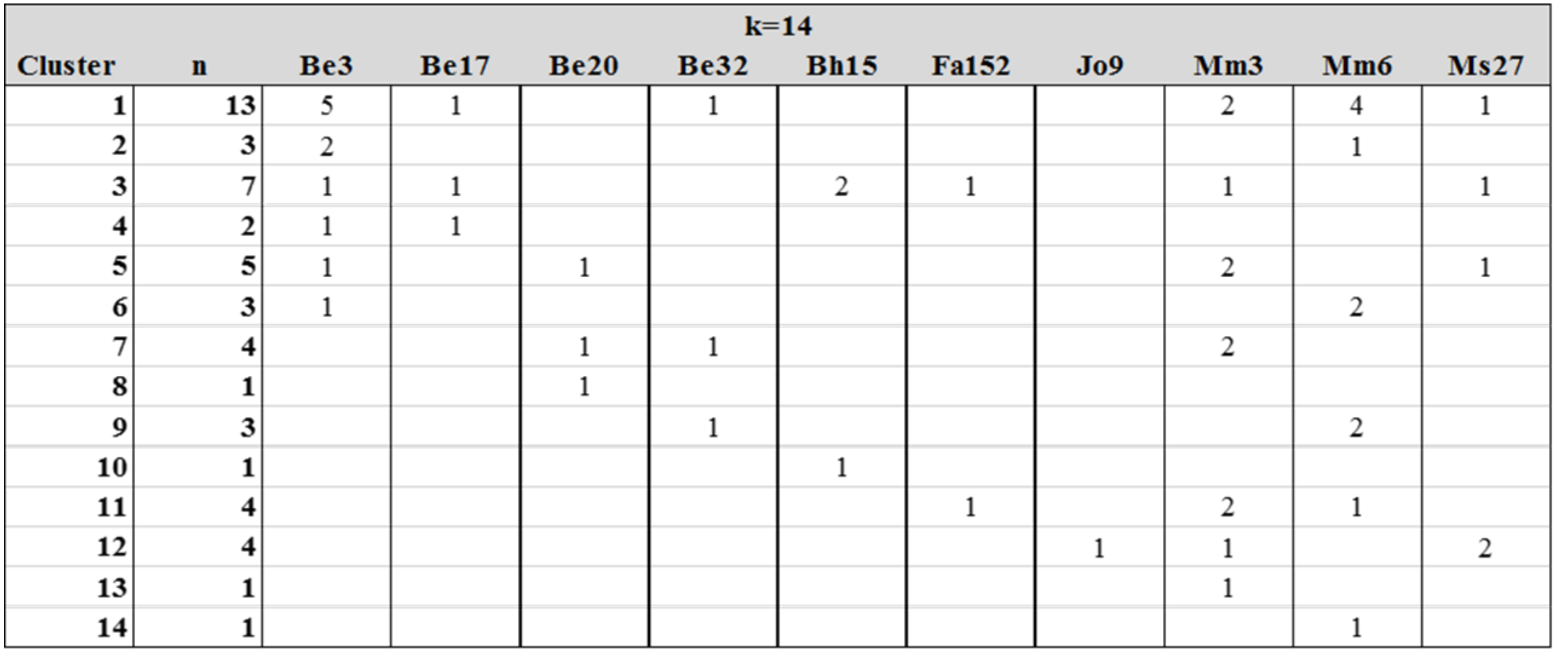
Dental nonmetric data.

For the combined-sex dental nonmetric data, the optimal clustering solution was identified as *k*=14. The distribution of the membership of each cluster across mounds is presented in Table 33. Of the 10 clusters whose membership exceeded one individual, nine were distributed across multiple regions. Only two clusters (Clusters 3 and 11) could be considered to possibly exhibit a geographical bias: three of the four members of Cluster 11 were interred within mounds in Montgomery County and both members of Cluster 3 were interred in Boone County sites. The remaining clusters all have memberships distributed across different subregions. Of the 17 pairs of individuals exhibiting the smallest inter-individual distances based on dental nonmetric data, only four included individuals who were interred in the same mound. Three of these pairs were included in the same interment episode, but none were included in the same grave. Of the remaining 13 pairs of phenotypically similar individuals, five included individuals who had been interred in neighboring mounds whereas the remaining eight pairs were distributed among mounds located in different subregions. The distribution of phenotypically similar pairs of individuals interred in different mounds is visualized in Figure 27.

The distribution of cluster membership across mounds for sex-specific clustering solutions is presented in Table 34. The optimal clustering solution for females was *k*=6. Four of these clusters had memberships that exceeded one individual and all but one of these were distributed more or less evenly among mounds located within different subregions. In contrast, all three members of Cluster 2 were interred within the same mound. For males, the optimal clustering solution was identified as *k*=10. Six clusters

Table 33

Distribution of Cluster Membership for Dental Nonmetric Data



		k=14									
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Be32**	**Bh15**	**Fa152**	**Jo9**	**Mm3**	**Mm6**	**Ms27**
1	**13**	5	1		1				2	4	1
2	**3**	2								1	
3	**7**	1	1			2	1		1		1
4	**2**	1	1								
5	**5**	1		1					2		1
6	**3**	1								2	
7	**4**			1	1				2		
8	**1**			1							
9	**3**				1					2	
10	**1**					1					
11	**4**						1		2	1	
12	**4**							1	1		2
13	**1**								1		
14	**1**									1	

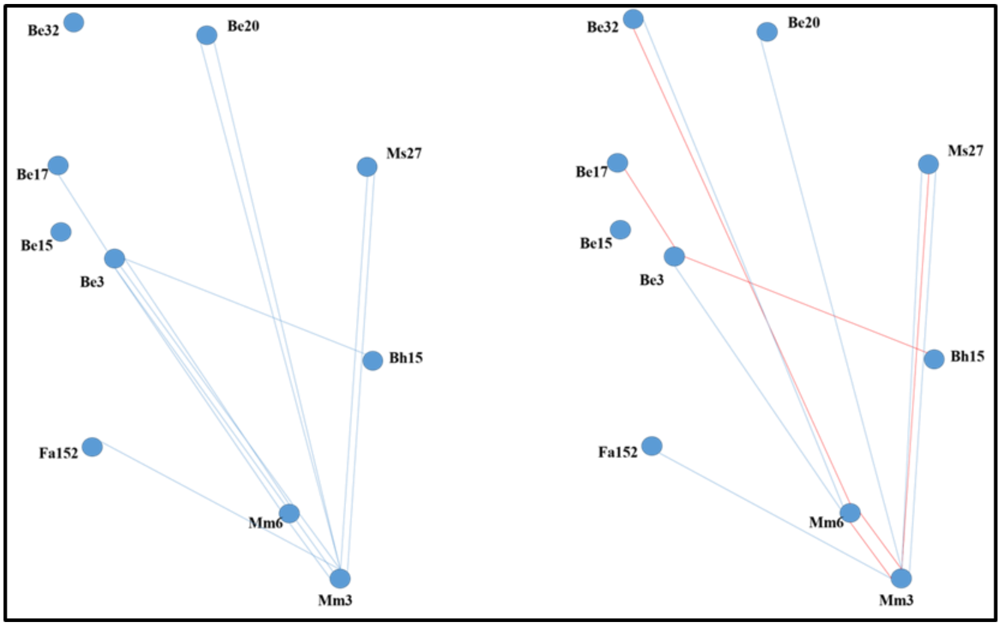


Figure 27. Distribution of pairs of individuals exhibiting the smallest inter-individual distances as determined by dental nonmetric data (left). For within-sex pairs (right), blue lines indicate paired males and red lines indicate paired females.

Table 34

Sex-Specific Cluster Membership, Dental Nonmetric Data

				Females k=6					
Cluster	**n**	**Be3**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**	
1	**9**	2	1	1		1	4		
2	**3**	3							
3	**8**	1			2	3	1	1	
4	**4**	1		1				2	
5	**1**	1							
6	**1**				1				
				Males k=10					
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Be32**	**Fa152**	**Mm3**	**Mm6**	**Ms27**
1	**5**	1	1				1	1	1
2	**3**			1			2		
3	**1**			1					
4	**4**			1		1	1		1
5	**2**				1			1	
6	**2**					1	1		
7	**1**						1		
8	**2**							2	
9	**1**							1	
10	**1**							1	

had memberships exceeding one individual, all but one of which include individuals interred in multiple mounds located in different subregions. Cluster 8 includes only two individuals, but both were interred in the same mound. Of the eight pairs of phenotypically similar females, only two pairs included individuals that were interred in the same mound and neither pair consisted of individuals included in the same interment episode. Three of the remaining six pairs included individuals interred within geographically proximate mounds. Of the seven pairs of males with the smallest inter-individual distances based on dental nonmetric traits, only one pair consisted of individuals interred within the same mound and these were included in the same episode of interment. None of the remaining pairs included individuals who were interred in neighboring mounds. The distribution of same-sex pairs of phenotypically similar individuals is visualized in Figure 27.

Maxillary cervicometric data.

For the combined-sex maxillary cervicometric data, the optimal clustering solution was identified as *k*=9 and the distribution of cluster membership across mounds is presented in Table 35. The memberships of all nine clusters are distributed among multiple subregions. Of the 23 pairs of individuals who are most phenotypically similar with regards to the cervical measurements of the maxillary dentition, only three pairs are composed of individuals interred within the same mound and only one is composed of individuals included in the same episode of interment. Of the 20 remaining pairs of phenotypically similar individuals, only five include individuals who were interred within geographically proximate mounds. The remaining 15 pairs are composed of individuals

Table 35

Distribution of Cluster Membership, Maxillary Cervicocmetric Data

		k=9							
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**8**	2	2				2	1	1
2	**9**	3	1					1	4
3	**6**	1		1			2	2	
4	**12**	2		2	1		3	3	1
5	**6**	2				1	1	1	1
6	**3**	1					1	1	
7	**5**	1				1	1	2	
8	**5**	1			1	1	2		
9	**4**				1		1	1	1

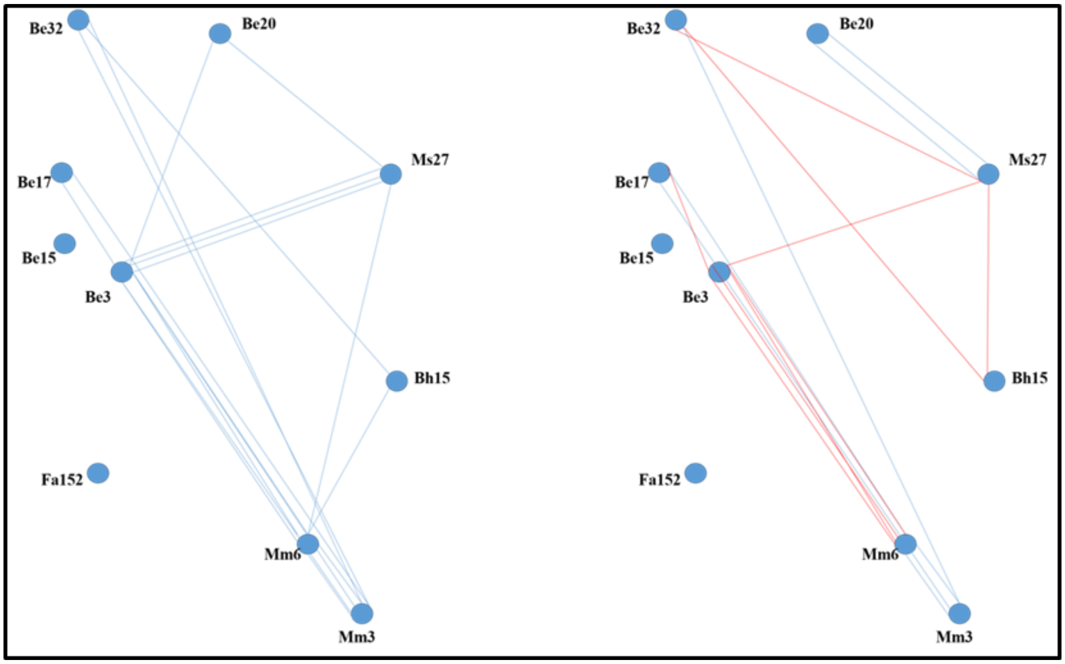


Figure 28. Distribution of pairs of individuals exhibiting the smallest inter-individual distances as determined by maxillary cervicometric data (left). For within-sex pairs (right), blue lines indicate paired males and red lines indicate paired females.

Table 36

Sex-Specific Cluster Membership, Maxillary Cervicometric Data

Females k=7								
Cluster	**n**	**Be3**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**8**	3	1		1		2	1
2	**5**	3				1	1	
3	**5**	2			1	1	1	
4	**5**	2				1	1	1
5	**4**	2			1	1		
6	**1**	1						
7	**2**			1				1

Males k=2								
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Be32**	**Mm3**	**Mm6**	**Ms27**
1	**23**	1	2	2	1	7	5	5
2	**5**			1		2	2	

Males k=9								
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Be32**	**Mm3**	**Mm6**	**Ms27**
1	**4**		2			1		1
2	**5**			1		2	2	
3	**5**			1		2	1	1
4	**6**			1	1	2	1	1
5	**1**	1						
6	**1**					1		
7	**1**					1		
8	**2**						2	
9	**3**						1	2

interred in mounds located in different subregions. The distribution of pairs of phenotypically similar individuals interred in separate mounds is visualized in Figure 28.

The distribution of cluster membership across mounds for sex-specific clustering solutions is presented in Table 36. An optimal clustering solution for females was identified at k=7. None of the six clusters whose membership exceeded one individual exhibited any geographic bias and all included individuals who had been interred in mounds located in different subregions. For males, an optimal clustering solution of k=2 was identified, with a second clustering solution evaluated at k=9. At the k=2 clustering solution, Cluster 2 exhibits some geographic bias with four of its five members interred within mounds located in Montgomery County. At the k=9 solution, however, five of the six clusters whose membership exceeded one individual were composed of individuals interred across multiple subregions. The sole exception, Cluster 8, was composed of two individuals interred within the same mound. Of the nine pairs of females exhibiting the greatest phenotypic similarity with regards to cervical measurements of the maxillary dentition, none were composed of individuals interred within the same mound. Only one pair included individuals interred in neighboring mounds. Of the nine pairs of males who were the most phenotypically similar, two were composed of individuals interred in the same mound but neither pair was included within the same episode of interment. Two more pairs included individuals interred within neighboring mounds. The distribution of same-sex pairs of phenotypically similar individuals is visualized in Figure 28.

Mandibular cervicometric data.

An optimal clustering solution of k=19 was identified for the combined-sex mandibular cervicometric data. The distribution of cluster membership across mounds is presented in Table 37. Thirteen clusters had memberships that exceeded one individual and, of these, only one (Cluster 19) did not include individuals derived from multiple subregions. Of the 23 pairs of individuals who exhibited the greatest phenotypic similarity based on mandibular cervical measurements, six were composed of individuals who derived from the same mound and two of these were pairs of individuals included in the same interment episode. Of the remaining 17 pairs of individuals, only two were composed of individuals interred in neighboring mounds. The distribution of pairs of phenotypically similar individuals is visualized in Figure 29.

The distribution of cluster membership across mounds for sex-specific clustering solutions of the mandibular cervicometric data is presented in Table 38. The optimal clustering solution for females was identified as k=15. Eight clusters had memberships that exceeded one individual and, of these, three (Clusters 1, 4, and 5) had memberships derived from either the same mound or subregion. The memberships of the remaining five clusters were distributed across multiple subregions. For males, the optimal clustering solution was identified as k=11. Of the 10 clusters that were composed of more than one individual, none exhibited any geographic bias and, instead, had memberships that were distributed fairly evenly across multiple subregions. Of the 13 pairs of females who exhibited the most phenotypic similarity with regards to the cervical diameters of the mandibular dentition, three pairs were composed of individuals interred in the same mound and two of these were included in the same interment episode. Of the remaining

Table 37

Distribution of Cluster Membership, Mandibular Cervicometric Data

						k=19					
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Bh15**	**Fa152**	**Mm3**	**Mm6**	**Ms27**
1	**6**	2	1					1	2		
2	**5**	3		1						1	
3	**7**	1		1					2	1	2
4	**1**				1						
5	**4**				1	1				1	1
6	**6**	2			1				1	2	
7	**1**	1									
8	**3**	2								1	
9	**4**	2							1		1
10	**4**	2								1	1
11	**6**	1					1		1	2	1
12	**5**	1							2	1	1
13	**4**	1					1	1		1	
14	**1**	1									
15	**4**					1	1			2	
16	**1**							1			
17	**1**								1		
18	**1**								1		
19	**2**								2		

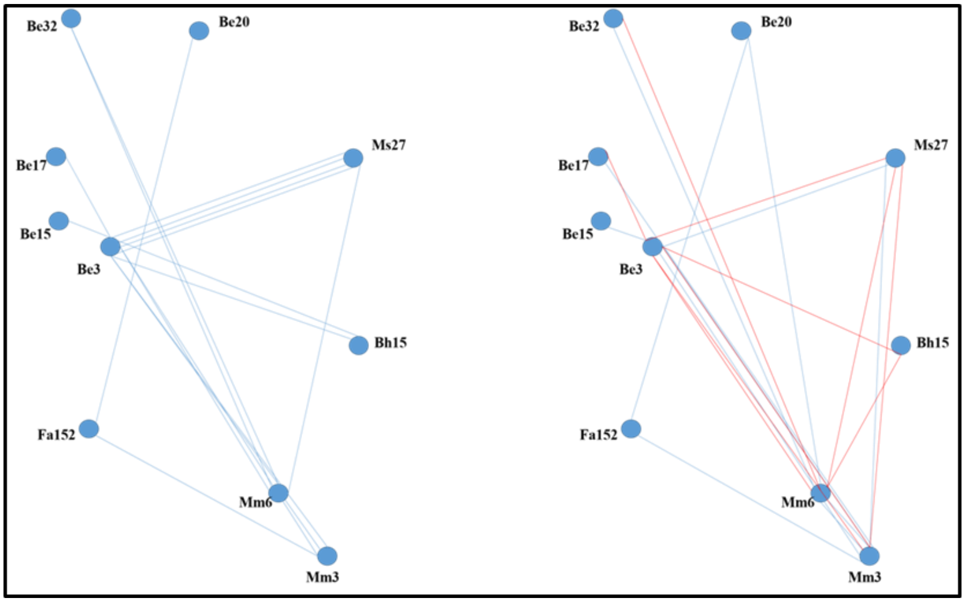


Figure 29. Distribution of pairs of individuals exhibiting the smallest inter-individual distances as determined by mandibular cervicometric data (left). For within-sex pairs (right), blue lines indicate paired males and red lines indicate paired females.

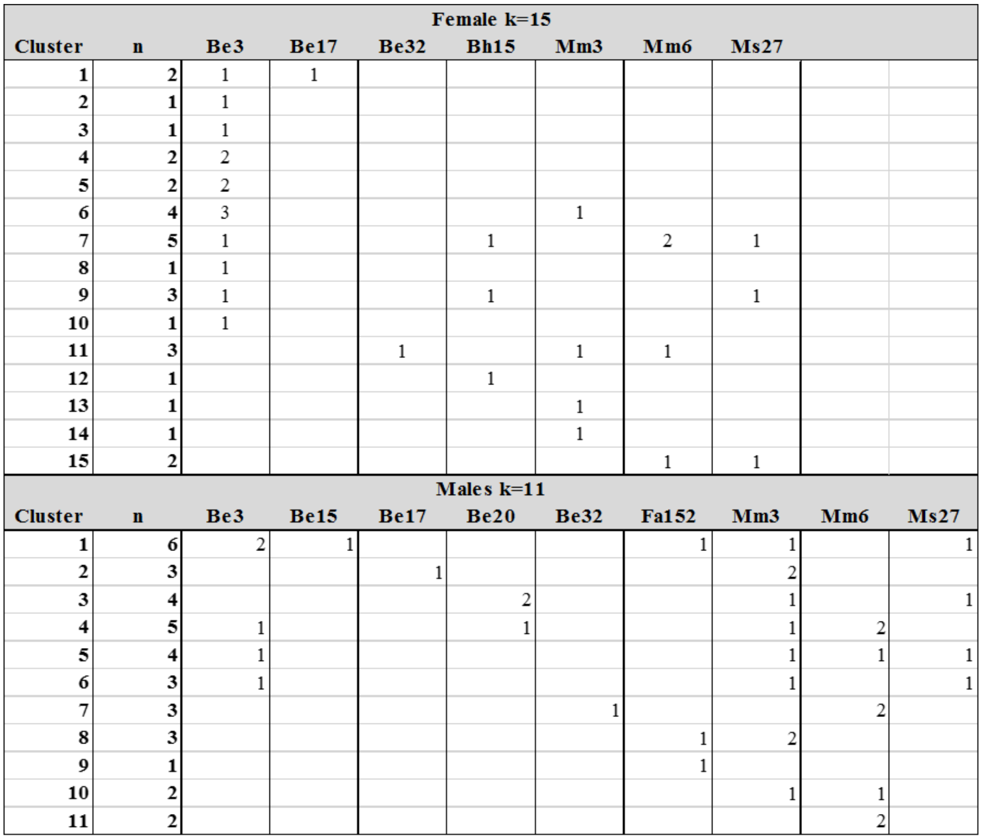
10 pairs, only two included individuals interred in neighboring mounds. Of the 13 pairs of phenotypically similar males, only one was composed of individuals derived from both the same mound and the same episode of interment. Of the remaining 12 pairs of males with similar mandibular cervical measurements, three were composed of individuals interred in geographically proximate mounds. The distribution of same-sex pairs of phenotypically similar individuals is visualized in Figure 29.

Full cervicometric data.

For cervical measurements taken from the full dentition, an optimal clustering solution was identified at *k*=12. The distribution of the membership of these clusters is presented in Table 39. Nine clusters have memberships that include more than one individual and, of these, all included individuals derived from multiple subregions. Only one cluster (Cluster 10) appeared to exhibit any geographic bias, with four of its five members

Table 38

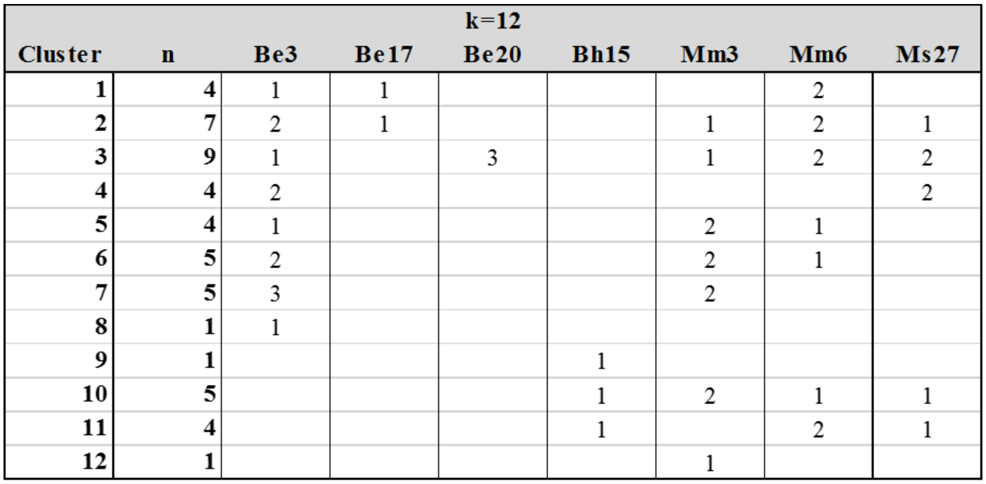
Sex-Specific Cluster Membership, Mandibular Cervicometric Data



				Female k=15						
Cluster	**n**	**Be3**	**Be17**	**Be32**	**Bh15**	**Mm3**	**Mm6**	**Ms27**		
1	**2**	1	1							
2	**1**	1								
3	**1**	1								
4	**2**	2								
5	**2**	2								
6	**4**	3				1				
7	**5**	1			1		2	1		
8	**1**	1								
9	**3**	1			1			1		
10	**1**	1								
11	**3**			1		1	1			
12	**1**				1					
13	**1**					1				
14	**1**					1				
15	**2**						1	1		
				Males k=11						
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Fa152**	**Mm3**	**Mm6**	**Ms27**
1	**6**	2	1				1	1		1
2	**3**			1				2		
3	**4**				2			1		1
4	**5**	1			1			1	2	
5	**4**	1						1	1	1
6	**3**	1						1		1
7	**3**					1			2	
8	**3**						1	2		
9	**1**						1			
10	**2**							1	1	
11	**2**								2	

Table 39

Distribution of Cluster Membership, Full Cervicometric Data



				k=12				
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**4**	1	1				2	
2	**7**	2	1			1	2	1
3	**9**	1		3		1	2	2
4	**4**	2						2
5	**4**	1				2	1	
6	**5**	2				2	1	
7	**5**	3				2		
8	**1**	1						
9	**1**				1			
10	**5**				1	2	1	1
11	**4**				1		2	1
12	**1**					1		

deriving from the same subregion. Of the 16 pairs of individuals who are the most phenotypically similar with regards to cervical measurements of the full dentition, four pairs are composed of individuals interred in the same mound. Of these, both members of the pair are included in the same interment episode only once. Among the 12 remaining pairs, only two are composed of individuals that are interred within geographically proximate mounds. The distribution of pairs of phenotypically similar individuals is visualized in Figure 30.

The distribution of cluster membership across mounds for sex-specific clustering solutions is presented in Table 40. The optimal clustering solution for females was identified as *k*=2, with a secondary clustering solution evaluated at *k*=5. For both

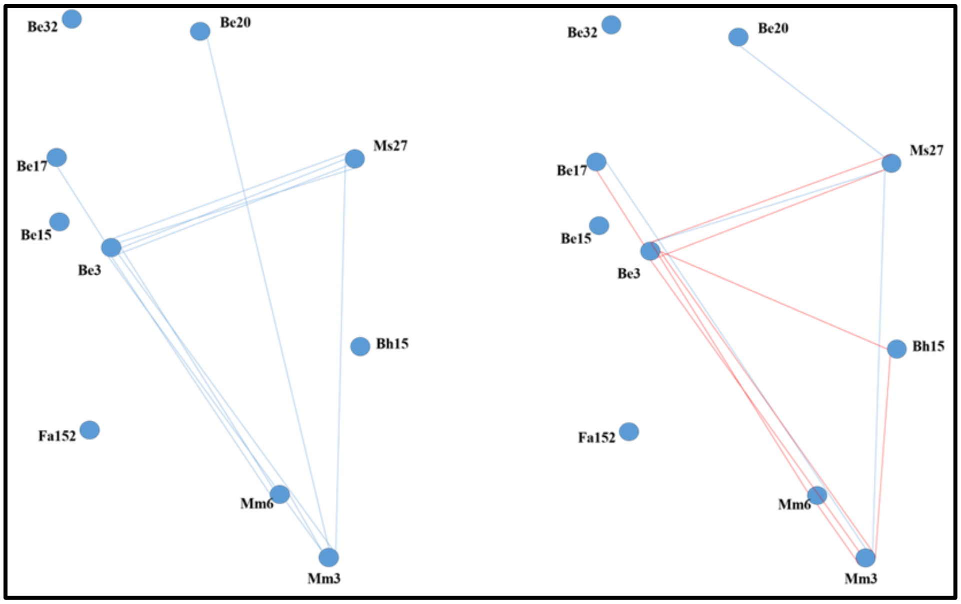
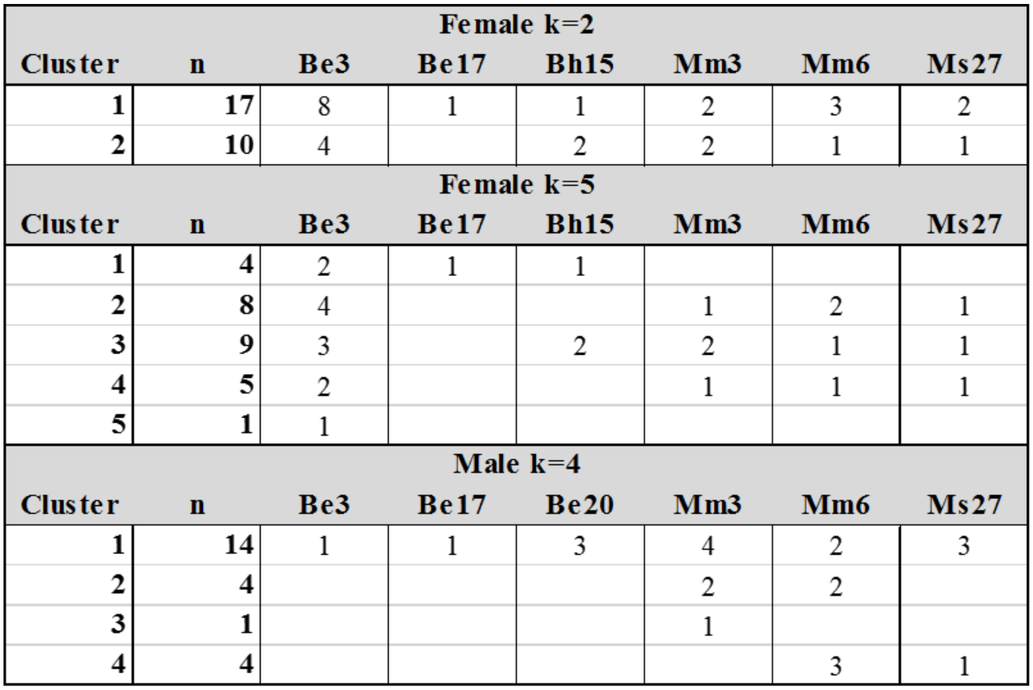


Figure 30. Distribution of pairs of individuals exhibiting the smallest inter-individual distances as determined by cervicometric data from the full dentition (left). For within-sex pairs (right), blue lines indicate paired males and red lines indicate paired females.

Table 40

Sex-Specific Cluster Membership, Full Cervicometric Data



Female k=2							
Cluster	**n**	**Be3**	**Be17**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**17**	8	1	1	2	3	2
2	**10**	4		2	2	1	1

Female k=5							
Cluster	**n**	**Be3**	**Be17**	**Bh15**	**Mm3**	**Mm6**	**Ms27**
1	**4**	2	1	1			
2	**8**	4			1	2	1
3	**9**	3		2	2	1	1
4	**5**	2			1	1	1
5	**1**	1					

Male k=4							
Cluster	**n**	**Be3**	**Be17**	**Be20**	**Mm3**	**Mm6**	**Ms27**
1	**14**	1	1	3	4	2	3
2	**4**				2	2	
3	**1**				1		
4	**4**					3	1

solutions, all clusters whose membership exceeded one individual included individuals derived from multiple subregions. For males, an optimal clustering solution was identified at *k*=4. Cluster 2 appears to exhibit geographic bias, with all four of its members interred in mounds located in Montgomery County. A geographic bias may also be exhibited by Cluster 4, where three of its four members are interred within the Wright mound (15Mm6). Of the nine pairs of females who exhibit the most phenotypic similarity based on cervical measurements of the full dentition, none are composed of individuals interred within the same mound and only three include individuals interred in nearby mounds. In contrast, five of the nine pairs of males who exhibit the most phenotypic similarity are composed of individuals derived from the same mound. In three of these cases, the paired individuals are also included in the same episode of interment and, in one case, derive from the same grave. The remaining four pairs are composed of individuals interred in mounds located in different subregions. The distribution of same-sex pairs of phenotypically similar individuals interred in different mounds is visualized in Figure 30.

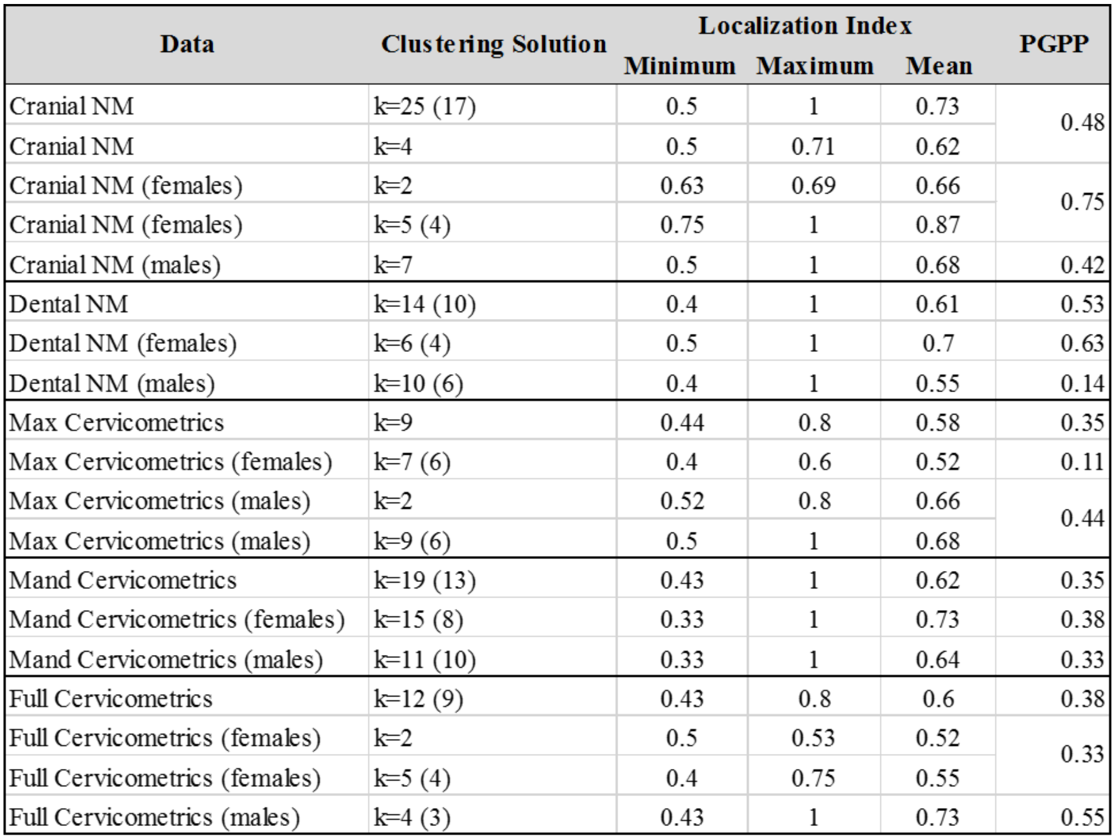
Summary of phenotypic cluster analyses.

To facilitate comparison and interpretation of the clustering results for the phenotypic datasets, a localization index was calculated (defined as the largest proportion of a cluster's membership that is derived from a single subregion) for each cluster including more than one individual. For example, if a cluster's total membership includes five individuals, three of which were interred within mounds located in the same subregion with the other two individuals interred in different subregions, than the localization index would be 3/5, or 0.6. While this metric is not perfect, it does allow the rough comparison of how localized the clusters for each dataset are. The range and mean of the localization indices calculated for each phenotypic dataset are presented in Table 41, along with the proportion of pairs of phenotypically similar individuals who were interred in the same or geographically proximate mounds.

Mean localization indices for combined-sex phenotypic data sets range from 0.58, for clusters based on maxillary cervicometrics, to 0.73, for clusters based on the cranial nonmetric data, with a median value of 0.61. This suggests that, in general, only about 60% of a phenotypic cluster's membership is derived from mounds located within the same subregion. Mean localization indices for sex-specific clusters are slightly higher and more variable, ranging from 0.52 to 0.87 for females (with a median value of 0.66) and

Table 41

Localization Indices for Phenotypic Data



Data	Clustering Solution	Localization Index			PGPP
		Minimum	Maximum	Mean	
Cranial NM	k=25 (17)	0.5	1	0.73	0.48
Cranial NM	k=4	0.5	0.71	0.62	
Cranial NM (females)	k=2	0.63	0.69	0.66	0.75
Cranial NM (females)	k=5 (4)	0.75	1	0.87	
Cranial NM (males)	k=7	0.5	1	0.68	0.42
Dental NM	k=14 (10)	0.4	1	0.61	0.53
Dental NM (females)	k=6 (4)	0.5	1	0.7	0.63
Dental NM (males)	k=10 (6)	0.4	1	0.55	0.14
Max Cervicometrics	k=9	0.44	0.8	0.58	0.35
Max Cervicometrics (females)	k=7 (6)	0.4	0.6	0.52	0.11
Max Cervicometrics (males)	k=2	0.52	0.8	0.66	0.44
Max Cervicometrics (males)	k=9 (6)	0.5	1	0.68	
Mand Cervicometrics	k=19 (13)	0.43	1	0.62	0.35
Mand Cervicometrics (females)	k=15 (8)	0.33	1	0.73	0.38
Mand Cervicometrics (males)	k=11 (10)	0.33	1	0.64	0.33
Full Cervicometrics	k=12 (9)	0.43	0.8	0.6	0.38
Full Cervicometrics (females)	k=2	0.5	0.53	0.52	0.33
Full Cervicometrics (females)	k=5 (4)	0.4	0.75	0.55	
Full Cervicometrics (males)	k=4 (3)	0.43	1	0.73	0.55

from 0.55 to 0.73 for males (with a median value of 0.67). Given the small membership sizes of most of the clusters, this are not particularly impressive values. A value of 0.67, for example, is produced when a cluster consists of two individuals derived from one subregion and one individual derived from another. Given that more than 60% of all phenotypic datasets is composed of individuals from just three sites (Robbins, Ricketts, and Wright) and representing two subregions, this is not an unlikely occurrence. This absence of geographic bias in cluster membership is most consistent with the expectations of Scenario 2.

A similar set of arguments can be made for the proportions of phenotypically similar pairs of individuals who were interred in mounds located within the same subregion (the PGPP values presented in Table 41). For the combined-sex cranial and dental nonmetric data, the PGPP values are 48% and 53%, respectively, which is to be expected given that each of these datasets is almost entirely made up of individuals derived from only two subregions. While the composition of the cervicometric datasets is similar, their slightly lower PGPP values suggest that phenotypically similar pairs of individuals tend to have been interred in different subregions. If these results reflect a real phenomenon, the fact that they appear among the metric datasets and not the nonmetric datasets may be a product of the use of continuous rather than binary or ordinal data. For sex-specific PGPP values, higher values (e.g., 0.75 for the female cranial nonmetric data, 0.63 for the female dental nonmetric data) occured in situations where sex-specific samples are geographically biased due to a large number of individuals derived from the same subregion. Thus, these relatively high values are the result of sampling error rather than the actual localization of phenotypically similar pairs of individuals. In contrast, the lower values (e.g., 0.14 for male dental nonmetric data and 0.11 for female maxillary cervicometric data), are harder to explain due to the fact that these results pertain to different sexes and different datasets, therefore rendering them ambiguous. In general, the PGPP values do not indicate that the interments of phenotypically similar individuals were geographically localized and may, on the contrary, indicate that they tended to be located in different subregions. Such a conclusion can only be tentative, though, given the resolution of the data.

Mortuary data.

Clustering analyses of mortuary data as initially coded produced clustering solutions where the majority of clusters referred to a single burial context. This was due to the specificity with which mortuary attributes were coded. As a result, the datasets concerning details of grave construction, treatment of the body and the placement of artifacts in relation to it, and the form, material, and quantity of artifacts accompanying a burial were reconfigured by collapsing variables and converting many ordinal variables into binary variables. For example, where the original dataset concerning details of grave construction included ordinal variables for the number of logs placed at an individual's head, feet, and sides, the collapsed dataset reduces these variables to a binary variable recording the presence or absence of a log frame. Variables used in the reconfigured datasets are presented in Table 42. While the loss of resolution resulting from these reconfigurations is lamentable, the new datasets are not affected by the over-specificity exhibited by their precursors.

Details of grave construction.

The optimal clustering solution identified for the dataset concerning the details of grave construction was *k*=49, with an alternative solution involving only a slight loss of fit identified at *k*=23. The distribution of cluster membership across mounds for the optimal clustering solution is presented in Table 43. Of the 31 clusters whose membership included more than one interment, only 13 had memberships that included individuals derived from multiple subregions. Sixteen of the remaining 18 clusters had memberships that were restricted to a single mound. The overall pattern, then, is one of local variation.

Table 42

Description of Revised Mortuary Variables

	Grave Construction	
Variable	**Description**	**Variable Type**
Bark	Recording number and placement of bark layers	Ordinal
Bark Perpendicular	Whether layers of bark are oriented perpendicular to each other	Binary
Clay	Recording number and placement of layers of clay	Ordinal
Log Frame	Records whether logs have been placed at two or more sides of the body	Binary
Logs Over	Records the placement of logs over the body	Binary
Log Platform	Records the presence of a log platform under the body	Binary
Roof	Records the presence or absence of evidence of a roof	Binary
Rocks	Records the number and placement of rocks as structural attributes	Ordinal

	Body Treatment	
Variable	**Description**	**Variable Type**
Treatment	Inhumation, cremation, or partial cremation	Categorical
Reburial	Records whether the remains have been redeposited	Binary
Body Position	Extended, prone, skull only, etc.	Categorical
Head Orientation	Orientation of body	Categorical
Pigment on the Skull	Records presence of pigment on the skull	Binary
Pigment on Upper Body	Records presence of pigment on the torso or upper extremities	Binary
Pigment on Lower Body	Records presence of pigment inferior to or on the pelvis	Binary
Head and Neck	Records presence of artifacts placed at head and/or neck	Binary
Left Upper Extremity	Records placement of artifacts along or on left upper extremity	Binary
Right Upper Extremity	Records placement of artifacts along or on right upper extremity	Binary
Chest	Records placement of artifacts on chest	Binary
Pelvis	Records placement of artifacts at pelvis	Binary
Lower Extremities	Records placement of artifacts along lower extremities	Binary
Feet	Records placement of artifacts next to or below the feet	Binary

	Artifact Form	
Variable	**Description**	**Variable Type**
Ochre on Artifacts	Records whether artifacts have been coated with ochre	Binary
Chipped Stone	Records presence of chipped stone artifacts	Binary
Groundstone	Records presence of groundstone artifacts	Binary
Ceramics	Records presence of ceramic sherds or vessels	Binary
Bone	Records presence of artifacts made from nonhuman bone	Binary
Shell	Records artifacts made from shell	Binary
Terrapin Shell	Records artifacts made from terrapin carapace	Binary
Copper	Records artifacts made from copper	Binary
Mica	Records artifacts made from mica	Binary
Pigment	Records presence of lump or powder forms of various pigments	Binary
Wood	Records presence of artifacts made from wood	Binary
Deposit	Records presence of a small pile of artifact fragments or raw materials	Binary
Bracelet	Records presence and number of bracelets	Ordinal
Finger Ring	Records presence of finger rings	Binary
Beads	Records presence of beads	Ordinal
Pendants	Records presence of pendants	Binary
Breastplate	Records presence of breastplates	Binary
Projectile Points	Records presence of projectile points	Binary
Animal Parts	Records presence of animal parts that have not been fashioned into tools	Binary
Decorative Items	Records presence of items of personal adornment not included in other variables	Binary
Utilitarian Items	Records presence of tools	Binary
Gorgets	Records presence of any type of gorget	Binary
Pipes	Records presence of any type of pipe	Binary
Tablets	Records presence of any type of tablet	Binary
Bar or Cylinder	Records presence of groundstone bars or cylinders	Binary

Table 43

Distribution of Cluster Membership, Grave Construction I

						k=49						
Cluster	**n**	**Be3**	**Be20**	**Be32**	**Bh15**	**Fa11**	**Fa152**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Ms27**
1	**15**	11	3								1	
2	**1**	1										
3	**2**	2										
4	**24**	8	1		1	1					1	12
5	**5**	4	1									
6	**8**	4	4									
7	**2**	2										
8	**15**	15										
9	**15**	4								1		10
10	**7**	1								4	1	1
11	**9**	4								3	2	
12	**3**	3										
13	**4**	4										
14	**13**	8	2								3	
15	**1**	1										
16	**6**	6										
17	**2**			1			1					
18	**2**				2							
19	**3**				3							
20	**1**				1							
21	**2**					2						
22	**3**						3					
23	**2**						1		1			
24	**1**						1					
25	**4**						1			2		1
26	**2**							2				
27	**1**							1				
28	**1**								1			
29	**1**								1			
30	**14**								1	12	1	
31	**3**								3			
32	**1**								1			
33	**1**								1			
34	**5**								1	2	1	1
35	**1**									1		
36	**3**									3		
37	**5**									4		1
38	**3**									1		2
39	**1**									1		
40	**1**										1	
41	**1**										1	
42	**1**										1	
43	**2**										2	
44	**1**										1	
45	**1**										1	
46	**1**										1	
47	**1**											1
48	**2**											2
49	**4**											4

The distribution of cluster membership across mounds for the alternative solution of *k*=23 is presented in Table 44. The pattern of local variation evident in the k=49 clustering solution disappears and is replaced by a pattern in which 20 of the 23 clusters contain members derived from multiple subregions. The remaining three clusters are all specific to the Robbins mound (15Be3). The combination of these two clustering solutions suggest that grave construction follows a pattern of local variations upon common themes.

Body treatment.

Although k=97 was identified as the optimal clustering solution for the dataset pertaining to body treatment, this solution exhibited high enough specificity that it lost utility. Alternative clustering solutions at *k*=31 and *k*=13 were therefore evaluated as these represented a small loss in the degree to which the solutions fit the data with the potential for identifying meaningful clusters instead of single mortuary contexts. The distribution of cluster membership for both of these clustering solutions is presented in Table 45. Only one cluster out of both solutions (Cluster 30, *k*=31) exhibits any geographical bias, whereas all other clusters have memberships that include individuals derived from at least two subregions. Despite this picture of regionally dispersed forms of body treatment, individuals interred at Robbins (15Be3) appear to be preferentially assigned to a small number of clusters whereas individuals interred at other large sites tend to be distributed more evenly across clusters. Within this overall variability, then, there may be locally preferred forms of body treatment.

Table 44

Distribution of Cluster Membership, Grave Construction II

						k=23						
Cluster	**n**	**Be3**	**Be20**	**Be32**	**Bh15**	**Fa11**	**Fa152**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Ms27**
1	**18**	10							1		1	6
2	**5**	2	1							2		
3	**25**	7		1		1			2	6	4	4
4	**5**	4										1
5	**8**	3	1									4
6	**15**	8	3								1	3
7	**15**	3								4	3	5
8	**9**	1			3	1			1	2		1
9	**10**	4	1		1					2	1	1
10	**7**	2	1							1		3
11	**4**	4										
12	**13**	5	3						2	1		2
13	**9**	9										
14	**5**	2								2	1	
15	**8**	2				1	1			2	1	1
16	**17**	1					3	2	2	5	3	1
17	**7**	1	1		2					2	1	
18	**4**	1							1	2		
19	**4**	1					1	1			1	
20	**5**	5										
21	**7**	3			1		1			2		
22	**3**						1		1	1		
23	**4**										1	3

Table 45

Distribution of Cluster Membership, Body Treatment

k=31															
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Bh15**	**Fa11**	**Fa152**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Mm7**	**Ms27**
1	**26**	12				2	4			1		5	1		1
2	**13**	11		1						1					
3	**21**	16		2			1						1		1
4	**7**	1		2								3			1
5	**7**	3	1								1				2
6	**19**	5	2	2	1						1		3		5
7	**33**	7				10			3		1	7		1	4
8	**20**	12	2		2							3	1		
9	**12**	2	1	2	1		1					2			3
10	**3**	1						1							1
11	**5**	1										1	2		1
12	**11**	4		1	1							1			4
13	**7**	1											2		4
14	**5**	1		1											3
15	**5**	3											1		1
16	**3**	1										1			1
17	**5**	2													3
18	**14**	3		4	1				2						4
19	**3**	1													2
20	**46**	1	1		6	1		3			21	5		1	7
21	**7**		1		1							4	1		
22	**10**				2							5	1		2
23	**5**				1			2		2					
24	**4**					1						3			
25	**4**						1					3			
26	**3**							1	1						1
27	**4**							1		1			1		1
28	**4**								3						1
29	**3**									1					2
30	**4**											1	3		
31	**4**												3		1

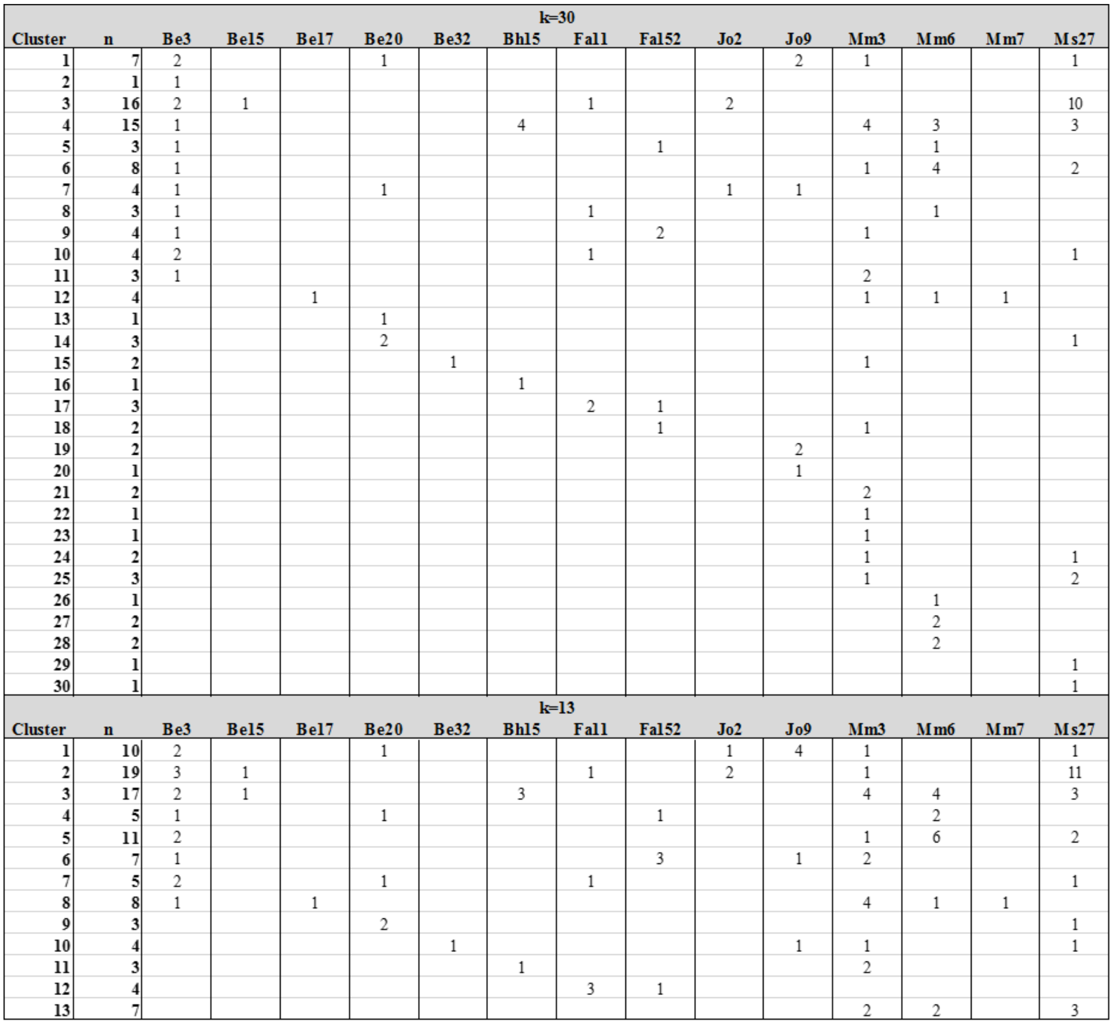
k=13															
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Bh15**	**Fa11**	**Fa152**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Mm7**	**Ms27**
1	**39**	13			1	2	4			1		10	2		6
2	**22**	14	1	1				1		1		1			3
3	**28**	22		2			1				1		1		1
4	**7**	1		2								3			1
5	**24**	6	2	3	1			1			1		3		7
6	**45**	8				10		1	6	3	1	7	1	1	7
7	**23**	12	2		3							4	1		1
8	**14**	2	2	2	1		1					2			4
9	**15**	4		1	1						1	2			6
10	**22**	1				1	1					4	11		4
11	**16**	4		4	1				2						5
12	**48**	1	1		6	1		4	1		21	5		1	7
13	**14**				2			1				5	2		4

Artifact form.

An optimal clustering solution of *k*=30 was identified for the dataset concerning variation in artifact form and material, and an alternative clustering solution was identified at *k*=13. The distribution of cluster membership across mounds for both solutions is presented in Table 46. As with the other datasets pertaining to variability in various aspects of mortuary practices, the overall pattern that emerges is one of widespread variation. For

Table 46

Distribution of Cluster Membership, Artifact Form



								k=30							
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Bhl5**	**Fal1**	**Fal52**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Mm7**	**Ms27**
1	**7**	2			1						2	1			1
2	**1**	1													
3	**16**	2	1					1		2					10
4	**15**	1					4					4	3		3
5	**3**	1							1				1		
6	**8**	1										1	4		2
7	**4**	1			1					1	1				
8	**3**	1						1					1		
9	**4**	1							2			1			
10	**4**	2						1							1
11	**3**	1										2			
12	**4**			1								1	1	1	
13	**1**				1										
14	**3**				2										1
15	**2**					1						1			
16	**1**						1								
17	**3**							2	1						
18	**2**								1			1			
19	**2**										2				
20	**1**										1				
21	**2**											2			
22	**1**											1			
23	**1**											1			
24	**2**											1			1
25	**3**											1			2
26	**1**												1		
27	**2**												2		
28	**2**												2		
29	**1**														1
30	**1**														1
								k=13							
Cluster	**n**	**Be3**	**Be15**	**Be17**	**Be20**	**Be32**	**Bhl5**	**Fal1**	**Fal52**	**Jo2**	**Jo9**	**Mm3**	**Mm6**	**Mm7**	**Ms27**
1	**10**	2			1					1	4	1			1
2	**19**	3	1					1		2		1			11
3	**17**	2	1				3					4	4		3
4	**5**	1			1				1				2		
5	**11**	2										1	6		2
6	**7**	1							3		1	2			
7	**5**	2			1			1							1
8	**8**	1		1								4	1	1	
9	**3**				2										1
10	**4**					1					1	1			1
11	**3**						1					2			
12	**4**							3	1						
13	**7**											2	2		3

the *k*=30 solution, 16 of the 21 clusters that included more than one individual had memberships that were distributed across multiple subregions. Four of the remaining five clusters are restricted to single mounds, suggesting the existence of some local variation in the types of artifacts interred with the dead. For the *k*=13 clustering solution, only two clusters (Clusters 11 and 12) exhibit any geographic bias. This again suggests that there may be some local idiosyncrasies in terms of the kinds of artifacts used in mortuary practices.

Full mortuary data.

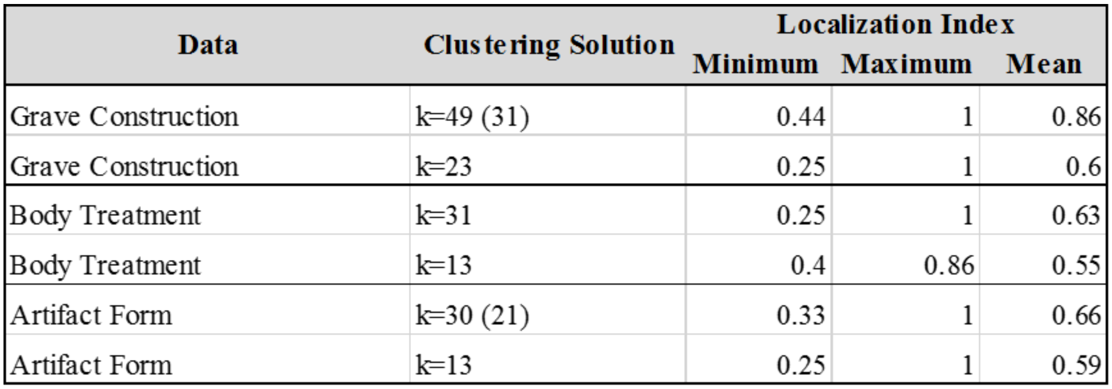
When the three sets of data pertaining to mortuary practices discussed above were merged and submitted to *k*-medoids clustering analysis, the optimal clustering solution identified was *k*=188. Such a high number of clusters is prohibitive, yet further reducing the component datasets would lead to a progressive loss of resolution. For this reason, the creation of a combined dataset was abandoned.

Summary of mortuary cluster analyses.

As with the phenotypic cluster analyses, localization indices were calculated for each of the clusters produced by the clustering of the three mortuary datasets. The range and mean of the localization indices for each clustering solution of the three datasets is presented in Table 47. The mean localization index for the optimal clustering solution of the grave construction dataset (*k*=49) is fairly high, indicating the presence of a fair amount of local variation in terms of grave structure. That this result is real and not merely an artifact of a relatively higher number of clusters created from this dataset is

Table 47

Localization Indices for Mortuary Data



Data	Clustering Solution	Localization Index		
		Minimum	Maximum	Mean
Grave Construction	k=49 (31)	0.44	1	0.86
Grave Construction	k=23	0.25	1	0.6
Body Treatment	k=31	0.25	1	0.63
Body Treatment	k=13	0.4	0.86	0.55
Artifact Form	k=30 (21)	0.33	1	0.66
Artifact Form	k=13	0.25	1	0.59

suggested through comparison to the mean localization index for the *k*=31 clustering solution of the body treatment dataset. Mean localization indices for the other two datasets as well as the reduced clustering solution for grave construction data range between 0.55 and 0.66. As explained in the summary of the phenotypic clustering analyses, indices of this magnitude are not difficult to obtain and are not indicative of any great degree of localization in terms of body treatment or the kinds of artifacts included with interments. The overall impression created by the clustering of the mortuary data is of substantial variability in mortuary practices with some localization of grave construction techniques.

Mantel Test Results

A series of Mantel tests of matrix correlation were run for two purposes: 1) to evaluate the presence and magnitude of any correlation between inter-individual distances based on the various phenotypic and mortuary datasets, and 2) to evaluate whether any of the datasets used in this research exhibit any spatial structure. Inter-individual distance matrices derived from different phenotypic datasets were evaluated for correlations primarily for the purpose of exploring the redundancy between these datasets. Inter-individual distance matrices derived from phenotypic datasets were tested for any correlation to inter-individual distance matrices derived from mortuary data in order to explore the possibility that mortuary practices were biologically structured (e.g., partially determined by membership in a biological lineage). Correlations between datasets therefore do not address any of the specific expectations of either of the alternative scenarios being explored by this research.

In contrast, the use of Mantel tests to evaluate whether any datasets exhibit any spatial structure is meant to assess the degree to which any datasets are consistent with an isolation-by-distance model. Under the expectations of Scenario 1 (i.e., the territorial hypothesis), phenotypic data should follow such a pattern and, therefore, inter-individual distances based on geographic distance should be positively correlated to inter-individual distances based on phenotypic characteristics. In contrast, under the expectations of both variants of Scenario 2, phenotypic data should not be consistent with an isolation-by-distance model and, consequently, there should be no correlation between inter-individual distance matrices based on phenotype and geographic distance. While the occurrence of mortuary practices conforming to the expectations of an isolation-by-distance model could be interpreted as lending some support to Scenario 1, it does not provide evidence *against* Scenario 2. Similarly, while a lack of spatial structuring to mortuary practices could be interpreted as lending support to Scenario 2, it does not provide evidence against Scenario 1. There is no *a priori* reason to assume that mortuary data and phenotypic data should exhibit the same (if any) pattern of spatial structuring. Tests of correlation between inter-individual distance matrices based on geographic distance and those derived from aspects of mortuary practices were therefore carried out in order to evaluate whether they support the results derived from phenotypic datasets.

Correlations between datasets.

Inter-individual distance matrices calculated from cervical measurements of the maxillary and mandibular dentitions exhibited a weak, but significant, positive correlation (see Table 48). All other correlations between phenotypic datasets were not significant. In contrast, all of the datasets based on formal attributes of mortuary practices exhibit significant positive correlations (see Table 49). These results should be interpreted cautiously, however, as the strengths of these correlations range from virtually nonexistent (between aspects of grave construction and body treatment) to weak (between body treatment and the kinds of accompanying artifacts). No significant correlations exist between inter-individual distances based on phenotypic data and those based on formal attributes of mortuary practices (see Table 50).

Spatial structure of the data.

Inter-individual geographic distance matrices were constructed by assigning a mound's latitude and longitude expressed in decimal degrees to all individuals interred within that mound. Inter-individual geographic distances are therefore zero for individuals interred in the same mound and equivalent to the geographic distance between the mounds in which they are interred for individuals derived from different mounds. These distance matrices were tested for correlation to inter-individual distance matrices based on phenotypic and

Table 48

Results of Mantel Tests between Phenotypic Datasets

Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Cranial Nonmetrics	Dental Nonmetrics	0.049	0.315
Cranial Nonmetrics	Maxillary Cervicometrics	0.06	0.224
Cranial Nonmetrics	Mandibular Cervicometrics	0.071	0.143
Cranial Nonmetrics	Full Cervicometrics	0.139	0.103
Dental Nonmetrics	Maxillary Cervicometrics	-0.153	0.956
Dental Nonmetrics	Mandibular Cervicometrics	0.156	0.07
Dental Nonmetrics	Full Cervicometrics	-0.018	0.546
Maxillary Cervicometrics	**Mandibular Cervicometrics**	**0.28**	**0.001**

Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant values are those where $p < 0.006$. Significant results are bolded.

Table 49

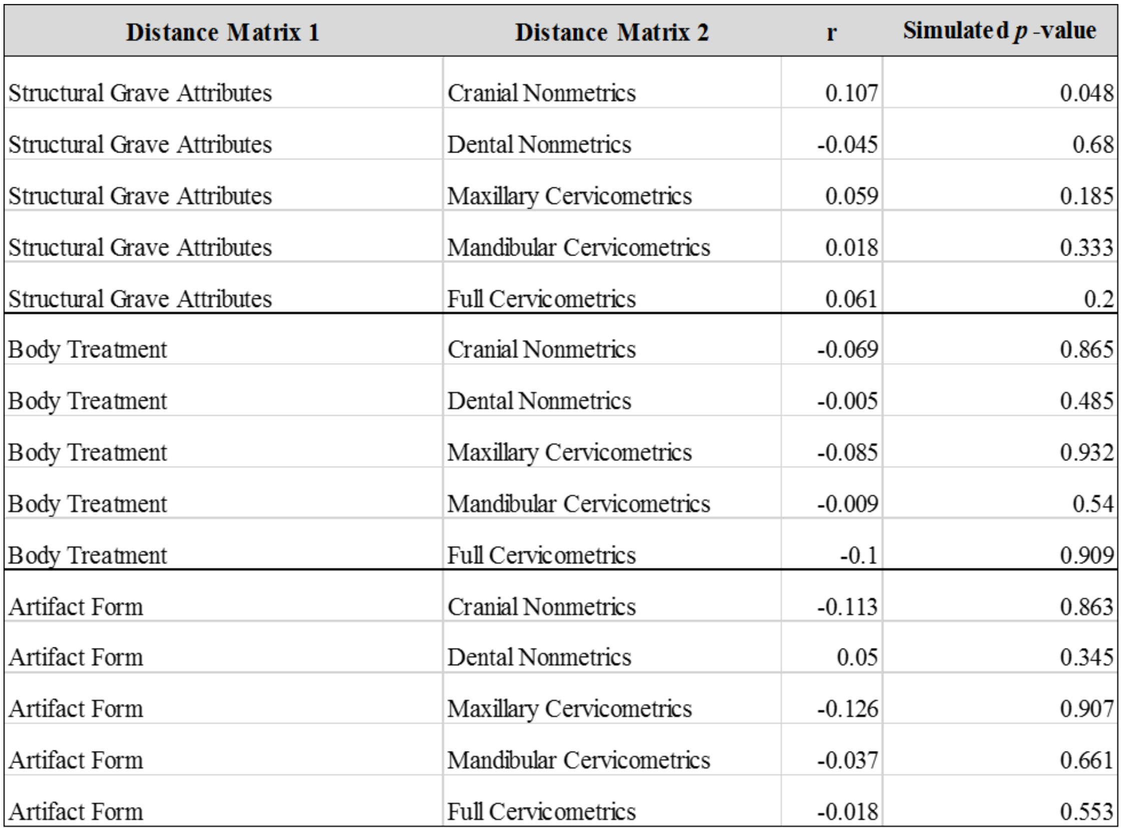
Results of Mantel Tests between Mortuary Datasets

Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Structural Grave Attributes	**Body Treatment**	**0.069**	**0.001**
Structural Grave Attributes	**Artifact Form**	**0.101**	**0.001**
Body Treatment	**Artifact Form**	**0.182**	**0.001**

Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant values are those where $p < 0.016$. Significant results are bolded.

Table 50

Results of the Mantel Tests between Mortuary and Phenotypic Datasets



Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Structural Grave Attributes	Cranial Nonmetrics	0.107	0.048
Structural Grave Attributes	Dental Nonmetrics	-0.045	0.68
Structural Grave Attributes	Maxillary Cervicometrics	0.059	0.185
Structural Grave Attributes	Mandibular Cervicometrics	0.018	0.333
Structural Grave Attributes	Full Cervicometrics	0.061	0.2
Body Treatment	Cranial Nonmetrics	-0.069	0.865
Body Treatment	Dental Nonmetrics	-0.005	0.485
Body Treatment	Maxillary Cervicometrics	-0.085	0.932
Body Treatment	Mandibular Cervicometrics	-0.009	0.54
Body Treatment	Full Cervicometrics	-0.1	0.909
Artifact Form	Cranial Nonmetrics	-0.113	0.863
Artifact Form	Dental Nonmetrics	0.05	0.345
Artifact Form	Maxillary Cervicometrics	-0.126	0.907
Artifact Form	Mandibular Cervicometrics	-0.037	0.661
Artifact Form	Full Cervicometrics	-0.018	0.553

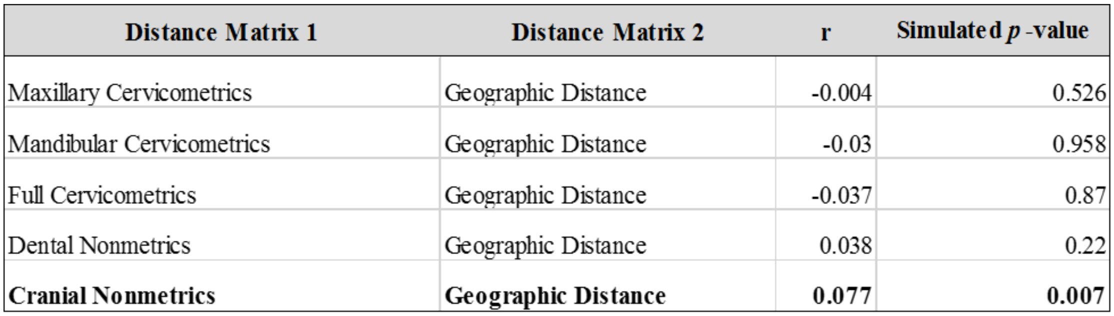
Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant values are those where $p < 0.003$.

mortuary data in order to evaluate the degree to which these datasets adhere to an isolation-by-distance model.

A significant correlation exists between inter-individual distances derived from cranial nonmetric traits and geographic distance (see Table 51). However, the strength of this correlation (r = 0.077) is so weak that it can effectively be ignored. The remainder of the phenotypic datasets exhibited nonexistent and nonsignificant correlations to geographic distance. This would indicate that inter-individual phenotypic distances do not follow an isolation-by-distance model. Sex-specific inter-individual distances based on phenotypic data were also evaluated for correlations to geographic distance (see Table 52). Results indicate that neither male nor female inter-individual phenotypic distances exhibit any correlation to geographic distance and, therefore, also do not adhere to the patterning expected under an isolation-by-distance model. In contrast, inter-individual distances based on formal attributes of mortuary practices all exhibit significant, positive correlations to geographic distance (see Table 53). Out of concern that these results were unduly influenced by the presence of large numbers of individuals with no prepared grave structure and/or no accompanying artifacts, a second set of Mantel tests were run with these individuals removed from consideration (see Table 53, “Reduced”). Removal of these individuals did not affect the overall pattern of these results, but it does suggest that structural attributes of grave preparation (e.g., the use of clay, bark, log frames, etc.) exhibit a weak-to-moderate degree of spatial structure. While statistically significant, the strengths of the correlations between both body treatment and artifact form and geographic distance are very weak and suggest that no real spatial structuring of these attributes exists.

Table 51

Results of the Mantel Tests between Phenotypic Data and Geographic Distance

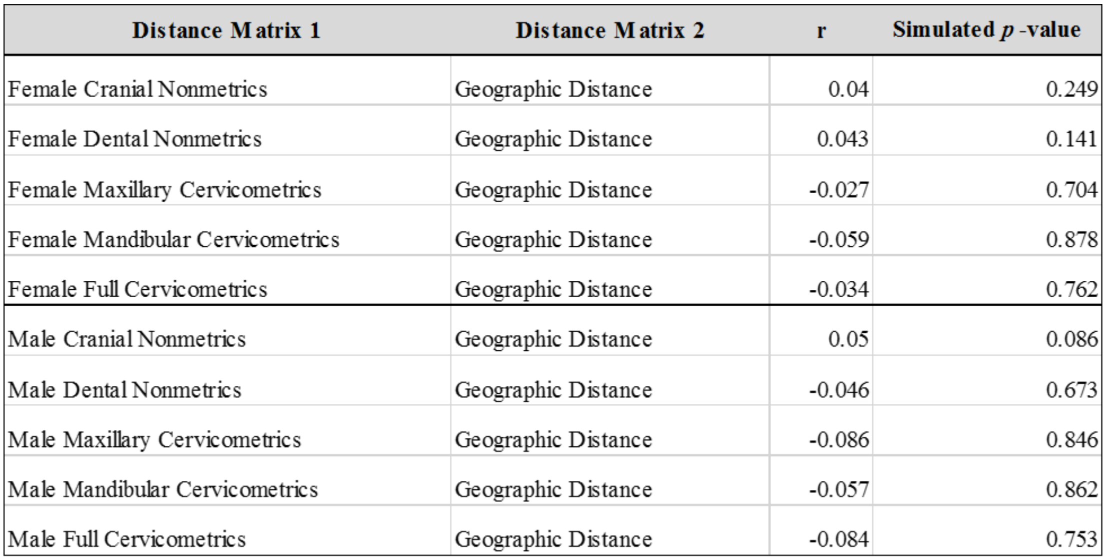


Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Maxillary Cervicometrics	Geographic Distance	-0.004	0.526
Mandibular Cervicometrics	Geographic Distance	-0.03	0.958
Full Cervicometrics	Geographic Distance	-0.037	0.87
Dental Nonmetrics	Geographic Distance	0.038	0.22
Cranial Nonmetrics	**Geographic Distance**	**0.077**	**0.007**

Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant results are those where p < 0.01. Significant results are bolded.

Table 52

Sex-Specific Results of Mantel Tests between Phenotypic Data and Geographic Distance



Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Female Cranial Nonmetrics	Geographic Distance	0.04	0.249
Female Dental Nonmetrics	Geographic Distance	0.043	0.141
Female Maxillary Cervicometrics	Geographic Distance	-0.027	0.704
Female Mandibular Cervicometrics	Geographic Distance	-0.059	0.878
Female Full Cervicometrics	Geographic Distance	-0.034	0.762
Male Cranial Nonmetrics	Geographic Distance	0.05	0.086
Male Dental Nonmetrics	Geographic Distance	-0.046	0.673
Male Maxillary Cervicometrics	Geographic Distance	-0.086	0.846
Male Mandibular Cervicometrics	Geographic Distance	-0.057	0.862
Male Full Cervicometrics	Geographic Distance	-0.084	0.753

Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant results are those where p < 0.005.

Table 53

Results of Mantel Tests between Mortuary Data and Geographic Distance

Distance Matrix 1	Distance Matrix 2	r	Simulated *p* -value
Structural Grave Attributes	**Geographic Distance**	**0.282**	**0.001**
Body Treatment	**Geographic Distance**	**0.147**	**0.001**
Artifact Form	**Geographic Distance**	**0.13**	**0.001**
Structural Grave Attributes (Reduced)	**Geographic Distance**	**0.307**	**0.001**
Body Treatment (Reduced)	**Geographic Distance**	**0.075**	**0.001**
Artifact Form (Reduced)	**Geographic Distance**	**0.113**	**0.003**

Based on 1000 replications. Using a Bonferroni correction for multiple comparisons, significant results are those where $p < 0.008$. Significant results are bolded.

Summary of Mantel test results.

The only inter-individual distance matrices derived from phenotypic data that exhibited significant intercorrelation were those based on cervical measurements of the maxillary and mandibular dentition, an unsurprising result given their functional integration. In contrast, inter-individual distance matrices derived from all three of the mortuary datasets exhibited weak, but significant, positive intercorrelation. This is again unsurprising since this result merely suggests that individuals in structurally dissimilar graves are more likely to have been given slightly different body treatments and interred with slightly different kinds of artifacts. No significant correlations existed between inter-individual distance matrices derived from phenotypic data and those derived from mortuary data, indicating that mortuary practices are not biologically structured. Given that, cross-culturally, kinship group membership (which, in itself, is not always biologically structured) only typically determines the individuals who are chosen to handle a corpse during mortuary practices (Carr, 1995), it is not surprising that material aspects of mortuary practices are not biologically structured.

While cranial nonmetric traits did follow an isolation by distance model, the strength of this relationship renders it negligible. The remaining phenotypic datasets exhibit nonexistent and nonsignificant correlations to geographic distance and therefore do not follow an isolation-by-distance model. These results are consistent with Scenario 2 and inconsistent with the patterning expected under Scenario 1. In contrast, all three mortuary datasets were consistent with the expectations of an isolation-by-distance model, although the magnitude of this relationship was only meaningful in the case of grave structure. These results are consistent with the results of the cluster analyses, and indicate that there are localized variants of mortuary practices within the data, especially in terms of grave structure.

Discussion

Chronological considerations.

The new series of radiocarbon dates obtained for the sites within the research sample help to both refine the Adena chronology and situate these mounds within a regional temporal sequence (see Figures 31 and 32 and Table 54). In their original synthesis of Adena archaeology, Webb and Snow (1945) suggested that Adena sites could be divided into "early" and "late" manifestations based on the overall similarity of the traits they exhibited to those of Hopewell sites. This method of categorization led them to characterize Robbins (15Be3) and Wright (15Mm6) as early and late manifestations of Adena, respectively. While the relative temporal placement of these two sites is upheld

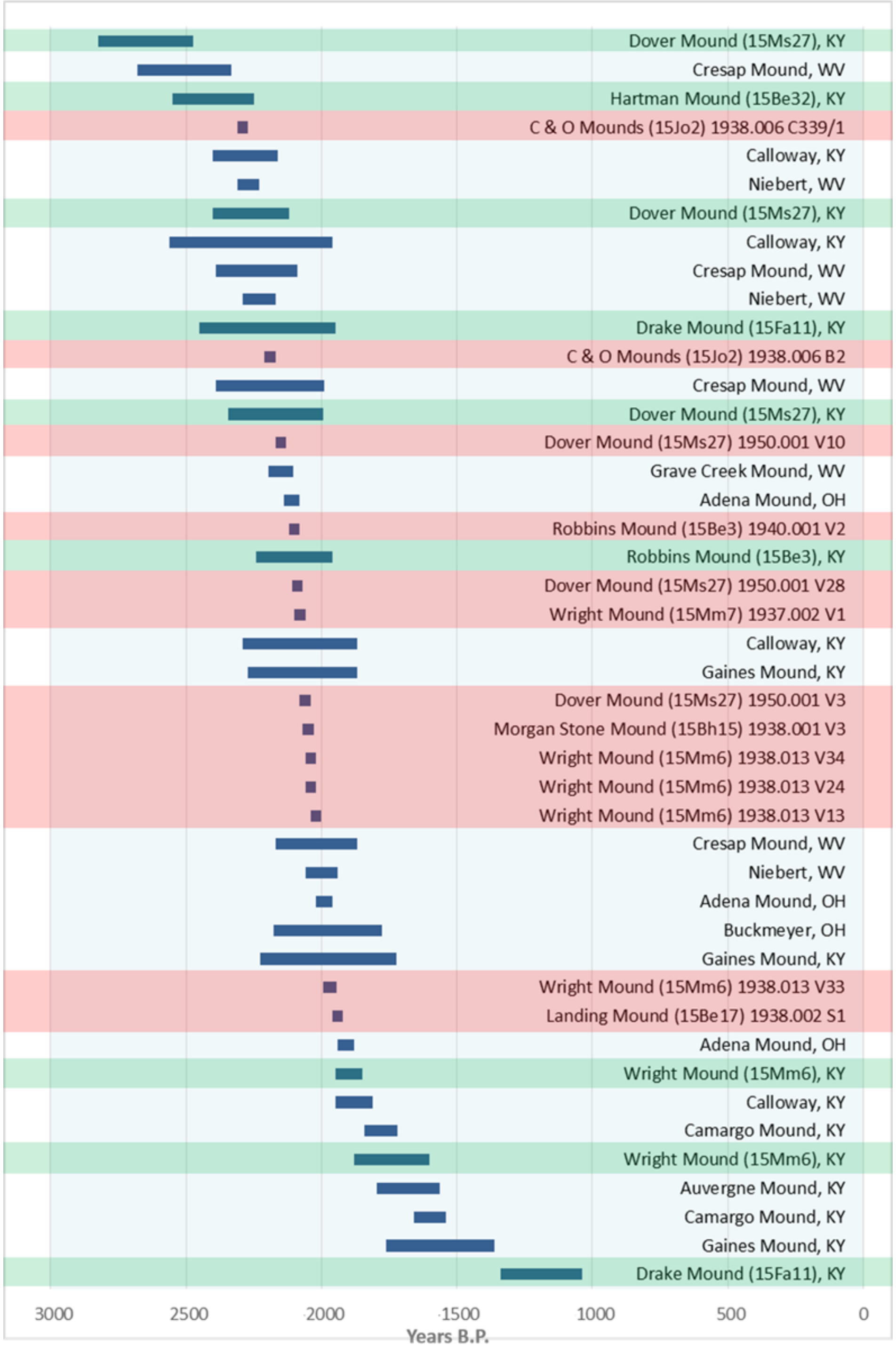


Figure 31. Radiocarbon dates in regional context. Dates highlighted in red are new dates obtained in the course of this research. Dates highlighted in green are previous dates obtained from sites included in this research. Comparisons are made to a sample of burial mounds attributed to Adena as well as to a selection of habitation sites discussed in Chapter 3. Adapted from Lepper and colleagues (2014: Tables 1 and 2).

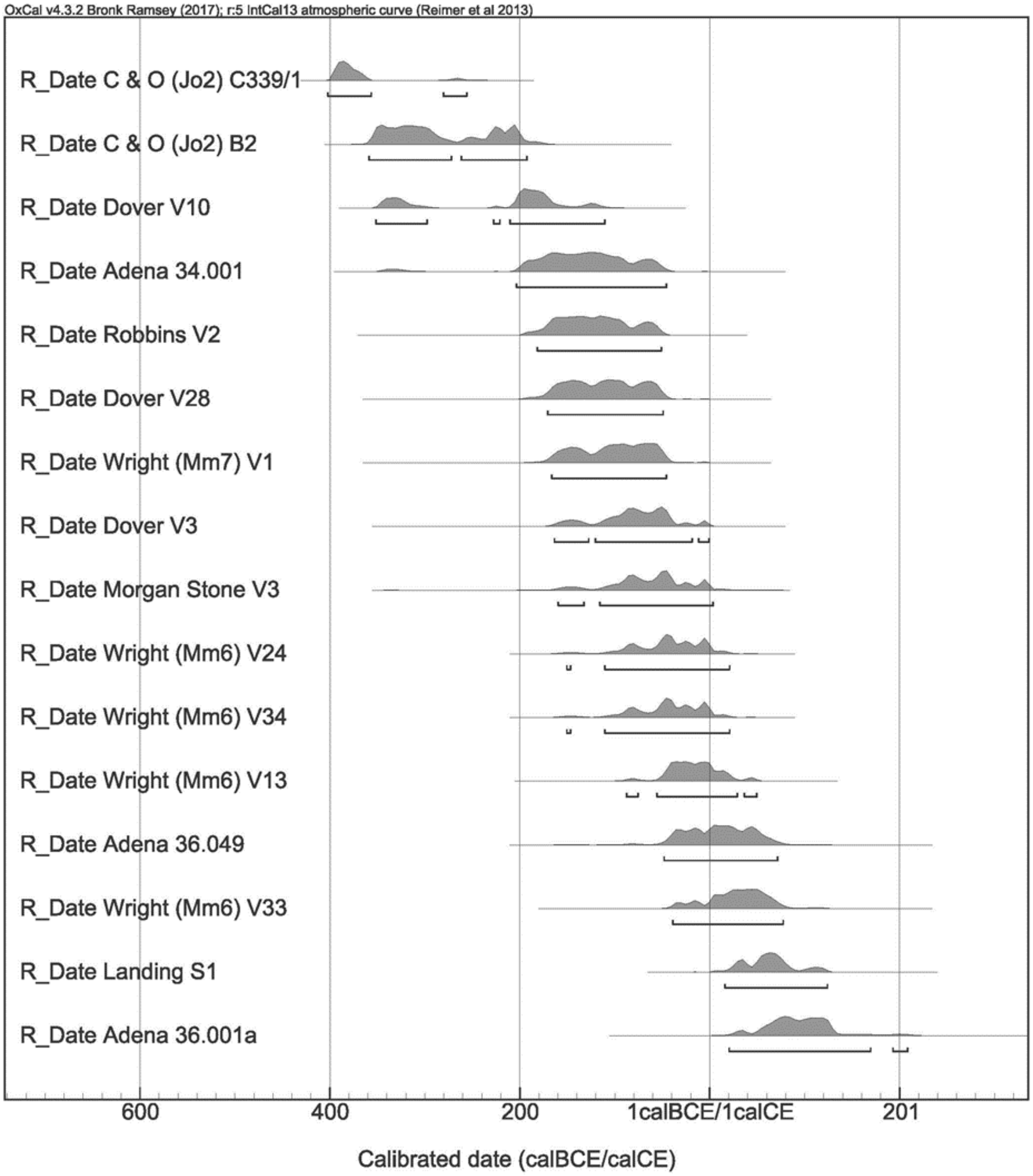


Figure 32. Calibrated radiocarbon dates obtained during this research with associated two-sigma ranges. Circles indicate mean calibrated date. Recent AMS dates from the Adena mound (33Ro1) have been included for comparison (Lepper et al., 2014). Problematic dates have been removed.

Table 54

Chronological Ordering of Dates Obtained in this Research

Lab Number	Site Name	Site Number	Sample	Radiocarbon Date (B.P.)
Gulf	Cresap	46Mr7		2506 ± 175
OS-131189	C & O	15Jo2	1938.006 C339/1	2290 ± 20
M-976	Cresap	46Mr7		2240 ± 150
M-975	Cresap	46Mr7		2190 ± 200
OS-132138	C & O	15Jo2	1938.006 B2	2190 ± 20
OS-131039	Dover	15Ms27	1950.001 V10	2150 ± 20
Beta-323214	Adena	33Ro1	A1200 34.001	2110 ± 30
OS-131036	Robbins	15Be3	1940.001 V2	2100 ± 20
OS-131040	Dover	15Ms27	1950.001 V28	2090 ± 20
OS-131174	Wright	15Mm7	1937.002 V1	2080 ± 20
OS-131038	Dover	15Ms27	1950.001 V3	2060 ± 20
OS-131037	Morgan Stone	15Bh15	1938.001 V3	2050 ± 20
OS-131171	Wright	15Mm6	1938.013 V24	2040 ± 20
OS-131173	Wright	15Mm6	1938.013 V34	2040 ± 20
M-974	Cresap	46Mr7		2020 ± 150
OS-131170	Wright	15Mm6	1938.013 V13	2020 ± 20
Beta-323216	Adena	33Ro1	A1200 36.049	1990 ± 30
OS-131172	Wright	15Mm6	1938.013 V33	1970 ± 25
OS-131351	Landing	15Be17	1938.002 S1	1940 ± 20
Beta-323215	Adena	33Ro1	A1200 36.001a	1910 ± 30

Supplemented with dates from the Cresap mound and AMS dates from the Adena mound (33Ro1) (Lepper et al., 2014). Blue-shaded blocks indicate groups of dates that are statistically the same at the 95% level based on calculations carried out with CALIB 7.1 (Stuiver et al., 2019) by the new radiocarbon dates, there is some overlap in their associated two-sigma ranges, suggesting that these two mounds were potentially contemporaries over a portion of the duration for which they were actively engaged with by Adena populations. Based on stratigraphic divisions and accompanying artifacts within the Cresap Mound (West Virginia), Dragoo (1963) proposed the existence of a late Adena “Robbins Complex,” suggesting that Robbins (15Be3), Wright (Mm6), the Adena Mound (Ohio), and the upper portion of the Cresap mound were all more or less contemporaneous. This assertion appears to be borne out by the new series of radiocarbon dates in that at least one date derived from each of these mounds are statistically the same at the 95% level according to calculations carried out using CALIB 7.1 (Stuiver et al., 2019). Further, and with the exception only of the dates obtained from the smaller C & O mound (15Jo2) and the earliest date obtained from Dover (15Ms27), all of the new Kentucky radiocarbon dates are bracketed by the youngest and oldest of a new series of AMS dates obtained from the central grave of the Adena mound (Lepper et al., 2014). As new dates are obtained, the Adena chronological sequence appears to be becoming progressively compressed. Further, the suite of traits identified by Dragoo (1963) as the Robbins Complex appears to be both geographically widespread and constrained to a relatively narrow temporal window – an observation that lends support to the notion of the existence of widespread networks of interaction between populations engaging in Adena ceremonialism.

Disregarding the problematic radiocarbon dates discussed above, the remainder of the absolute dates fall within a fairly constrained range. The maximal separation between mean calibrated dates obtained during the course of this research is 432 years, with more than a third of this due to the relatively early dates deriving from the smaller of the

C & O mounds (15Jo2). The mean calibrated dates from Robbins, Landing, Morgan Stone, both Wright mounds (15Mm6 and 15Mm7), and Dover all fall within a period of 283 years (see Figure 32) and their associated time ranges exhibit a fair amount of overlap. Robbins, Dover, Morgan Stone, and Wright (15Mm6) were likely to be contemporaneous for at least a portion of the time that they were active places of interment (see Table 54). If Webb and Snow's (1945) contention that the Ricketts site is contemporaneous with the Robbins mound is valid, then the vast majority of the skeletal data used in this research derives from mounds that are likely to have been at least partly coeval. This observation lends legitimacy to the comparison of the degree of phenotypic variability exhibited by mound-specific and regional burial samples that form the framework of this research.

Interpretation of the quantitative results.

Prior to discussing the results of the quantitative analyses presented above, it is pertinent to review how the data is expected to pattern under each of the scenarios developed in Chapter 5. Under Scenario 1, if a mound served a territorial function, then it should have resulted from the continuous use of a location over time by a single, stably located, descent-based corporate group. Geographic stability would result in regional patterns of corporate group interaction that can be expected to follow an isolation-by-distance model. Under this scenario, the amount of biological variability exhibited by a sample of individuals included in a single episode of interment should be approximately equal to the amount of biological variability exhibited by the entire burial sample derived from the same mound. In contrast, the amount of biological variability exhibited by a single mound's burial sample should be significantly less than the amount of biological variability present within the regional burial sample, since the regional sample should be composed of individuals derived from multiple descent-based corporate groups. Mortuary patterns may exhibit some localization under an isolation-by-distance model, but both intra- and extra-regional patterns of social interaction may disrupt this patterning.

Scenario 2 characterizes Adena mounds as persistent places and suggests that they may have been the products of the actions of multiple, descent-based corporate groups over time. In this scenario, the amount of biological variability exhibited by a single mound's burial sample would not be expected to be significantly different from the amount of biological variability present in the regional burial sample. Further, this could occur as the result of two different patterns of engagement with mounds. In the first (Scenario 2a), a mound may be engaged with by different groups sequentially over time. This would result in a situation in which the amount of biological variability exhibited by the burial sample included in a single episode of interment would be less than the biological variability of the burial sample derived from the mound as a whole. In the second (Scenario 2b), a mound could have been engaged with by multiple groups at the same time. In this situation, the amount of biological variability exhibited by the burial sample from a single interment episode should be comparable to the amount of biological variability present in both the entire mound's burial sample as well as that of the region.

Using phenotypic variability as a proxy for biological variability, a series of variability comparisons were undertaken and a summary of their results is presented in Table 55 (see also Tables 24 and 30). For the interpretation of these results, preference is given to the results of the comparisons of centroid size, as these incorporated more of

Table 55

Summary of Variability Comparisons

Site and Type of Comparison	Number of Comparisons Made	Scenario			
		1	2	2a	2b
Robbins (15Be3)					
SD					
Mound to Region	5		5		
IE 6	2		2		2
IE 8	2		2	1	1
Mound to Region (Females)	5		5		
Mound to Region (Males)	2		2		
CS					
Mound to Region	5		5		
IE 6	2		2		2
IE 8	2		2		2
Mound to Region (Females)	5		5		
Mound to Region (Males)	2		2		
Total	**32**		**32**	**1**	**7**
Landing (15Be17)					
SD					
Mound to Region	1		1		
Mound to Region (Males)	1	1			
CS					
Mound to Region	1		1		
Mound to Region (Males)	1		1		
Total	**4**	**1**	**3**		
Ricketts (15Mm3)					
SD					
Mound to Region	5	1	4		
Mound to Region (Males)	5	1	4		
CS					
Mound to Region	5		5		
Mound to Region (Males)	5		5		
Total	**20**	**2**	**18**		
Wright (15Mm6)					
SD					
Mound to Region	5	2	3		
IE4	3	1	2		2
IE5	2	2			
Mound to Region (Females)	2	2			
Mound to Region (Males)	5		5		
CS					
Mound to Region	5	1	4		
IE4	3		3		3
IE5	2	1	1	1	
Mound to Region (Females)	2	2	2		
Mound to Region (Males)	5		5		
Total	**34**	**11**	**23**	**1**	**5**
Dover (15Ms27)					
SD					
Mound to Region	4	1	3		
Mound to Region (Males)	1		1		
CS					
Mound to Region	4	3	1		
Mound to Region (Males)	1	1			
Total	**10**	**5**	**5**		

the variability inherent in each dataset into the analysis and exhibited more internal consistency than the comparisons based on the standard deviation of either the first principal component scores or their nonmetric analogs. Regionally, both sexes are equally phenotypically variable for three of the five datasets (cranial nonmetric, dental nonmetric, and full dentition cervicometrics). Females exhibit more variability in maxillary cervicometrics whereas males exhibit more variability in mandibular cervicometrics. There is therefore no *a priori* reason to assume that one sex is more mobile than the other and variation comparisons will be made using combined-sex samples for each mound and qualifying the results with sex-specific comparisons where sample size permits.

The results of the comparisons of phenotypic variability for individuals interred in the Robbins mound (15Be3) are unanimously consistent with Scenario 2, and both observable interment episodes are most consistent with Scenario 2b. Both males and females interred at Robbins are as phenotypically variable as their regional counterparts and there is no significant difference in the amount of phenotypic variability exhibited by each sex. Results from the Landing mound (15Be17) indicate that it, too, is most consistent with Scenario 2, although these results are less robust as they are based on a relatively limited number of comparisons. Lastly, comparisons of phenotypic variability for individuals derived from the Ricketts site (15Mm3) are most consistent with Scenario 2, and males interred at this site are as phenotypically variable as the regional sample of males.

In contrast, the results from the Dover mound (15Ms27) are most consistent with Scenario 1. While this is not immediately apparent, inspection of Table 19 and Figure 14 illustrates that most of the nonsignificant comparisons based on standard deviations of the first principal component or dimension of variation are nearly significant, with most of the 95% confidence interval located below the regional mean. The results of the centroid size comparisons, despite seeming contrary to the results of the standard deviation comparisons, therefore appear to be both consistent with and amplifications of an extant, albeit nonsignificant, pattern within the standard deviation comparisons. Further, the males interred in Dover are significantly less phenotypically variable than the males derived from the regional sample – another result that contrasts with the patterns evident in the results from Robbins, Landing, and Ricketts.

Results from the comparisons of phenotypic variability for individuals interred within the Wright mound (15Mm6) are more complex, but placing an emphasis on the comparisons of centroid size produces some discernible patterning. Four of the five mound to region comparisons are consistent with Scenario 2. The exception, the comparison based on dental nonmetric data, is based on a sample with a higher proportion of females in it than the other datasets. Females interred in Wright are significantly less phenotypically variable than the regional sample of females for both dental nonmetric data and maxillary cervicometric data, and this decreased variation may have biased the mound to region comparison of dental nonmetric variability. Females interred at Wright are also significantly less phenotypically variable than their male counterparts for both dental nonmetric and maxillary cervicometric datasets. Thus, females from Wright are consistently less variable than the populations that they can be compared to, suggesting that they may be drawn from a smaller catchment area than both females at other sites and males from Wright. Males interred at Wright are not significantly different in the amount of phenotypic variation that they exhibit than the regional burial sample of males.

Comparisons of phenotypic variability between samples drawn from specific interment episodes and samples drawn from the entire mound indicate that the fourth interment episode at Wright is most consistent with Scenario 2b (four of five comparisons). The fifth interment episode, however, is most consistent with Scenario 1 (three of four comparisons). The disagreement results primarily from the fact that the fifth interment episode involves a comparison based on dental nonmetric data which, as discussed above, may be unduly affected by the low variability of Wright females for this dataset. If this dataset is removed from consideration, then centroid size comparisons would indicate that the fifth interment episode is most consistent with Scenario 2a, or sequential use of the same mound by multiple groups. In either case, whether the fifth interment episode is consistent with Scenario 1 or with Scenario 2a, the overall patterning at Wright could result from a change in how the mound was being used, switching between a situation in which multiple groups interred their dead within the same (fourth) interment episode to a situation in which only one group interred their dead in an interment episode (the fifth). The larger Wright mound, then, is not entirely consistent with either scenario but may, instead, represent a diachronic transition from one to the other.

Results of the cluster analyses for the phenotypic datasets do not have any direct bearing on the comparisons of phenotypic variability. Instead, they provide a means of assessing whether these datasets exhibit any spatial structure that may be interpreted as either consistent or inconsistent with an isolation-by-distance model. On average, the clusters produced for the phenotypic datasets did not exhibit any more geographic bias in their memberships than would be expected given the disproportionate contribution of two specific subregions to the composition of the datasets. While this lack of spatial structure to cluster membership may be a product of low-resolution datasets, it is inconsistent with an isolation-by-distance model and therefore provides tentative support for the two variants of Scenario 2. In contrast, the clustering analyses of the mortuary datasets indicate that the data pertaining to grave structure exhibits some geographic bias and suggests that localized traditions of grave construction may exist.

Results of the Mantel tests provide a more direct means of evaluating whether the different datasets exhibit patterning consistent with an isolation-by-distance model. Four of the five phenotypic datasets exhibit no spatial structure in that inter-individual distance matrices derived from them do not exhibit significant correlations to geographic distance. While cranial nonmetric data does exhibit some spatial structure, the magnitude of the correlation is such that it can effectively be ignored. This is consistent with the expectations of Scenario 2. In contrast, inter-individual distance matrices derived from all three of the mortuary datasets exhibit significant positive correlations to geographic distance, but the magnitude of the relationship is only meaningful in the case of grave structure. The results of the cluster analyses and the Mantel tests are therefore mutually supportive and generally consistent with the results of the comparisons of phenotypic variability.

The contrast between the mortuary data exhibiting spatial structure while the phenotypic data seem to exhibit a lack thereof is not consistent with the expectations of either of the scenarios developed in Chapter 5. As a result, it is difficult to know how to interpret this discrepancy aside from making the unsurprising observation that biology and cultural practices are not patterning in the same way. One possibility is that localized traditions of grave construction existed as the result of stably located networks of interaction. It would be a mistake to think of the mounds included in this research sample as contained within a bounded area. It is very likely that each of them would have had interaction with populations located outside of the study region. As such, the populations engaging with different mounds may be exposed to and operationalize different ideas regarding tomb construction, thereby creating the spatial structure evident in this dataset. Alternatively, given that grave construction relies heavily on materials derived from the physical environment (e.g., bark, clay, logs, and rocks), it is possible that localized traditions result from environmental variables and the differing availability of the materials used in construction. A third possibility is that the disjunction between the mortuary data and the phenotypic data results from a situation in which the degree of biological interaction between groups (e.g., mate exchange, migration from one group to another) exceeded the degree of social interaction (e.g., trade, the exchange of ideas, alliance formation). This is similar to observations made by Barth (1969) in his study of the creation and maintenance of ethnic boundaries, where ethnic identity is maintained despite changes in group composition resulting from migration or intermarriage. If, for Adena populations, group social group identity is manifested in mortuary practices and relatively independent of biology, then this could produce the patterning seen in the results of these analyses.

This last possibility may also provide a reason for why grave structure seems to exhibit more robust spatial patterning than other aspects of mortuary practices. Where the fine details of body treatment or artifact form and placement may not be apparent to an observer attending an interment and witnessing the mortuary practices involved, the larger details of grave construction – such as the use of clay coverings or the construction of log frames – may be more readily apprehended. Grave structure may therefore have been more actively involved in signaling group affiliation and, if social group identity was spatially anchored, this could account for the localization exhibited by different forms of grave construction.

Conclusion

This chapter has presented the results of the stratigraphic reconstructions, radiocarbon dating, reassessment of the osteological collections derived from the mounds in the research sample, data cleaning and pretreatment, and the quantitative analyses of both phenotypic and mortuary data. The results of the analyses undertaken here suggest that the ways in which Adena mounds were engaged with was far from uniform. Robbins, Landing, and Ricketts all appear to be consistent with a scenario in which multiple descent-based corporate groups interred their dead within the same mound. In the case of Robbins, sample sizes are sufficient to provide evidence that this occurred within the same interment episodes, thereby suggesting (as does its size and sheer number of burials) that Robbins was likely a site where multiple groups came together for the interment of their dead. Surprisingly, this is suggested for the much smaller Landing mound, too, since the interments at that site appear to have been made in a single episode. In contrast, Dover is most consistent with a scenario in which it is the product of the interments of a single group. Further, and unlike Robbins, Landing, or Ricketts, the males interred at Dover appear to be drawn from a significantly smaller catchment area than the regional population. The larger of the Wright mounds may represent a third option – a situation in which a mound alternated between being used by a single group and by multiple groups. What is more, the females interred at Wright, like the males interred at Dover, appear to be drawn from a more restricted population than that of the region. Five mounds, three different patterns.

Neither the cluster analyses nor the Mantel tests indicate the presence of any meaningful spatial structure within the phenotypic data. While this is consistent with the expectations of a scenario in which mounds included interments derived from multiple groups, it may also be indicative of a general lack of significant variation in the research sample as the result of it deriving from a relatively homogenous population. If this is the case, then it is possible that there is not enough variation within the phenotypic datasets to permit the detection of spatial structure where it does, in fact, exist. The relatively consistent within-mound patterning exhibited by the comparisons of phenotypic variability based on centroid size, however, would suggest that the results presented in this chapter reflect real differences in the ways that different mounds were engaged with by Adena populations.

Addendum: Additional Results

Demographic characteristics of the Adena burial sample.

The reassessment of the skeletal remains undertaken as part of this research changes our understanding of the demographic characteristics of the individuals selected for mound interment as a part of Adena mortuary ceremonialism. In Webb and Snow's (1945) original synthesis, only 32.3% of individuals for whom sex estimates were made (70 out of 217) were considered to be female, a significant departure from the assumption that males and females were equally likely to be interred in mounds (χ^2 = 13.753, d.f. = 1, *p*-value = 0.000). In contrast, 40.5% of the individuals for whom revised estimates of sex could be made were considered to be female. While this proportion that does not differ significantly from that produced by Webb and Snow's estimates (χ^2 = 1.998, d.f. = 1, *p*-value = 0.158), neither is it significantly different from an assumption of equal sex representation within mound interments (χ^2 = 2.602, d.f. = 1, *p*-value = 0.107). Revised estimates of age-at-death likewise represent a shift away from those presented by Webb and Snow (1945), indicating slightly more equal representation across age categories and a general shift toward older ages-at-death among adults (see Figure 33). Significant differences include a substantial decrease in the proportion of individuals classified as young adults (χ^2 = 41.559, d.f. = 1, *p*-value = $1.143e^{-10}$), with concomitant increases in the proportions of individuals classified as adolescents (χ^2 = 8.16, d.f. = 1, *p*-value = 0.004), middle adults (χ^2 = 12.744, d.f. = 1, *p*-value = 0.000), and old adults (χ^2 = 5.371, d.f. = 1, *p*-value = 0.02). These results are in line with both a documented general bias toward the identification of males among earlier researchers (Weiss, 1972) as well as specific reassessments of Snow's skeletal analyses (e.g., Milner & Jefferies, 1987;

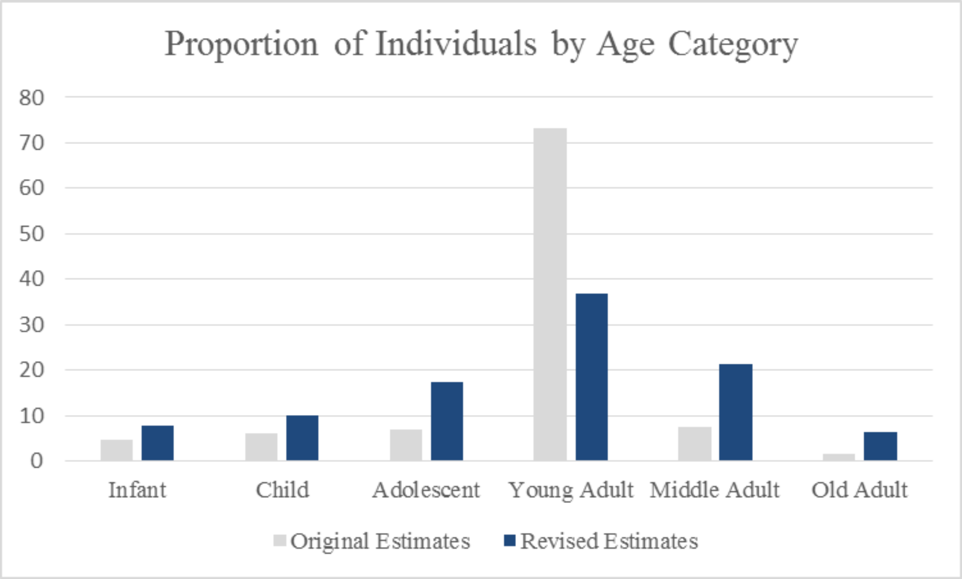
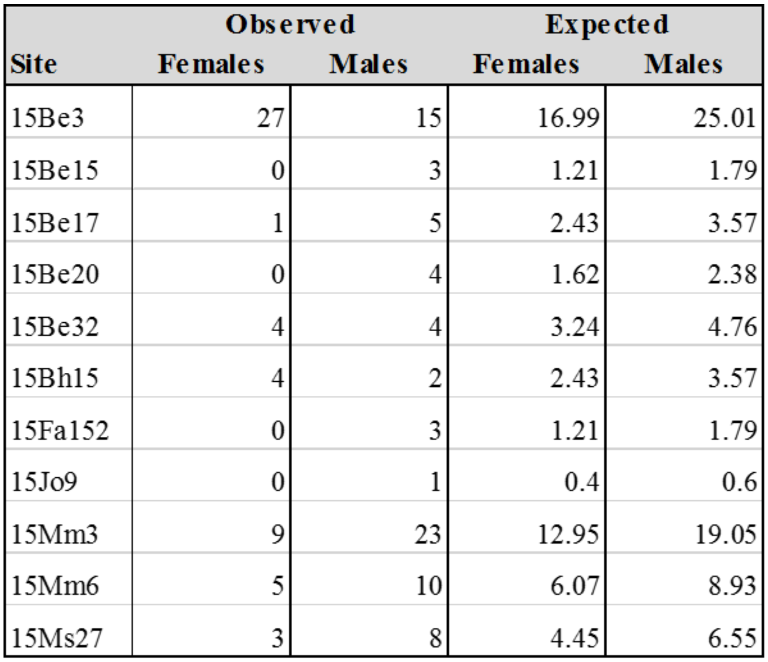


Figure 33. Comparison of the demographic characteristics of the Kentucky Adena burial sample based on the published estimates and the revised estimates made in the course of this research.

Table 56

Expected vs. Observed Frequencies of Each Sex at Each Mound



	Observed		**Expected**	
Site	**Females**	**Males**	**Females**	**Males**
15Be3	27	15	16.99	25.01
15Be15	0	3	1.21	1.79
15Be17	1	5	2.43	3.57
15Be20	0	4	1.62	2.38
15Be32	4	4	3.24	4.76
15Bh15	4	2	2.43	3.57
15Fa152	0	3	1.21	1.79
15Jo9	0	1	0.4	0.6
15Mm3	9	23	12.95	19.05
15Mm6	5	10	6.07	8.93
15Ms27	3	8	4.45	6.55

Powell, 1985) that documented both a bias towards the identification of males and a tendency to underage adult remains.

Aside from the demographic shifts discussed above, the revised estimates of sex exhibit some degree of spatial structure. Specifically, the mound in which an individual was interred is not independent of estimated sex (Fisher's exact test; *p*-value = 0.005). Table 56 presents the observed frequencies with which individuals of each sex were documented in the sites included in the research sample as well as the frequencies with which they were expected to appear based on the demographic characteristics of the entire burial sample. In general, females tend to be slightly underrepresented. The exceptions to this rule include the Hartman mound (15Be32), the Morgan Stone mound (15Bh15), and the larger of the Robbins mounds (15Be3). For the Robbins mound, the observed proportion of females in the mound's sample of burials is significantly greater than the expected proportion ($\chi^2 = 4.782$, d.f. = 1, *p*-value = 0.029), a situation that may also have obtained at Morgan Stone, given that Snow originally estimated six out of the seven interments to be either females or probable females (Webb, 1941b). Whether this phenomenon is indicative of regional differences in the selection criteria used for mound interment or, alternatively, differences in how these mounds were being used is unclear and unlikely to be resolved given the available data.

Dental morphology.

As can be seen in Table 15, the expression of groove pattern on the mandibular second molar had significant or near-significant associations with the expression of the greatest number of other traits, including the degree of shoveling exhibited by the maxillary central incisor, the expression of the metacone on the maxillary first molar, the expression of the hypocone on the maxillary second molar, the expression of the hypocone and metacone as well as the presence of an enamel extension on the maxillary third molar, the expression of a protostylid on the mandibular second molar, and the groove pattern, expression of cusp 6, and the presence of an enamel extension on the mandibular third molar. This is almost twice as many associations as were recorded for any other morphological trait. Similarly, the groove pattern exhibited by the mandibular third molar was significantly or near-significantly associated with the expression of the metacone and the presence of an enamel extension on the same tooth as well as the expression of both the hypocone and the metacone on the maxillary second molar. Stojanowski and colleagues (2019) have noted that, within an historic population of ethnic Gullah, groove pattern seems to have a significant relationship to the expression of other cusp variants. Specifically, they observed that the presence of a + groove pattern is associated with more complex overall crown morphology whereas the presence of a y groove pattern tends to be associated with a reduction in the presence of other minor crown variants. While these specific relationships cannot be confirmed with the present data (in large part due to the relative rarity of individuals exhibiting either a + or a y groove patterns in the sample), the high number of associations between groove pattern and other morphological variants – even extending to variants expressed on other teeth – seems to lend tentative support to the idea that groove pattern is one of a suite of traits whose expression is affected by the same underlying genes.

CHAPTER 7

CONCLUSION

Introduction

This concluding chapter reviews the key results that were presented in Chapter 6, contextualizes them within the theoretical and archaeological literatures drawn on throughout this dissertation, and discusses the implications of the results for these literatures. To this end, the chapter begins by summarizing the key argumentation and results of this research, situating them within the alternative scenarios developed in Chapter 5. The chapter continues with discussions of how these results have contributed to our understanding of Adena ceremonialism and the populations who engaged in it as well as the implications of the results of this research for the different theoretical models employed to develop each of the alternative scenarios. Following this, the broader impacts of this dissertation are presented in regard to both the use of museum collections for contemporary research and the repatriation process mandated under NAGPRA. Finally, this chapter concludes by suggesting avenues for future research.

Summarization of Argumentation and Key Results of this Research

The research undertaken in this dissertation assessed the degree to which the expectations of both space-bound and place-bound models of land tenure (*sensu* Zedeño, 2000) are consistent with patterning observed in the archaeological record. As a case study, this project drew upon osteological and mortuary data derived from the excavation of a series of burial mounds located in northern Kentucky and associated with Adena ceremonialism in order to evaluate two alternative scenarios. The first scenario adopts a space-bound model of land tenure and is aligned with contemporary interpretations of Adena burial mounds in viewing their construction as intertwined with the formation and long-term maintenance of exclusive territories. As an alternative, the second scenario (and its two variants) employs a place-bound model of land tenure developed through an expansion of Schlanger's (1992) concept of a "persistent place" and explicitly considers that multiple corporate groups may have used a given Adena mound and that those groups may have changed over the duration of time in which it was an active site of interment.

Counterintuitively, the interpretation of Adena mounds as territorial markers became common after the reconceptualization of Adena from being representative of a unified, sedentary, agricultural society (e.g., Webb & Baby, 1957; Webb & Snow, 1945) to a mortuary program shared by multiple, distinct small-scale societies and characterized by local variations on common themes (e.g., Abrams & Freter 2005; Aument 1990; Fitting & Brose 1971; Greber, 2005; Hays 1995; Rafferty 2005). As traced in Chapter 3, the intellectual lineage that underlies the territorial interpretation is based on work that suggests that the construction of monuments is indicative of territorial formation and maintenance as a means of controlling access to "crucial but restricted resources" (Saxe, 1970:119). Although this association is firmly rooted in ethnographic literature (e.g., Goldstein, 1976; 1981; Renfrew, 1976; Saxe, 1970; Saxe & Gall, 1977), its application to Adena rests on three assumptions: 1) Adena mounds can be characterized as permanent, bounded areas that were used exclusively for the interment of the dead (Goldstein, 1976, 1981); 2) the subsistence resources exploited by Adena populations were both dense and predictable; and 3) Adena populations can be characterized as sedentary. A review of the contemporary Adena archaeological literature suggests that the degree to which each of these assumptions holds is ambiguous and/or regionally variable.

A further complication to the interpretation of Adena mounds as territorial markers is that there is a disjunction between the temporal scale of mound construction and the span of time over which forager territories typically remain stable. Sociobiological models of human territoriality (e.g., Cashdan, 1983; Dyson-Hudson & Smith, 1978) emphasize that territorial behavior is contingent on resource density and distribution as well as population size and aggregation. As such, the spatial extent and location of foraging territories generally shift within a few years (Helm, 1968; Ingold, 1986; Kelly, 1995). The discovery of humus layers and evidence for substantial tree growth in between some episodes of mound construction (Dragoo, 1963; Webb, 1940, 1942, 1959), the use of the cavities created by tomb collapse for new interments (Webb & Elliott, 1942), radiocarbon dates that are separated by one or more centuries (Dragoo, 1963; Turnbow, 1981; see also Chapter 6), and the occurrence of both precedent and “intrusive” burials (Webb, 1942, 1943a) at many Adena mounds suggests that they were used intermittently and over a long period of time. In turn, these observations suggest that different episodes of interment may have been separated by decades, if not centuries. Such mounds may, therefore, have been incorporated into changing social configurations. The interpretation of Adena mounds as territorial markers is therefore likely to be an oversimplification if not an outright mischaracterization of the social processes involved in their construction.

Schlanger (1992) developed the concept of “persistent place” as a means of explicitly considering the ways in which a specific location was used over the course of the long-term occupation of a region. As originally stated, however, the concept placed undue emphasis on subsistence and resource extraction as the reasons underlying the repeated use of a location. The research undertaken in this dissertation has expanded upon Schlanger’s (1992) concept by drawing on ideas from humanist geography and anthropological interpretations of indigenous ontologies in order to redefine a persistent place as one that is repeatedly engaged with throughout the long-term history of a region as a result of the affordances (*sensu* Gibson, 1979) that it is perceived to offer, whether such affordances are material or immaterial. In emphasizing perception, this definition explicitly considers that the persistence of place is mediated, in part, by personal experiences and memories as well as collective memory and worldview (*sensu* Redfield, 1952). Application of this expanded formulation of persistent place to the ethnographic record suggests that some behaviors that have been labeled as territorial may, instead, have been intended to preserve proper social relations between humans and other-than-human persons; individuals or groups who were aware of such relations and understood the proper modes of comportment were not excluded from the use of the region. There is also evidence that, in several cases, group identity is conferred by geography. Where, from an outside perspective, there appears to be a continuous association between an area and a named human group (often considered as evidence of territoriality), such an association may mask both biological and cultural discontinuity. While this framework does not preclude the possibility that Adena mounds served a territorial function, it does allow for the possibility that they represent the cumulative actions of multiple groups over time, thereby accommodating aspects of Adena archaeology that are problematic for the territorial hypothesis.

Review of alternative scenarios and their associated expectations. The two alternative scenarios proposed by this research are therefore distinguishable by whether they assume Adena mounds are the cumulative result of the actions of a single, stably located, descent-based corporate group (i.e., Scenario 1, consistent with the territorial hypothesis) or the product of the actions of multiple such groups (i.e., Scenario 2, consistent with the characterization of mounds as persistent places). To investigate these two options, the analytical framework that has been employed in this research quantifies and compares the relative amounts of biological variability exhibited by burial samples derived from multiple spatial scales (individual interment episodes, entire mounds, and the region as a whole). In addition, this research evaluates the spatial distributions of both individuals exhibiting phenotypic similarity (and therefore assumed to share some biological affinity) and formally similar mortuary practices for evidence of geographic localization.

In Scenario 1, the localization of descent-based corporate groups into fixed, stable territories is expected to result in a situation where corporate group interaction (e.g., trade, mate exchange, etc.) was consistent with an isolation-by-distance model. In other words, groups would have interacted more frequently with neighboring groups and the frequency of inter-group interaction would have declined with increasing geographic distance among groups. As a result, the amount of phenotypic variability exhibited by a burial sample derived from a single mound would be expected to be significantly less than that exhibited by a burial sample derived from the entire region since the regional sample would be expected to be composed of multiple descent-based corporate groups. At the same time, the amount of biological variability exhibited by a burial sample derived from a single episode of interment should be comparable to that from a burial sample derived from the mound as a whole since both burial samples should be derived from the same corporate group. Additionally, an isolation-by-distance model should result in a situation in which inter-individual distances based on phenotypic data are positively correlated with those based on geographic distance. As a result of relatively more frequent interaction with neighboring groups than with distant groups, mortuary variability may also exhibit some spatial restriction under an isolation-by-distance model due to the localization of shared practices.

In contrast, Scenario 2 posits that mounds may have resulted from the combined actions of multiple descent-based corporate groups. In this scenario, the amount of biological variability exhibited by a burial sample derived from a single mound would be expected to be comparable to that exhibited by a regional burial sample, since both samples would represent multiple descent-based corporate groups. Further, multiple groups may have participated in mound construction in two ways. In the first, Scenario 2a, multiple groups could have contributed to mound construction sequentially. In this case, each interment episode would represent the actions of a single corporate group, whereas the mound as a whole would represent multiple groups. As such, in this scenario, the amount of biological variability exhibited by a burial sample derived from an individual interment episode should be less than that exhibited by a burial sample derived from the entire mound. In contrast, Scenario 2b considers the possibility that multiple groups may have participated in mound construction simultaneously, with the result that burial samples derived from both individual interment episodes and from the mound as a whole would be composed of individuals derived from multiple corporate groups and, consequently, exhibit comparable amounts of biological variability. In either variant of Scenario 2, there is no reason to anticipate the geographic localization of either phenotypically similar individuals or formally similar mortuary practices.

Summary of key results.

As discussed at the end of Chapter 5, the amount of phenotypic variability exhibited by the burial sample derived from a given mound is assumed to result primarily from two factors: 1) the number of corporate groups interring their dead within that mound and 2) post-marital residence patterns. Since the two scenarios reviewed above differ primarily in terms of the number of corporate groups involved in the construction of a particular mound, it is desirable to control for any phenotypic variability contributed by patterns of post-marital residence. To this end, sex-specific and between-sex patterns of phenotypic variability were evaluated wherever sample sizes were sufficient. At Robbins (15Be3), both males and females exhibited phenotypic variability comparable to their regional counterparts. At Landing (15Be17), Ricketts (15Mm3), and Wright (15Mm6), male burial samples (the only sex yielding sufficient sample sizes for comparison) exhibited comparable phenotypic variability to the regional burial sample of males. The female burial sample from Wright, however, was significantly less phenotypically variable than the female burial sample derived from the region. This suggests that females interred at this site may have been drawn from a more localized population. A similar pattern is exhibited by the male burial sample from the Dover mound (15Ms27).

Between-sex comparisons were only possible for Robbins and Wright. At the former, both male and female burial samples exhibited comparable levels of phenotypic variability. At Wright, however, females were significantly less phenotypically variable than males interred in the same mound. This may indicate that, at Wright, females were the less mobile sex (Lane & Sublett, 1972), thereby suggesting the possibility of a matrilocal post-marital residence pattern. While between-sex comparisons could not be made for Dover, the fact that males interred at this site were significantly less variable than their regional counterparts may indicate patrilocality. These contrasting patterns are further complicated by the lack of any difference in phenotypic variability between the males and females interred at Robbins. At the regional scale, the results of the sex-specific Mantel tests indicate that there is no spatial structure to the phenotypic variability of either males or females. Taken together, these results suggest that there is no empirical basis for favoring one sex over the other when interpreting the results of the comparisons of phenotypic variability, regardless of the spatial scales used in the comparison. Combined-sex samples were therefore used for variability comparisons and qualified with the results of the sex-specific and between-sex comparisons where necessary.

Burial samples derived from the larger Robbins mound are comparable to regional burial samples in terms of phenotypic variability for all observable datasets, results that are consistent with the expectations of Scenario 2. In addition, the two interment episodes from Robbins that yielded sample sizes sufficient for comparison are consistent with the expectations of Scenario 2b, where multiple descent-based corporate groups interred their dead within the same interment episode. Individuals interred at the Landing mound, although only observable for the cranial nonmetric dataset, are likewise consistent with the expectations of Scenario 2. The burial samples from the Ricketts site are statistically indistinguishable from regional samples in terms of phenotypic variability across all datasets. Again, these empirical patterns are consistent with Scenario 2. In contrast to this pattern, the burial samples derived from the Dover mound (15Ms27) exhibit significantly less phenotypic variability than regional samples for the majority of observable datasets. These results are most consistent with Scenario 1.

Burial samples derived from the larger Wright mound exhibit patterning that is more complex and may be indicative of both scenarios. For mound-to-region comparisons based on centroid size, individuals interred at Wright are comparable to regional burial samples in terms of phenotypic variability for the majority of the phenotypic datasets. The exception is the dental nonmetric dataset, for which individuals interred at Wright are significantly less variable than the regional sample. As with Robbins, two interment episodes yielded sample sizes sufficient for comparison. In contrast to Robbins, however, these interment episodes yielded conflicting results. The burial sample derived from the fourth interment episode at Wright is consistent with Scenario 2b, exhibiting comparable phenotypic variability to burial samples derived from both the mound as a whole and the entire region. The burial sample derived from the fifth interment episode is consistent with Scenario 1 for one observable dataset (dental nonmetrics) and is consistent with Scenario 2a for the other dataset (maxillary cervicometrics). Although these results are contradictory, they are consistent in their suggestion that the burial sample from this interment episode is less phenotypically variable than that of the region.

Cluster analyses were used as an exploratory means of assessing the presence of any spatial structure within phenotypic and mortuary datasets. Results for all phenotypic datasets indicate a lack of spatial structure, with individuals belonging to the same phenotypic cluster typically having been interred within multiple mounds located in different geographic subregions. This finding is inconsistent with an isolation-by-distance model and therefore lends tentative support to Scenario 2. In contrast, the results of the cluster analysis of the mortuary dataset pertaining to grave structure provide evidence of geographic bias in cluster membership. This suggests the presence of localized traditions of grave construction.

Mantel tests of matrix correlation provided a more direct means of assessing whether the datasets used in this research exhibited spatial structure consistent with an isolation-by-distance model. Results of these analyses confirm the patterning observed in the results of the cluster analyses. None of the phenotypic datasets exhibit patterning consistent with an isolation-by-distance model (while inter-individual distance matrices based on both cranial nonmetric data and geographic distance were statistically significantly correlated with each other, the magnitude of this correlation renders it effectively meaningless). These results are consistent with the expectations of Scenario 2. In contrast, all three of the mortuary datasets (grave structure, body treatment, and the kinds of artifacts included in mortuary contexts) exhibit patterning consistent with an isolation-by-distance model and, therefore, the expectations of Scenario 1. The strongest correlation is exhibited by the data pertaining to grave construction, whereas the other two datasets are characterized by weaker correlations.

Temporary territories and persistent places.

These results indicate that the Adena mounds included in this dissertation research cannot be characterized in a single way. Robbins, Landing, and Ricketts are all consistent with a scenario in which multiple descent-based corporate groups interred their dead within the same mound and, for both Robbins and Landing, within the same episode of interment. In contrast, Dover is most consistent with the actions of a single, stably located descent-based corporate group having interred their dead in the same mound over time. The larger of the Wright mounds presents patterning that seems to indicate a transition from the participation of multiple groups during the fourth interment episode to reduced group participation during the fifth interment episode. The blanket interpretation of Adena mounds as implicated in the creation and long-term maintenance of exclusive territories is therefore untenable, as this interpretation mischaracterizes the social processes that seem to have been associated with the construction of Robbins, Landing, Ricketts, and, to a lesser extent Wright. At the same time, however, the data from Dover indicates that the characterization of all mounds as persistent places is equally inappropriate in the case of this mound. Wherever possible, mounds should be interpreted within their regional context and with reference to change over time.

Revisiting the Alternative Scenarios

The foregoing summary of the key results of this research made little of the fact that mortuary datasets exhibited spatial patterning that is consistent with an isolation-by-distance model while phenotypic datasets did not. These contrasting patterns were not anticipated and not accounted for during the development of the test expectations associated with the two alternative scenarios considered in this dissertation. As such, the disparate patterning exhibited by the mortuary and phenotypic datasets merits further discussion and necessitates the revisiting of the alternative scenarios employed in this research.

Albeit unintentionally, the expectations associated with the alternative scenarios developed in Chapter 5 did not differentiate between patterns of group interaction that would affect the spatial distribution of similar phenotypes (e.g., migration or intermarriage) and those that would affect the spatial distribution of similar material culture (e.g., trade, the sharing of ritual knowledge, the formation of intergroup alliances), implicitly assuming that both kinds of group interaction would occur in lockstep. For example, if there were relatively greater amounts of economic, social, and political interaction between groups than biological interaction in the form of intermarriage or migration of individuals from one social group to another, then phenotypic similarity may exhibit localization (consistent with Scenario 1) while formally similar mortuary practices may not (consistent with Scenario 2). Similarly, if there was a relatively greater degree of migration or intermarriage than social interactions that facilitate the distribution of similar practices and material culture, then phenotypic similarity would not exhibit any spatial restriction (consistent with Scenario 2) whereas formally similar mortuary practices may be localized (consistent with Scenario 1).

As it is the latter situation that is most consistent with the results of this research, it is worthwhile to consider it in more depth. Barth (1969), in his study of the creation and maintenance of ethnic boundaries, notes that social group identities can remain intact despite changes in group composition as a result of migration or intermarriage. In other words, Barth (1969) suggests that ethnic boundaries and, consequently, ethnic groups are maintained by a system of practices and not by biology. Royce (1982) expands on this idea of boundary maintenance and suggests that ethnic boundaries are two-fold – with an inner boundary maintained by an ethnic group and dealing with self-identification based on systems of shared values and understandings and an outer boundary maintained between ethnic groups and enforced primarily on the basis of overt differences in observable behavior. Such boundaries, however, typically only become meaningful in the context of increased interaction between different ethnic groups. Lucy asserts that "…if [ethnic groups] are characterized by anything, it is that their members choose to do (some) things in similar ways to each other, and in different ways from other people" (2005: 86). In other words, ethnicity is more a way of behaving than a concrete 'thing' and, as such, is an aspect of social relationships and consequently a fluid component of an individual's identity (Barth, 1969; Hodder, 1982; Lucy, 2005).

While "ethnic group" may not be a wholly appropriate analogy for Adena populations due to the historical association of ethnicity with notions of power, dominance, and alterity, the idea that social group identity can be manifested in and mediated by practice is certainly applicable. Mortuary practices, for example, may be one means of signaling group identity. If, as has been articulated by a number of contemporary Native American groups (e.g., Hill, 2006; Julien et al., 2008; Peters, 2006; Welch & Ferguson, 2007), group identity can be conferred by place in preference to biology, then a situation may have existed in which particular social groups were associated with particular regions on the landscape but group membership and composition was highly fluid and individuals were able to change their group affiliation with relative ease. Such a situation can be expected to result in the localization of formally similar mortuary practices (expressing geographically anchored group identity) and the absence of spatial patterning associated with phenotypic similarity. Further, this may explain the relative strength of the correlation between inter-individual distances based on grave structure and inter-individual distances based on geographic separation when compared to other aspects of mortuary practices such as body treatment or artifact form and placement. The relative ease with which structural details of grave preparation can be observed by an outsider suggests that they might be implicated in the expression of group identity, whereas the finer details of body treatment and artifact placement may have been reserved for within-group differentiations (these distinctions being reminiscent of Royce's [1982] articulation of a double boundary).

Consideration of this possibility – social groups associated with a particular region but characterized by fluid group membership and composition – suggests that the analytical framework employed in this dissertation is based upon a false dichotomy. While it was clearly stated in Chapter 4 that the conceptualization of Adena mounds as persistent places did not preclude the possibility that mounds also served a territorial function, the manner in which these concepts were developed into alternative scenarios positioned them as mutually exclusive. Effectively, the alternative scenarios considered within this research considered only two possibilities: first, that a single group maintained exclusive use and occupancy of a particular place or region over time (i.e., territoriality), or second, that multiple groups used and occupied a place or region over time (formulated in this research as a persistent place). Upon reflection, this is clearly a simplification of the many different situations that may exist. For instance, a given place or region may have been used by multiple, distinct social groups who, working together, maintained exclusive use and occupancy of a region. Another possibility is that a single group used and occupied a particular place or region for an extended period of time, but did not do so in a territorial fashion (i.e., the use of that region by a single group resulted from historical happenstance rather than the intentional repulsion of other groups). This latter possibility makes clear that the interpretation of territoriality from the archaeological record represents a conflation of empirical patterning and the intent of past populations – an issue that is discussed further below. The alternative scenarios developed and employed in this dissertation research therefore artificially simplify what was likely to be a complex reality, unintentionally masking a wider range of behavioral possibilities.

The geographic region considered within this dissertation is not very large – less than 11500 km^2 – but three broad patterns of mound use were described within it. Dover, for example, appears to be the product of the actions of a single group over a long period of time, whereas Robbins, Ricketts, and Landing are more consistent with multiple groups having been involved in their construction. Wright presents a third pattern, in that it provides evidence for diachronic changes in the number of groups participating in mound construction. If mounds as persistent places and mounds as territorial markers are considered to be mutually exclusive interpretations, then such diversity within a small region is difficult to explain. Consideration of the wider range of possibilities discussed above, however, is better able to accommodate these contrasting patterns. If Adena social groups had fluid memberships and frequently exchanged group members either through migration or marriage, then the three different patterns just described could all conceivably arise as the result of the history of formation and dissolution of social ties between groups based on the movement of individuals from one group to another. By analogy with the Huron Feast of the Dead – in which large ossuaries were constructed at locations agreed upon in advance by the participating groups – Robbins, Landing, Ricketts, and Wright may have been places chosen for multiple groups to come together. The burial sample interred at Dover, on the other hand, may have exhibited decreased phenotypic variability not as the result of territoriality but, rather, as the result of simply never having been a location at which multiple groups happened to converge for the interment of their dead.

Theoretical Implications of this Research

More broadly speaking, the results of this research suggest that current approaches to inferring territoriality from the material remains of the archaeological record are of limited utility for understanding past social dynamics. As documented in the ethnographic literature, human territoriality is a behavior that varies considerably from group to group and situation to situation. Dyson-Hudson and Smith (1978) are careful to point out that different resources have different distributions in both time and space and, as a result, they will be defended differently, if they are defended at all. In addition, territoriality is exhibited at different scales of social grouping, ranging from family groups (e.g., Fowler, 1982) to regional bands (e.g., Helm, 1968). Territoriality may be expressed in relation to particular locations that are understood to be powerful or that are perceived to possess ritual potency (e.g., Layton, 1999; Kuznar, 2003). Further, the territories established by a given group may not be contiguous (e.g., Van Valkenburgh & Osborne, 2013; Zedeño, 2000). Without being able to adequately account for such variation (an all but impossible task given the temporal resolution of the archaeological record), current archaeological assertions of territoriality are relatively devoid of information. At best, the interpretation of monuments as territorial markers freezes time, implicitly assuming that the social circumstances that existed at the time of a monument's inception persisted throughout its lifespan. At worst, the interpretation of the construction of monuments as being implicated in the creation and maintenance of exclusive territories prevents archaeologists from considering the full range of social configurations into which a monument may have been incorporated throughout the period of its construction and alteration. As stated by Van Valkenburgh and Osborne,

> Where we find the remains of fortifications, physical barriers, and lines of cleavage in settlement patterns, we should not simply assume that they delimit hardened spaces of political domination, but attempt to seek out further evidence that will help to clarify both the conditions under which these patterns emerged and the effects that had on the people who lived among them. (2013:15).

Archaeologists stand to learn much more about past societies through placing monuments in their spatiotemporal contexts and, where possible, evaluating the social processes that led to their creation, alteration, and abandonment.

On a more fundamental level, the interpretation of the spatial distribution of material remains as indicative of territorial behavior implies intent where none may have existed. Archaeological studies, this dissertation included, look for patterns in data that are *consistent* with what would be expected in a territorial scenario. The intervisibility of burial mounds, for example, has been interpreted as an indication of a stable territorial arrangement (Waldron & Abrams, 1999). While this is certainly consistent with the expectations of a territorial scenario, the construction of such mounds within shared sight-lines may not have been intended to demarcate territorial boundaries but, rather, to facilitate communication across a wider region. The archaeological record is subject to equifinality and our interpretations of the material remains of the past are contingent, in part, on the questions we ask and the theoretical models that we employ. The territorial hypothesis conflates empirical patterns observed in material culture or in phenotypic data that are consistent with territoriality with the intentions of past populations without consideration of other processes (e.g., communication and cooperation between social groups, an affinity for a specific place by one or multiple groups, the creation and maintenance of permeable social boundaries, the demarcation of important or powerful places, marking the location of resources without making a claim to them, etc.) that may have resulted in the same patterning. With the possible exception of documentary evidence, there are no unambiguous material indicators of territorial behavior. Multiple lines of evidence should be used and alternative explanations should be sought and evaluated when making inferences of territoriality from the archaeological record.

The primary theoretical contribution of this dissertation is its expansion of Schlanger's (1992) concept of persistent place. Drawing on theories of place from humanist geography as well as anthropological interpretations of indigenous ontologies, this formulation differs from recent applications of the persistent place concept (e.g., di Lernia & Tafuri, 2013; Gamble, 2017; Littleton & Allen, 2007; Moore, 2015; Purtill, 2012; Schneider, 2015; Thompson, 2010) in its explicit recognition that the persistence of place is mediated by experience, memory, and perception. The result is a concept that emphasizes that the repeated use of a location results from the perceived affordances (*sensu* Gibson, 1979) that it provides, and that the perception of those affordances is mediated, in part, by worldview (*sensu* Redfield, 1952). Within this dissertation, the application of this expanded concept enabled the proposition of an alternative scenario for the processes resulting in mound construction that could accommodate the idiosyncrasies of Adena archaeology that are problematic for their interpretation as territorial markers. Although the application of this scenario within this research was limited in that it only explicitly considered the use of a particular place or region by multiple groups and placed this in strict opposition to a territorial scenario (see above), this is a shortcoming of the analytical framework employed in this dissertation and not of the persistent place concept itself.

The theoretical utility of the persistent place concept arises in that it makes no assumptions about how a place came to be repeatedly used over the long-term occupation of a region or how the ways in which a place was interacted with by human populations may have changed over time. Instead, it explicitly frames these issues as questions to be asked of the archaeological record. It is not a concept that should be used in strict opposition to the territorial hypothesis (as has been done in this research) because it *includes* the territorial hypothesis as one of the many possibilities for how past populations engaged with particular places over time. Thus, a persistent place may result from the continued use of a location by a single group over a long period of time, and this use may be territorial, non-territorial, or may cycle between the two depending on temporal changes in ecological, demographic, and social factors. A persistent place may also result from the use of a specific location by multiple groups over time, and this, too, may be territorial, non-territorial, or temporally contingent. Over the course of time, a persistent place may be used in any of these ways and it is in this breadth of possibilities that the value of the concept is found – it requires archaeologists to investigate the dynamic ways in which particular places are engaged with throughout their histories rather than assuming their incorporation into improbably static social systems of the past.

Implications of this Research for Adena Archaeology

Nineteen samples were submitted for radiocarbon dating during the course of this research, of which six were determined to be problematic. The dates derived from the remaining 13 samples contribute to our knowledge of the chronology associated with Adena ceremonialism and help to place the Kentucky Adena sites within a broader regional context. The dates obtained suggest that Webb and Snow's original (1945) division of Adena sites into "early" and "late" manifestations is problematic, with at least some of the dates derived from Robbins (an "early" site) and Wright (a "late" site) exhibiting temporal overlap. In contrast, the dates obtained in the course of this research lend support to the contemporaneity of sites associated with the “Robbins Complex” identified by Dragoo (1963). The Cresap Mound (46Mr7), the Robbins Mound (15Be3), the larger Wright Mound (15Mm6), and the Adena Mound (33Ro1) all appear to have been coeval for at least a portion of the time that they were active sites of interment, and, based on dates obtained here, this can be extended to include the smaller Wright Mound (15Mm7), the Dover Mound (15Ms27), and the Morgan Stone Mound (15Bh15). This new suite of dates suggests that the Robbins Complex is both geographically widespread (appearing in sites located in Ohio, West Virginia, and Kentucky) and potentially associated with a fairly narrow temporal window. While this research did not undertake a systematic survey of dates associated with the Robbins Complex, the sites that were examined here all appear to be at least partially contemporaneous. In turn, these observations suggest the existence of geographically widespread networks of interaction between Adena populations through which the Robbins Complex, as a suite of ceremonial practices and material expressions of ideas, may have been disseminated. Such networks of interaction may also account for the widespread similarity in mortuary practices that continue to lend the Adena concept some measure of analytical utility as a “way of doing things” (Brose, quoted in Swartz, 1971: 176).

Given that Snow’s original assessments of the age and sex of the individuals interred in Adena mounds have been called into question (Milner & Jefferies, 1987; Taxman, 1994), it was necessary to re-evaluate the osteological collections derived from the excavation of the Adena mounds in the research sample and produce new estimates of sex and age-at-death based upon contemporary techniques. These new estimates provide a substantially different picture of the Adena burial population. Where Webb and Snow's (1945) original synthesis of the Adena skeletal remains indicated that the proportion of individuals estimated to be female was only 32.3%, the revised estimates suggest 40.5% of the interments in Adena mounds were female. Additionally, the distribution of the revised estimates of age-at-death differs from that presented by Webb and Snow (1945), with a significantly lower number of young adults among the revised estimates as well as significantly higher numbers of adolescents, middle adults, and old adults. In sum, these results indicate more equal representation of males and females within the Adena burial population as well as a more equal representation across age categories. These changes in the demographic composition of the Adena burial sample undermine assertions that Adena mound interments represent ranked societies (e.g., McConaughy, 1990; Shryock, 1987).

The results of the multiscalar comparisons of phenotypic variability suggest that, at least in Kentucky, Adena mounds can be broadly divided into mounds associated with local groups (e.g., Dover) and mounds representing the aggregation of multiple groups (e.g., Robbins, Landing, Ricketts, and probably Wright). Contrary to what might be expected, these two kinds of sites do not appear to be distinguishable based on mound size or number of interments. For example, Robbins and Dover are both comparable in size and both include a relatively large number of burials, yet Dover is most consistent with the actions of a single group over time and Robbins is consistent with the aggregation of multiple groups. Likewise, Landing is considerably smaller than Dover and contains many fewer interments, yet is most consistent with the aggregation of multiple groups.

The broad categorization of Adena mounds into sites affiliated with local groups and those indicative of group aggregation may find a parallel in the Hocking Valley, where Abrams (1992a, b) associates the presence of small, ridgetop mounds with local Adena hamlets and suggests that the larger, mounds whose construction was concentrated in the area known as The Plains are associated with a later period of community aggregation. The current findings, however, suggest that Abrams' (1992a, b) implicit use of size in determining whether a mound represented the actions of a local hamlet or community aggregation may be problematic.

The analysis of post-marital residence patterns for Adena populations is undermined to some extent by available sample sizes. At Robbins, the amounts of phenotypic variation exhibited by males and females is not significantly different. At Wright, the only other mound yielding sample sizes sufficient to allow between-sex comparisons, females are significantly less variable than males interred at the same site. This may be the result of sampling error or it may indicate that males interred at this site represent the more mobile sex – a possible indicator of matrilocality (Lane & Sublett, 1972). Although sample sizes prohibited between-sex comparisons of the individuals interred at Dover, the observation that the males interred at this site are significantly less phenotypically variable than the regional sample of males may indicate that, at this mound, males were the less mobile sex – possibly indicative of patrilocality. If these results are not the product of sampling error then they represent contrasting post-marital residence patterns. This finding is further complicated by the absence of any such patterning at Robbins. It is possible that the differences represent regional or temporal variation, but available evidence is insufficient to assess either of these possibilities.

The Importance of Museum Collections

This research demonstrates the continued value of museum collections for contemporary archaeological research. Original field records curated at the University of Kentucky's William S. Webb Museum of Anthropology were successfully used to reconstruct mound stratigraphy and segregate burial samples into their respective interment episodes. Close examination of museum collections also resulted in the identification of 19 different samples that were submitted for AMS dating, contributing to our understanding of the temporal range associated with Adena ceremonialism in the Ohio Valley. The osteological collections derived from the excavations of the Adena mounds included in the study sample have long been considered too fragmentary to permit any meaningful research. This project, however, has demonstrated that even fragmentary remains can provide sufficient data to answer new research questions and challenge long-standing assumptions. There is a widespread reluctance to employ museum collections in current research owing to the fact that many of them derive from excavations that, by contemporary standards, are considered to be inadequate. This research, however, suggests that the utility of such collections is far from exhausted.

Implications for Repatriation

Through its evaluation of the relative applicability of space-bound and place-bound models of land tenure to the Adena archaeological record, this research also has implications for the repatriation of culturally unidentifiable human remains. The Native American Graves Protection and Repatriation Act (NAGPRA) specifies the priority order for the disposition of human remains lacking cultural affiliation. If such remains were removed from tribal land, then NAGPRA specifies that the tribe whose land they were removed from be given first priority for control of them. If such control is declined, or if the remains were not removed from tribal land, then second priority is granted to the Indian tribe who is recognized by the federal government to have aboriginally occupied the land from which the remains were removed. Preferential disposition of culturally unidentifiable human remains is therefore made on the basis of geographic linkages between excavated remains and federally-recognized Indian tribes.

While the priority order for the disposition of human remains lacking cultural affiliation is culturally sensitive in that it is consistent with the stated beliefs of a number of Native American tribes that shared places are constitutive of shared identity in a way that supersedes ties of language, culture, and biology (e.g., Hill, 2006; Julien, 2008; Peters, 2006; Welch & Ferguson, 2007), it is problematic in that both the contemporary distribution of tribal lands and the determination of aboriginal occupancy are typically based on European concepts of land tenure that distort the historical reality of patterns of Native American land use. Aboriginal occupancy, for example, was typically determined by the Indian Claims Commission (ICC) and based upon the demonstration of exclusive use and occupancy of an area. Aboriginal title was typically denied for tracts of land that were historically used by multiple tribes (Kaplan, 1985; Rosenthal, 1985; Sutton, 1985). As a result, tribes whose use of an area did not meet the requirement of exclusivity for the establishment of aboriginal title are potentially excluded from the consultation process mandated under NAGPRA despite having an historically documented tie to the area of land from which culturally unidentifiable remains were removed.

In contrast to this space-bound approach for prioritizing participants in the consultation process required during repatriation, recent research undertaken in compliance with legislation aimed at Native American cultural preservation has begun to adopt a place-bound approach to land tenure (Zedeño, 2000). Place-bound approaches to land tenure have been influenced by collaborations between anthropologists and indigenous communities (e.g., Astor-Aguilera 2010; Bernardini 2005; Brown & Emery 2008; Colwell-Chanthaphonh & Ferguson 2006; Colwell-Chanthaphonh et al. 2008; Fowles 2013; Hill 2006; Julien et al. 2008; Kuwanwisiwma & Ferguson 2009; Peters 2006; Stoffle & Zedeño 2001; Welch & Ferguson 2007) and explicitly recognize that land use is not limited to the extraction and exploitation of subsistence resources. Rather the use of land affects and is affected by all aspects of social life. Place-bound approaches to land tenure may therefore be more consistent with patterns of land use that have been ethnohistorically documented for many Native American tribes.

The results of this research have demonstrated that the patterning of the Adena archaeological record is consistent with both space-bound and place-bound models of land tenure. Further, these results indicate that patterns of land use consistent with both models exhibit substantial time-depth; approximately 2500 years ago, mound construction within portions of the Ohio Valley appears to have been undertaken by multiple groups, suggesting shared use and occupancy of the region. It is therefore suggested that the geographic ties utilized within the repatriation process for culturally unidentifiable human remains be determined through the use of both models of land tenure. One potential way of accomplishing this would be to refer the disposition of human remains that lack cultural affiliation to a consortium composed of all tribes who are known to have used the area of land from which such remains were removed, regardless of whether such use meets the exclusivity criterion employed by the ICC. Similar solutions to the repatriation of culturally unidentifiable human remains have already been employed and with promising results (e.g., Colwell & Nash, 2015; Kretzler, 2015; Noble, 2015). Mandating such consultations would remove the potential pitfall associated with the current repatriation procedures.

This research was completed using osteological data from culturally unidentifiable human remains. As such, it is tempting to make the argument that there is merit in the retention and study of such collections as they have the potential to impact federal legislation in ways that could benefit indigenous societies. Such an argument, however, privileges systems of knowledge based on the scientific method over traditional knowledge and this claim is ethically untenable. It is possible, however, that a compromise position can be taken. To this end, it is suggested that, where tribes involved in the consultation process permit, culturally unidentifiable human remains with secure provenience be thoroughly documented prior to their repatriation.

Suggestions for Future Research

During the course of completing this dissertation, several avenues for further research have presented themselves. The reanalysis of the osteological collections that was undertaken as part of this research revealed the presence of taphonomic signatures on several sets of remains that are indicative of long-term exposure of the bones. As the identification and documentation of such taphonomic processes was not a priority during the data collection phase of this dissertation, such observations were not systematically made. A more careful and thorough assessment of the Adena osteological collections could be made with the purpose of documenting the presence and variability of taphonomic signatures on the skeletal remains. This could, in turn, lead to a more careful delineation of the suite of mortuary practices associated with Adena ceremonialism.

On a related note, cremated remains were not thoroughly analyzed during data collection as they were often extremely fragmentary and to do so was not possible given time constraints. Careful analysis of these remains, however, may result in a better understanding of variation in body treatment as well as revisions to the demographic profile of the Adena burial sample that were obtained through the current research.

The reconstructions of mound stratigraphy carried out in this research were limited by the fact that many of the original profile maps made during excavation were unavailable during the period of data collection. As such, many of the reconstructions in this research were based on the limited legibility of microfilm copies of the original maps and therefore do not represent the mound in its entirety. If the original profile maps can be located, more detailed and complete reconstructions can be made. Further, while the mound reconstructions undertaken here incorporated stratigraphy and burial locations, nonmortuary features were not plotted. By incorporating such features into the extant mound reconstructions, a clearer picture of mound-related activities can be produced.

While stratigraphic reconstructions of the mounds were used to parse burial samples into their respective interment episodes, no attempt was made to characterize diachronic changes in Adena mortuary practices. This data is now readily available and offers the potential to not only produce a better understanding of chronological variation in Adena mortuary practices but may also result in the ability to delineate finer-scale Adena chronologies through artifact seriation.

The problematic radiocarbon dates obtained from freshwater mussel shell suggest the need for an assessment of the freshwater reservoir effect for the Ohio Valley. A systematic comparison of radiocarbon dates derived from shell and those derived from charcoal originating from the same depositional context could help in determining the magnitude of such a reservoir effect. If the magnitude of this effect is found to be relatively invariant within certain regions, a correction may be feasible.

Lastly, the results of this research suggests that the use of fragmentary crania for the collection of morphometric data from the temporal bone should be undertaken with caution. Although not explicitly stated, review of a number of studies using such data (e.g., Lockwood et al., 2002; Smith, 2009; Smith et al., 2007, 2013) suggests that research samples were composed primarily of intact crania (e.g., photographs published in articles, descriptions of age-related criteria derived from the dentition or cranial base). The unacceptably high intra-observer error that was associated with this data in this dissertation indicates that a more systematic assessment of the potential for fragmentary crania to yield usable morphometric data may be warranted.

REFERENCES

Abrams, E. M.

1989a The Boudinot #4 Site (33AT521); An Early Woodland Habitation Site in Athens County, Ohio. *The West Virginia Archaeologist* 41: 16-26.

1989b Architecture and Energy: An Evolutionary Perspective. *Archaeological Method and Theory* 1: 47-87.

1992a Archaeological Investigations of the Armitage Mound (33-At-434), The Plains, Ohio. *Midcontinental Journal of Archaeology* 17: 80-111.

1992b Woodland Settlement Patterns in the Southern Hocking River Valley, Southeastern Ohio. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*, edited by M. F. Seeman. MCJA Special Paper No. 7. The Kent State University Press, Kent. Pages 19-23.

Abrams, E. M., and A. C. Freter (editors)

2005 *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeast Ohio*. Ohio University Press, Athens.

Abrams, E. M. and P. E. Patton

2015 The Ecology of Indigenous Domestic Architecture in the Hocking River Valley, Ohio. In *Building the Past: Prehistoric Wooden Post Architecture in the Ohio Valley-Great Lakes*, edited by B.G. Redmond and R.A. Genheimer. University Press of Florida, Gainesville, FL. Pages 63-84.

Adachi, N. et al.

2003 Morphologic and genetic evidence for the kinship of juvenile skeletal specimens from a 2,000 year-old double burial of the Usu-Moshiri site, Hokkaido, Japan. *Anthropological Science* 111: 347-363.

Adams, D. C., M. L. Collyer, and A. Kaliontzopoulou

2018 Geomorph: Software for geometric morphometric analyses. R package version 3.0.6. https://cran.r-project.org/package=geomorph.

Albert, B. and F. Le Tourneau

2007 Ethnogeography and Resource Use. *Current Anthropology* 48: 584-592.

Albert, A. M. and W. R. Maples

1995 Stages of Epiphyseal Union for Thoracic and Lumbar Vertebral Centra as a Method of Age Determination for Teenage and Young Adult Skeletons. *Journal of Forensic Sciences* 40: 623-633.

Allen, A.
1981 Adena Pottery in the Walhonding Valley, Part II. *Ohio Archaeologist* 31: 4-7.

Allen, M. and J. Gardiner
2002 A Sense of Time: Cultural Markers in the Mesolithic of Southern England? In *Inscribed Landscapes: Marking and Making Place*, edited by B. David and M. Wilson. University of Hawai'i Press, Honolulu. Pages 139-153.

Alt, K. W., et al.
1997 Twenty-Five Thousand-Year-Old Triple Burial from Dolní Věstonice: An Ice-Age Family? *American Journal of Physical Anthropology* 102: 123-131.

Alt, K. W. and W. Vach
1992 Non-spatial analysis of "genetic kinship" in skeletal remains. In *Analysis and Modeling Data and Knowledge*, edited by M. Schader. Springer-Verlag, Berlin. Pages 247-256.

Anderson, K. M.
1969 Ethnographic Analogy and Archaeological Interpretation. *Science* 163: 133-138.

Applegate, D.
2008 Woodland Period. In *The Archaeology of Kentucky: An Update*, Volume I, edited by D. Pollack. Kentucky Heritage Council, Frankfort, KY. Pages 339-604.

2005 Woodland Taxonomy in the Middle Ohio Valley: A Historical Overview. In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D Applegate and RC Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 1-18.

2013 The Early-Middle Woodland Domestic Landscape in Kentucky. In *Early and Middle Woodland Landscapes of the Southeast*, edited by A.P. Wright and E.R. Henry. University Press of Florida, Gainesville. Pages 19-44.

Armelagos, G. J., et al.
1982 The Theoretical Foundations and Development of Skeletal Biology. In *A History of American Physical Anthropology* 1930-1980, edited by F. Spencer. Academic Press, New York. Pages 305-328.

Artursson, M., T. Earle, and J. Brown.
2016 The construction of monumental landscapes in low-density societies: New evidence from the Early Neolithic of Southern Scandinavia (4000-3300 BC) in comparative perspective. *Journal of Anthropological Archaeology* 41: 1-18.

Astor-Aguilera, M. A.
2010 *The Maya World of Communicating Objects: Quadripartite Crosses, Trees, and Stones*. University of New Mexico Press, Albuquerque.

Aument, B. W.

1990 *Mortuary Variability in the Middle Big Darby Drainage of Central Ohio Between 300 B.C. and 300 A.D. (Volumes I and II).* PhD Dissertation, Department of Anthropology, The Ohio State University, Columbus.

Bache, C. and L. Satterthwaite

1930 Excavation of an Indian Mound at Beech Bottom, West Virginia. *The Museum Journal/University of Pennsylvania* 21: 133-188.

Baker, B. J., Dupras, T. L., and M. W. Tocheri

2005 *The Osteology of Infants and Children*. Texas A&M University Anthropology Series, Number Twelve.

Barrett, J. C.

1988 Fields of Discourse: Reconstituting a Social Archaeology. *Critique of Anthropology* 7: 5-16.

1994 *Fragments from Antiquity: An Archaeology of Social Life in Britain, 2900 – 1200 BC*. Blackwell, Oxford.

1999a Chronologies of Landscape. In *The Archaeology and Anthropology of Landscape: Shaping your landscape*. Routledge, New York. Pages 21-30.

1999b The Mythical Landscapes of the British Iron Age. In *Archaeologies of Landscape: Contemporary Perspectives,* edited by W Ashmore and AB Knapp. Blackwell, Malden, MA. Pages 253-265.

2001 Agency, the Duality of Structure, and the Problem of the Archaeological Record. In *Archaeological Theory Today*, edited by I. Hodder. Polity Press, Cambridge. Pages 141-164.

Bartel, B.

1981 Collective burial and social organization: A multivariate analysis of human population from early Bronze Age Western Turkey. *Journal of Mediterranean Anthropology and Archaeology* 1: 3-21.

Barth, F.

1969 *Ethnic Groups and Boundaries: The Social Organization of Cultural Difference.* Universitetsforlaget, Oslo.

Basso, K. H.

1996a Wisdom Sits in Places: Notes on a Western Apache landscape. In *Senses of Place,* edited by S. Feld and K. H. Basso. School of American Research Press, Santa Fe. Pages 53-90.

1996b *Wisdom Sits in Places: Landscape and language among the Western Apache*. University of New Mexico Press, Albuquerque.

Beach, H. et al.
1992 Dynamics of Saami Territoriality within the Nation-States of Norway, Sweden and Finland. In *Mobility and Territoriality: Social and Spatial Boundaries among Foragers, Fishers, Pastoralists and Peripatetics,* edited by M. Casimir and A. Rao. Berg, New York. Pages 55-90.

Bell, M. M.
1997 The Ghosts of Place. *Theory and Society* 26: 813-836.

Beneš, J. and M. Zvelebil.
1999 A historical interactive landscape in the heart of Europe: the case of Bohemia. In *The Archaeology and Anthropology of Landscape: Shaping your landscape*, edited by P. J. Ucko and R. R. Layton. Routledge, New York. Pages 73-93.

Bense, J. A.
1994 *Archaeology of the Southeastern United States: Paleoindian to World War I*. Academic Press, New York.

Bernardini, W. and C. Carr
2005 Hopewellian Copper Celts from Eastern North America: Their Social and Symbolic Significance. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction,* edited by C. Carr and D. T. Case. Kluwer Academic/Plenum Publishers, New York. Pages 624-647.

Bessire, L. and D. Bond
2014 Ontological anthropology and the deferral of critique. *American Ethnologist* 41: 440-456.

Binford, L. R.
1972 Directionality in Archaeological Sequences. In *An Archaeological Perspective,* edited by L.R. Binford. Seminar Press, New York. Pages 314-326.

1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45: 4-20.

Bird-David, N.
1999 "Animism" Revisited: Personhood, environment, and relational epistemology. *Current Anthropology* 40: S67-S91.

Birkhold, M. H.
2011 Tipping NAGPRA's Balancing Act: The Inequitable Disposition of "Culturally Unidentified" Human Remains under NAGPRA's New Provision. *William Mitchell Law Review* 37: 2046-2096.

Bock, P. K.
1978 Micmac. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 109-122.

Bondioli, L., R. S. Corruccini, and R. Macchiarelli
1986 Familial segregation in the Iron Age community of Alfedena, Abruzzo, Italy, based on osteodental trait analysis. *American Journal of Physical Anthropology* 71: 393-400.

Borić, D.
2013 Theater of Predation: Beneath the Skin of Göbekli Tepe Images. In *Relational Archaeologies: Humans, Animals, Things*, edited by C. Watts. Routledge, London. Pages 42-64.

Bourdieu, P.
1977 *Outline of a Theory of Practice*. Cambridge University Press, Cambridge.

Bradley, R.
1993 *Altering the Earth*. Society of Antiquaries of Scotland Monograph Series 8. Edinburgh.

1996 Long Houses, Long Mounds and Neolithic Enclosures. *Journal of Material Culture* 1: 239-256.

1998a *The Significance of Monuments: On the shaping of human experience in Neolithic and Bronze Age Europe*. Routledge, London.

1998b Ruined Buildings, Ruined Stones: Enclosures, tombs and natural places in the Neolithic of south-west England. *World Archaeology* 30: 13-22.

2000 *An Archaeology of Natural Places*. Routledge, London.

Bray, T.
2009 An Archaeological Perspective on the Andean Concept of Camaquen: Thinking Through Late Pre-Columbian Ofrendas and Huacas. *Cambridge Archaeological Journal* 19:357–66.

Bronk Ramsey, C.
2017 Methods for Summarizing Radiocarbon Datasets. *Radiocarbon* 59: 1809-1833.

Brown, L. A.
2000 From Discard to Divination: Demarcating the Sacred through the Collection and Curation of Discarded Objects. *Latin American Antiquity* 11: 319-333

Brown, L. A., & Emery, K. F.
2008 Negotiations with the Animate Forest: Hunting Shrines in the Guatemalan Highlands. *Journal of Archaeological Method and Theory* 15:300–337.

Brück, J.
1999 Ritual and Rationality: Some Problems of Interpretation in European Archaeology. *European Journal of Archaeology* 2:313–44.

Buikstra, J. E.
1972 *Hopewell in the lower Illinois Valley. A regional study of human biological variability and prehistoric mortuary behavior*. Northwestern Archaeological Program Scientific Papers, No 2.

1977 Biocultural dimensions of archaeological study: A regional perspective. In *Biocultural Adaptation in Prehistoric America*, edited by R. L. Blakely. University of Georgia Press, Athens. Pages 67-84.

1979 Contribution of Physical Anthropologists to the Concept of Hopewell: A Historical Perspective. In *Hopewell Archaeology: The Chillicothe Conference,* edited by D. S. Brose and N. Greber. Kent State University, Kent. Pages 220-233.

1980 Epigenetic distance: A study of biological variability in the Lower Illinois River Valley. In *Early Native Americans,* edited by D. L. Browman. Mouton, Paris. Pages 271-299.

Buikstra, J. E. and D. K. Charles.
1999 Centering the Ancestors: Cemeteries, Mounds, and Sacred Landscapes of the Ancient North American Midcontinent. In *Archaeologies of Landscape: Contemporary Perspectives,* edited by W. Ashmore and A. B. Knapp. Blackwell, Malden, MA. Pages201-228.

Buikstra, J. E., D. K. Charles, and G. F. M. Rakita.
1998 *Staging Ritual: Hopewell Ceremonialism at the Mound House Site, Greene County, Illinois*. Kampsville Studies in Archaeology and History, No. 1. Center for American Archaeology, Kampsville, Illinois.

Buikstra, J. E., S. R. Frankenberg, and L. W. Konigsberg
1990 Skeletal Biological Distance Studies in American Physical Anthropology: Recent Trends. *American Journal of Physical Anthropology* 82: 1-7.

Buikstra, J. E. and D. H. Ubelaker, eds.
1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archaeological Survey Research Series, No. 44.

Busby, C.
1997 Permeable and Partible Persons: A comparative analysis of gender and the body in South India and Melanesia. *Journal of the Royal Anthropological Institute* 3: 261-278.

Bush, D.
1975 A Ceramic Analysis of the Late Adena Buckmeyer Site, Perry County, Ohio. *The Michigan Archaeologist* 21: 9-23.

Buttimer, A.
1980 Home, Reach, and the Sense of Place. In *The Human Experience of Space and Place*, edited by A. Buttimer and D. Seamon. St. Martin's Press, New York. Pages 166-187.

Byrd, J. E. and R. L. Jantz
1994 Osteological evidence for distinct social groups at the Leavenworth site. In *Skeletal Biology in the Great Plains*, edited by D. H. Owsley and R. L. Jantz. Smithsonian Institution Press, Washington DC. Pages 203-208.

Cabrera, J. M. and F. Giri
2016 Evomorph: Evolutionary Morphometric Simulation. R package version 0.9. https://cran.r-project.org/package=Evomorph.

Calce, S.E.
2012 A new method to estimate adult age-at-death using the acetabulum. *American Journal of Physical Anthropology* 148: 11-23.

Callendar, C.
1978 Shawnee. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 622-635.

Carr, C.
1995 Mortuary Practices: Their Social, Philosophical-Religious, Circumstantial, and Physical Determinants. *Journal of Archaeological Method and Theory* 2: 105-200.

2005 The Gathering of Hopewell. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by C. Carr and D. T. Case. Kluwer Academic/Plenum Publishers, New York. Pages 19-50.

2008a World View and the Dynamics of Change: The Beginning and the End of Scioto Hopewell Culture and Lifeways. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*, edited by D.T. Case and C. Carr. Springer, New York. Pages 289-328.

2008b Environmental Setting, Natural Symbols, and Subsistence. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding,* edited by D.T. Case and C. Carr. Springer, New York. Pages 41-100.

2008c Coming to Know Ohio Hopewell Peoples Better: Topics for Future Research, Masters' Theses, and Doctoral Dissertations. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*, edited by D. T. Case and C. Carr. Springer, New York. Pages 603-690.

Carr, C. and D. T. Case, eds.
2005 *Gathering Hopewell: Society, Ritual, and Ritual Interaction*. Kluwer Academic/Plenum Publishers, New York.

Carroll, A. K., M. N. Zedeño, and R. W. Stoffle
2004 Landscapes of the Ghost Dance : A Cartography of Numic Ritual. *Journal of Archaeological Method and Theory* 11(2):127–156.

Carskadden, J. and T. Gregg
1974 Excavation of an Adena Open Site, Duncan Falls, Ohio. *Ohio Archaeologist* 24: 4-7.

Case, D. T. and C. Carr, eds.
2008 *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*. Springer, New York.

Case, D. T., N. S. Ossenberg, and S. E. Burnett.
1998 Os intermetatarseum: A heritable accessory bone of the human foot. *American Journal of Physical Anthropology* 107: 199-209.

Casey, E. S.
1996 How to Get from Space to Place in a Fairly Short Stretch of Time: Phenomenological prolegomena. In *Senses of Place*, edited by S. Feld and K. H. Basso. School of American Research Press, Santa Fe. Pages 13-52.

Cashdan, E.
1983 Territoriality among Human Foragers: Ecological Models and an Application to Four Bushman Groups. *Current Anthropology* 24: 47-66.

Casimir, M. J.
1992 The Dimensions of Territoriality: An Introduction. In *Mobility and Territoriality: Social and Spatial Boundaries among Foragers, Fishers, Pastoralists, and Peripatetics*, edited by M. J. Casimir and A Rao. Berg, Providence. Pages 1-26.

Chapman, R.
1981 The Emergence of Formal Disposal Areas and the "Problem" of Megalithic Tombs in Prehistoric Europe. In *The Archaeology of Death*, edited by R. Chapman, I. Kinnes, and K. Randsborg. Cambridge University Press, Cambridge. Pages 71-81.

1995 Ten Years After – Megaliths, Mortuary Practices, and the Territorial Model. In *Regional Approaches to Mortuary Analysis*, edited by L. A. Beck. Plenum Press, New York. Pages 29-51.

Charles, D. K.
2005 The Archaeology of Death as Anthropology. In *Interacting with the Dead: Perspectives on Mortuary Archaeology for the New Millennium*, edited by G.F.M. Rakita, J.E. Buikstra, L.A. Beck, and S.R. Williams. University Press of Florida, Gainesville, FL. Pages 15-24.

Charles, D. K. and J. E. Buikstra
1983 Archaic Mortuary Sites in the Central Mississippi Drainage: Distribution, Structure, and Behavioral Implications. In *Archaic Hunters and Gatherers in the American Midwest*, edited by J. L. Phillips and J. A. Brown. Academic Press, New York. Pages 117-146.

Charles, D. K. et al.
2004 From the Earth: Minerals and Meaning in the Hopewellian World. In *Soils, Stones and Symbols: Cultural Perceptions of the Mineral World*, edited by N. Boivin and M. A. Owoc. UCL Press, London. Pages 43-70.

Clark, J.E.
2004 Surrounding the Sacred: Geometry and Design of Early Mound Groups as Meaning and Function. In *Signs of Power: The Rise of Cultural Complexity in the Southeast*, edited by J. L. Gibson and P. J. Carr. The University of Alabama Press, Tuscaloosa. Pages 162-213.

Clay, R. B.
1983 Pottery and Graveside Ritual in Kentucky Adena. *Midcontinental Journal of Archaeology* 8: 109-126.

1984 Styles of Stone Graves. In *Late Prehistoric Research in Kentucky*, edited by D. Pollack, C. D. Hockensmith, and T.N. Sanders. Kentucky Heritage Council, Frankfort. Pages 131-144.

1986 Adena Ritual Spaces. In *Early Woodland Archaeology*, edited by K. B. Farnsworth and T. E. Emerson. Center for American Archaeology Press, Kampsville. Pages 581-595.

1987 Circles and Ovals: Two Types of Adena Space. *Southeastern Archaeology* 6: 46-56.

1991 Adena Ritual Development: An Organizational Type in a Temporal Perspective. In *The Human Landscape in Kentucky's Past: Site Structure and Settlement Patterns*, edited by C. Stout and C. K. Hensley. Kentucky Heritage Council, Frankfort. Pages 30-39.

1992 Chiefs, Big Men, or What? Economy, Settlement Patterns, and their Bearing on Adena Political Models. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*, edited by M. F. Seeman. MCJA Special Paper No. 7. The Kent State University Press, Kent. Pages 77-80.

1998 The Essential Features of Adena Ritual and Their Implications. *Southeastern Archaeology* 17: 1-21.

2002 Deconstructing the Woodland Sequence from the Heartland: A Review of Recent Research Directions in the Upper Ohio Valley. In *The Woodland Southeast*, edited by D. G. Anderson and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 162-184.

2005 Adena: Rest in Peace? In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D. Applegate and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 94-110.

2009 Where Have All the Houses Gone? Webb's Adena House in Historical Context. *Southeastern Archaeology* 28: 43-63.

Clay, R. B. and S. D. Creasman
1999 Middle Ohio Valley Late Woodland Nucleated Settlements; "Where's the Beef?" *The West Virginia Archaeologist* 51: 1-10.

Clay, R. B. and C. M. Niquette
1992 Middle Woodland Mortuary Ritual in the Gallipolis Locks and Dam Vicinity, West Virginia. *The West Virginia Archaeologist* 44: 1-25.

Cohen, J.
1960 A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement* 20: 37-46.

Colwell, C. & S. E. Nash
2015 Repatriating Human Remains in the Absence of Consent. *The SAA Archaeological Record* 15: 14-16.

Colwell-Chanthaphonh, C. et al.
2008 Always Multivocal and Multivalent: Conceptualizing Archaeological Landscapes in Arizona's San Pedro Valley. In *Archaeologies of Placemaking: Monuments, Memories, and Engagement in Native North America,* edited by PE Rubertone. Left Coast Press, Walnut Creek. Pages 59-80.

Cooney, G.
1999 Social Landscapes in Irish Prehistory. In *The Archaeology and Anthropology Landscape: Shaping your landscape*, edited by P. J. Ucko and R. R. Layton. Routledge, New York. Pages 46-64.

Corruccini, R. S. and I. Shimada
2002 Dental relatedness corresponding to mortuary patterning at Huaca Loro, Peru. *American Journal of Physical Anthropology* 117: 113-121.

Crane, H. R. and J. B. Griffin
1964 University of Michigan Radiocarbon Dates IX. *Radiocarbon* 6: 1-24.

Crothers, G. M.
2004 The Green River in Comparison to the Lower Mississippi Valley during the Archaic: To Build Mounds or Not to Build Mounds? In *Signs of Power: The Rise of Cultural Complexity in the Southeast,* edited by J. L. Gibson and P. J. Carr. The University of Alabama Press, Tuscaloosa. Pages 86-96.

Crowell, D. et al.
2005 Woodland Communities in the Hocking Valley. In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by E. M. Abrams and A. C. Freter. Ohio University Press, Athens. Pages 82-97.

Darvill, T.
1999 The historic environment, historic landscapes, and space-time-action models in landscape archaeology. In *The Archaeology and Anthropology of Landscape: Shaping your landscape*. Routledge, New York. Pages 104-118.

David, B. et al.
2010 Living Landscapes of the Dead: Archaeology and the afterworld among the Rumu of Papua New Guinea. In *Handbook of Landscape Archaeology,* edited by B. David and J. Thomas. Left Coast Press, Walnut Creek, CA. Pages 158-166.

Deloria, V., Jr.
1975 *God is Red*. Dell Publishing Co., Inc., New York.

1999 Reflection and Revelation: Knowing land, places, and ourselves. In *For This Land: Writings on Religion in America*, edited by J. Treat. Routledge, London. Pages 250-260.

Descola, P.
1996 Constructing Natures: Symbolic ecology and social practice. In *Nature and Society: Anthropological perspectives*, edited by P. Descola and G. Pálsson. Routledge, London. Pages 82-102.

De Souza, J. G. et al.
2016 The genesis of monuments: Resisting outsiders in the contested landscapes of southern Brazil. *Journal of Anthropological Archaeology* 41: 196-212.

di Lernia, S. and M. A. Tafuri
2013 Persistent Deathplaces and Mobile Landmarks: The Holocene mortuary and isotopic record from Wadi Takarkori (SW Libya). *Journal of Anthropological Archaeology* 32: 1-15.

Dillehay, T. D.
2007 *Monuments, Empires, and Resistance: The Araucanian Polity and ritual narratives*. Cambridge University Press, Cambridge.

Douglass, W. A.
1969 *Death in Murelaga: Funerary ritual in a Spanish Basque village*. University of Washington Press, Seattle.

Dragoo, D. W.
1963 *Mounds for the Dead: An Analysis of the Adena Culture*. Annals of Carnegie Museum, Vol. 37, Pittsburgh.

1964 The Development of Adena Culture and its Roles in the Formation of Ohio Hopewell. In *Hopewellian Studies*, edited by J. R. Caldwell and R. L. Hall. Scientific Papers No. 12, Illinois State Museum, Springfield. Pages 1-34.

Durkheim, E.
1915 *The Elementary Forms of Religious Life*. Free Press, New York.

Dyson-Hudson, R. and E. A. Smith
1978 Human Territoriality: An Ecological Reassessment. *American Anthropologist* 80: 21-41.

Edmonds, M.
1999 *Ancestral Geographies of the Neolithic: Landscape, monuments and memory*. Routledge, London.

Evans, A. R., et al.
2016 A simple rule governs the evolution and development of hominin tooth size. *Nature* 530: 477-480.

Evans, C.
1985 Tradition and the Cultural Landscape: An archaeology of place. *Archaeological Review from Cambridge* 4: 80-94.

Fagan, B. M.
2005 *Ancient North America: The Archaeology of a Continent, Fourth Edition*. Thames & Hudson, New York.

Fenton, J. P.
1991 *The social uses of dead people: Problems and solutions in the analysis of post mortem body processing in the archaeological record*. PhD Dissertation, Graduate School of Arts and Sciences, Columbia University, New York.

Fenton, W. N.
1978 Northern Iroquoian Culture Patterns. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 296-321.

Fentress, J. and C. Wickham
1992 *Social Memory*. Blackwell, Cambridge.

Ferguson, T. J. and C. Colwell-Chanthaphonh
2006 *History is in the Land: Multivocal Tribal Traditions in Arizona's San Pedro Valley*. University of Arizona Press, Tucson.

Fischer, F. W.
1974 *Early and Middle Woodland Settlement, Subsistence, and Population in the Central Ohio Valley*. PhD Dissertation, Department of Anthropology, Washington University, St. Louis.

Fitting, J. E. and D. S. Brose
1971 The Northern Periphery of Adena. In *Adena: The Seeking of an Identity*, edited by BK Swartz, Jr. Ball State University Press, Muncie. Pages 29-55.

Fleiss, J. L.
1981 *Statistical methods for rates and proportions*, 2nd Edition. John Wiley, New York.

Ford, R. I.
1979 Gathering and Gardening: Trends and Consequences of Hopewell Subsistence Strategies. In *Hopewell Archaeology: The Chillicothe Conference*, edited by D.S. Brose and N.B. Greber. Kent State University Press, Kent, Ohio. Pages 234-238.

Fowler, C.
2004 *The Archaeology of Personhood: An anthropological approach*. Routledge, London.

Fowler, C. S.
1982 Food-Named Groups Among Northern Paiute in North America's Great Basin: An Ecological Interpretation. In *Resource Managers: North American and Australian Hunter-Gatherers*, edited by N. M. Williams and E. S. Hunn. Westview Press, Boulder. Pages 113-129.

Fowler, D. B., E. T. Hemmings, and G. R. Wilkins
1976 Some Recent Additions to Adena Archaeology in West Virginia. *Archaeology of Eastern North America* 4: 110-121.

Fowles, S. M.
2013 *An Archaeology of Doings: Secularism and the study of Pueblo religion*. School for Advanced Research Press, Santa Fe.

Funkhouser, W. D. and W. S. Webb
1935 *The Ricketts Site in Montgomery County, Kentucky*. Reports in Archaeology and Anthropology 3(3). The University of Kentucky, Lexington.

Gamble, L. H.
2017 Feasting, Ritual Practices, Social Memory, and Persistent Places: New Interpretations of Shell Mounds in Southern California. *American Antiquity* 82: 427-451.

Gartley, R.
1974 Ceramics from the Duncan Falls Adena Site. *Ohio Archaeologist* 24: 19-21.

Gejvall, N. G. and F. Henschen
1968 Two late Roman skeletons with malformation and close family relationship from ancient Corinth. *Opuscula Athenia* 8: 179-193.

Gell, A.
1998 *Art and Agency: An anthropological theory*. Clarendon Press, Oxford.

Gibson, J. J.
1979 *The Ecological Approach to Visual Perception*. Houghton Mifflin Harcourt, Boston.

Gibson, J. L.
2004 The Power of Beneficent Obligation in First Mound-Building Societies. In *Signs of Power: The Rise of Cultural Complexity in the Southeast*, edited by J. L. Gibson and P. J. Carr. The University of Alabama Press, Tuscaloosa. Pages 254-269.

Giddens, A.
1984 *The Constitution of Society: Outline of the Theory of Structuration*. Polity Press, Cambridge.

Goddard, I.
1978 Delaware. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 213-239.

Godkin, M. A.
1980 Identity and Place: Clinical applications based on notions of rootedness and uprootedness. In *The Human Experience of Space and Place*, edited by A. Buttimer and D. Seamon. St. Martin's Press, New York. Pages 73-85.

Goldstein, L.G.
1976 *Spatial Structure and Social Organization: Regional Manifestations of Mississippian Society*. Ph.D. dissertation, Department of Anthropology, Northwestern University, Evanston.

1981 One-dimensional archaeology and multi-dimensional people: spatial organization and mortuary analysis. In *The Archaeology of Death*, edited by R. Chapman, I. Kinnes, and K. Randsborg. Cambridge University Press, Cambridge. Pages 53-70.

Goodenough, W. H.
1965 Rethinking 'Status' and 'Role': Toward a general model of the cultural organization of social relationships. In *The Relevance of Models for Social Anthropology*, edited by M. Banton. A. S. A., Monographs 1, Travistock. Pages 1-24.

Goslin, R. M.
1957 Food of the Adena People. In *The Adena People, No. 2.*, by W. S. Webb and. R. S. Baby. The Ohio State University Press, Columbus. Pages 41-46.

Gower, J. C.
1971 A General Coefficient of Similarity and Some of Its Properties. *Biometrics* 27: 857-871.

Grantz, D. L.
1986 Archaeological Investigation of the Crawford-Grist Site #2 (36Fa262): An Early Woodland Hamlet. *Pennsylvania Archaeologist* 56: 1-21.

Greber, N.
1991 A Study of Continuity and Contrast between Central Scioto Adena and Hopewell Sites. *The West Virginia Archaeologist* 43: 1-26.

2005 Adena and Hopewell in the Middle Ohio Valley: To Be or Not to Be? In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D. Applegate and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 19-39.

Greenman, E. F.
1932a Excavation of the Coon Mound and an Analysis of the Adena Culture. *Ohio Archaeological and Historical Quarterly* 41: 366-523.

1932b Origin and Development of the Burial Mound. *American Anthropologist* 34: 286-295.

Gremillion, K. J.
1994 Evidence of Plant Domestication from Kentucky Caves and Rockshelters. In *Agricultural Origins and Development in the Midcontinent*, edited by W. Green. Office of the State Archaeologist, The University of Iowa, Iowa City. Pages 87-103.

2002 The Development and Dispersal of Agricultural Systems in the Woodland Period Southeast. In *The Woodland Southeast*, edited by D. G. Anderson and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 483-501.

2004 Seed Processing and the Origins of Food Production in Eastern North America. *American Antiquity* 69: 215-233.

Griffin, J. B.
1974 Foreword to the New Edition. In *The Adena People*, by W. S. Webb and C. E. Snow. The University of Tennessee Press, Knoxville. Pages v-xix.

Grinnell, G. B.
2008 *The Cheyenne Indians: Their History and Lifeways*. World Wisdom, Bloomington.

Groleau, A. B.
2009 Special Finds: Locating Animism in the Archaeological Record. *Cambridge Archaeological Journal* 19:398–406.

Guthe, C. E.
1967 Reflections on the Founding of the Society for American Archaeology. *American Antiquity* 32: 433-440.

Guthrie, S.
1993 *Faces in the Clouds: A new theory of religion*. Oxford University Press, Oxford.

Haag, W. G.
1974 The Adena Culture. In *Archaeological Researches in Retrospect*, edited by G. R. Willey. Winthrop Publishers, Cambridge, MA. Pages 119-145.

Halbwachs, M.
1992 *On Collective Memory*, edited and translated by L. A. Coser. The University of Chicago Press, Chicago.

Hall, R.L.
1977 An Anthropocentric Perspective for Eastern United States Prehistory. *American Antiquity* 42: 499-518.

1979 In Search of the Ideology of the Adena-Hopewell Climax. In *Hopewell Archaeology: The Chillicothe Conference*, edited by D.S. Brose and N. Greber. The Kent State University Press, Kent, OH. Pages 258-265.

1997 *An Archaeology of the Soul: Native American Indian Belief and Ritual*. University of Illinois Press, Urbana.

Hallowell, A. I.
1960 Ojibwa Ontology, Behavior, and World View. In *Culture in History: Essays in Honor of Paul Radin*, edited by S. Diamond. Columbia University Press, New York. Pages 19-52.

1966 The Role of Dreams in Ojibwa Culture. In *The Dream and Human Societies*, edited by G. E. von Grunebaum and R. Caillois. The University of California Press, Los Angeles. Pages 267-292.

1967 *Culture and Experience*. Schocken Books, New York.

Harrell, F. E., Jr.
2019 Hmisc: Harrell Miscellaneous. R package version 4.2.0. https://cran.r-project.org/package=Hmisc.

Hartnett, K. M.
2010a Analysis of age-at-death estimation using data from a new, modern autopsy sample – part I: pubic bone. *Journal of Forensic Sciences* 55: 1145-1151.

2010b Analysis of age-at-death estimation using data from a new, modern autopsy sample – part II: sternal end of the fourth rib. *Journal of Forensic Sciences* 55: 1152-1156.

Harvati, K. and T. D. Weaver
2006 Human cranial anatomy and the differential preservation of population history and climate signatures. *The Anatomical Record. Part A, Discoveries in Molecular, Cellular, and Evolutionary Biology* 288A:1225–1233.

Hauser, G. and G. F. De Stefano
1989 *Epigenetic Variants of the Human Skull*. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.

Hays, C. T.
1994 *Adena Mortuary Patterns and Ritual Cycles in the Upper Scioto Valley, Ohio*. PhD Dissertation, Department of Anthropology, State University of New York, Binghamton.

Heidegger, M.
1967 *What is a Thing?* Translated by W. B. Barton, Jr. and Vera Deutsch. Henry Regnery Company, Chicago, Illinois.

1971 *Poetry, Language, Thought*. Translated by Albert Hofstadter. Harper Colophon Books, New York.

Heidenreich, C. E.
1978 Huron. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 368-388.

Helm, J.
1968 The Nature of the Dogrib Socioterritorial Groups. In *Man the Hunter*, edited by R. Lee and I. DeVore. Aldine, Chicago. Pages 118-125.

Hemmings, E. T.
1978 *Exploration of an Early Adena Mound at Willow Island, West Virginia*. West Virginia Geological and Economic Survey, Morgantown.

1984 Investigations of Grave Creek Mound 1975-6: A Sequence for Mound and Moat Construction. *The West Virginia Archaeologist* 36: 3-49.

Henry, E. R.
2013 Working out Adena Political Organization and Variation from the Ritual Landscape in the Kentucky Bluegrass. In *Early and Middle Woodland Landscapes of the Southeast*, edited by A.P. Wright and E.R. Henry. University Press of Florida, Gainseville. Pages 219-233.

2017 Building Bundles, Building Memories: Processes of Remembering in Adena-Hopewell Societies of Eastern North America. *Journal of Archaeological Method and Theory* 24: 188-228.

Herva, V.
2009 Living (with) Things: Relational Ontology and Material Culture in Early Modern Northern Finland. *Cambridge Archaeological Journal* 19:388–97.

Hewitt, J. N. B.
1895 The Iroquoian Concept of the Soul. *Journal of American Folk-Lore* 8: 107-116.

Heyman, M. et al.
2005 Late Archaic Community Aggregation and Feasting in the Hocking Valley. In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by E.M. Abrams and A.C. Freter. Ohio University Press, Athens. Pages 67-81.

Hiatt, L. R., R. Lee, and A. R. Pilling
1968 Discussions, Part III – 17f. Territorial Boundaries. In *Man the Hunter*, edited by R. Lee and I. DeVore. Aldine, Chicago. Pages 156-157.

Hill, E.
2011 Animals as Agents: Hunting Ritual and Relational Ontologies in Prehistoric Alaska and Chukotka. *Cambridge Archaeological Journal* 21:407–26.

Hill, R.W.
2006 Making a Final Resting Place Final: A History of the Repatriation Experience of the Haudenosaunee. In *Cross-Cultural Collaboration: Native Peoples and Archaeology in the Northeastern United States,* edited by JE Kerber. University of Nebraska Press, Lincoln. Pages 3-17.

Hillson, S. et al.
2005 Alternative Dental Measurements: Proposals and Relationships with Other Measurements. *American Journal of Physical Anthropology* 126: 413-426.

Hodder, I.
1982 *Symbols in action: Ethnoarchaeological studies of material culture*. Cambridge University Press, Cambridge.

1984 Burials, houses, women and men in the European Neolithic. In *Ideology, Power and Prehistory*, edited by D Miller and C Tilley. Cambridge University Press, Cambridge. Pages 51-68.

Horn, J.
1965 A rationale and test for the number of factors in factor analysis. *Psychometrika* 32: 179-185.

Howell, T. L. and K. W. Kintigh
1996 Archaeological identification of kin groups using mortuary and biological data: An example from the American Southwest. *American Antiquity* 61: 537-554.

Howells, W. W.
1973 *Cranial variation in man: A study by multivariate analysis of patterns of difference among recent human populations*. Peabody Museum Papers, Vol. 67. Harvard University.

1989 *Skull shapes and the map*. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 79. Harvard University.

1995 *Who's who in skulls. Ethnic identification of crania from measurements*. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 82. Harvard University.

Hunter, J. P., et al.
2010 Model of tooth morphogenesis predicts Carabelli cusp expression, size, and symmetry in humans. *PloS One*, 5(7):e11844.

Ingold, T.
1986 *The appropriation of nature: Essays on human ecology and social relations*. Manchester University Press, Manchester.

1990 An Anthropologist Looks at Biology. *Man* (New Series) 25: 208-229.

1993 The Temporality of the Landscape. *World Archaeology* 25: 152-174.

1996 The Optimal Forager and Economic Man. In *Nature and Society: Anthropological Perspectives*, edited by P. Descola and G. Pálsson. Routledge, London. Pages 25-44.

2000 *The Perception of the Environment: Essays on livelihood, dwelling and skill*. Routledge, London.

Jacobi, K. P.
1996 *An Analysis of Genetic Structuring in a Colonial Maya Cemetery, Tipu, Belize, Using Dental Morphology and Metrics*. Ph.D. dissertation, Department of Anthropology, Indiana University, Bloomington.

Jefferies, R. W.
2004 Regional-Scale Interaction Networks and the Emergence of Cultural Complexity along the Northern Margins of the Southeast. In *Signs of Power: The Rise of Cultural Complexity in the Southeast*, edited by J.L. Gibson and P.J. Carr. The University of Alabama Press, Tuscaloosa. Pages 71-85.

2008 Archaic Period. In *The Archaeology of Kentucky: An Update,* Volume I, edited by D. Pollack. Kentucky Heritage Council, Frankfort, KY. Pages 193-338.

Jennings, J. D.
1947 Review of *The Adena People*. *American Anthropologist* 49: 275-279.

Jernvall, J.
2000 Linking development with generation of novelty in mammalian teeth. *Proceedings of the National Academy of Sciences of the United States of America* 97:2641–2645.

Jernvall, J. and H.-S. Jung
2000 Genotype, phenotype, and developmental biology of molar tooth characters. *Yearbook of Physical Anthropology* 43:171–190.

Jones, A.
2005 Lives in Fragments? Personhood and the European Neolithic. *Journal of Social Archaeology* 5: 193-224.

2007 *Memory and Material Culture*. Cambridge University Press, Cambridge.

Jones, W.
1939 *Ethnography of the Fox Indians.* Bureau of American Ethnology Bulletin 125. GPO, Washington DC.

Joyce, R.A.
2004 Unintended Consequences? Monumentality as a Novel Experience in Formative Mesoamerica. *Journal of Archaeological Method and Theory* 11: 5-29.

Julien, D. M. et al.
2008 Paleo is Not Our Word: Protecting and Growing a Mi'kmaw Place. In *Archaeologies of Placemaking: Monuments, Memories, and Engagement in Native North America*, edited by P. E. Rubertone. Left Coast Press, Walnut Creek. Pages 35-57.

Kangas, A. T., et al.
2004 Nonindependence of mammalian dental characters. *Nature* 432:211–214.

Kaplan, M. J.
1985 Issues in Land Claims: Aboriginal Title. In *Irredeemable America: The Indians' Estate and Land Claims*, edited by I. Sutton. University of New Mexico Press, Albuquerque. Pages 71-86.

Kaufman, L. and P. J. Rousseeuw
1987 Clustering by means of Medoids. In *Statistical Data Based on the L_1-Norm and Related Methods*, edited by Y. Dodge. North-Holland, New York. Pages 405-416.

Kelley, J. O.
1989 Identification of Family Groups from Genetic Anomalies in the First African Baptist Church Cemetery. *American Journal of Physical Anthropology* 78: 251-2.

Kelley, K. and H. Francis
1993 Places Important to Navajo People. *American Indian Quarterly* 17: 151-169.

Kelly, R. L.
1995 *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Smithsonian Institution Press, Washington.

Konigsberg, L. W.
1987 *Population genetic models for interpreting prehistoric intra-cemetery biological variation*. PhD Dissertation, Department of Anthropology, Northwestern University.

1988 Migration Models of Prehistoric Postmarital Residence. *American Journal of Physical Anthropology* 77: 471-482.

1990 Temporal aspects of biological distance: Serial correlation and trend in a prehistoric skeletal lineage. *American Journal of Physical Anthropology* 82: 45-52.

Konigsberg, L. W. and J. E. Buikstra
1995 Regional Approaches to the Investigation of Past Human Biocultural Structure. In *Regional Approaches to Mortuary Analysis*, edited by L. A. Beck. Plenum Press, New York. Pages 191-219.

Kretzler, I.
2015 Repatriation of "Culturally Unidentifiable" Human Remains: The View from Fort Vancouver. *The SAA Archaeological Record* 15: 21-24.

Kunos, C. A., et al.
1999 First Rib Metamorphosis: Its Possible Utility for Human Age-at-Death Estimation. *American Journal of Physical Anthropology* 110: 303-323.

Kuwanwisiwma, L.J. and T.J. Ferguson
2009 *Hopitutskwa* and *Ang Kuktota*: The Role of Archaeological Sites in Defining Hopi cultural Landscapes. In *The Archaeology of Meaningful Places*, edited by B.J. Bowser and M.N. Zedeño. The University of Utah Press, Salt Lake City. Pages 90-106.

Kuznar, L. A.
2003 Sacred Sites and Profane Conflicts: The Use of Burial Facilities and Other Sacred Locations as Territorial Markers – Ethnographic Evidence. In *Theory, Method, and Practice in Modern Archaeology*, edited by R. J. Jeske and D. K. Charles. Praeger, Westport, CT. Pages 269-286.

Landis, J. R. and G. G. Koch
1977 The measurement of observer agreement for categorical data. *Biometrics* 33: 159-174.

Lane, R. A.
1977 *The Allegany Seneca: A test of the genetic reliability of nonmetric osteological traits for intrapopulation analysis*. PhD Dissertation, Department of Anthropology, University of Texas, Austin.

Lane, R. A. and A. J. Sublett
1972 Osteology of social organization: Residence pattern. *American Antiquity* 37: 186-201.

Larsen, C. S., et al.
1995 Cross Homestead: Life and death on the Midwestern frontier. In *Bodies of Evidence: Reconstructing history through skeletal analysis*, edited by A. L. Grauer. Wiley-Liss, New York. Pages 139-159.

Latour, B.
1993 *We Were Never Really Modern*, translated by C. Porter. Harvard University Press, Cambridge.

Layton, R.
1995 Relating to the Country in the Western Desert. In *The Anthropology of Landscape: Perspectives on place and space*, edited by E. Hirsch and M. O'Hanlon. Clarendon Press, Oxford. Pages 210-231.

1999 The Alawa totemic landscape: ecology, religion, politics. In *The Archaeology and Anthropology of Landscape: Shaping your landscape*, edited by P. J. Ucko and R. Layton. Routledge, London. Pages 219-239.

Leacock, E.
1954 The Montagnais Hunting Territory and the Fur Trade. *American Anthropological Association Memoir* 78. Washington, D.C.

Lee, B., ed.
1979 *Psychosocial Theories of the Self*. Plenum Press, New York.

Lepper, B. T.
2013 *Is the man on the Adena pipe a dwarf?* Retrieved on January 29, 2019 from https://www.ohiohistory.org/learn/collections/archaeology/archaeology-blog/2013/may-2013/is-the-man-on-the-adena-pipe-a-dwarf

Lepper, B. T., K. L. Leone, K. A. Jakes, L. L. Pansing, W. H. Pickard
2014 Radiocarbon Dates on Textile and Bark Samples from the Central Grave of the Adena Mound (33RO1), Chillicothe, Ohio. *Midcontinental Journal of Archaeology* 39: 201-221.

Lévi-Strauss, C.
1962 *Totemism*. Beacon Press, Boston.

Lind, V.
1972 Short root anomaly. S*candinavian Journal of Dental Research* 80: 85-93.

Linton, R.
1936 *The Study of Man: An introduction*. D. Appleton-Century Co., New York.

LiPuma, E.
1998 Modernity and Forms of Personhood in Melanesia. In *Bodies and Persons: Comparative views from Africa and Melanesia,* edited by M. Lambek and A. Strathern. Cambridge University Press, Cambridge. Pages 53-79.

Littleton, J. and H. Allen
2007 Hunter-Gatherer Burials and the Creation of Persistent Places in Southeastern Australia. *Journal of Anthropological Archaeology* 26: 283-298.

Lockwood, C. A. et al.
2002 Quantifying temporal bone morphology of great apes and humans: an approach using geometric morphometrics. *Journal of Anatomy* 201: 447-464.

Losey, R. J. et al.
2013 The Bear-Able Likeness of Being: Ursine Remains at the Shamanka II Cemetery, Lake Baikal, Siberia. In *Relational Archaeologies: Humans, Animals, Things*, edited by C. Watts. Routledge, London. Pages 65–96

Lovell, N.
1998 Introduction: Belonging in Need of Emplacement. In *Locality and Belonging*, edited by N. Lovell. Routledge, London. Pages 1-24.

Lucy, S.
2005 Ethnic and Cultural Identities. In *The Archaeology of Identity: Approaches to Gender, Age, Status, Ethnicity and Religion*, edited by M. Díaz-Andreu, S. Lucy, S. Babić, and D.N. Edwards. Routledge, New York. Pages 86-109.

Macnaghten, P. and J. Urry
1998 *Contested Natures*. Sage Publications, London.

Maechler, M., P. Rousseeuw, A. Struyf, M. Hubert, and K. Hornik
2013 cluster: Cluster Analysis Basics and Extensions. R package version 3.4.4.

Mainfort, R. C., Jr.
1989 Adena Chiefdoms? Evidence from the Wright Mound. *Midcontinental Journal of Archaeology* 14: 164-178.

Mantel, N.
1967 The Detection of Disease Clustering and a Generalized Regression Approach. *Cancer Research* 27: 209-220.

Mantha, A.
2009 Territoriality, social boundaries and ancestor veneration in the central Andes of Peru. *Journal of Anthropological Archaeology* 28: 158-176.

Marquardt, W. H. and P. J. Watson
1983 The Shell Mound Archaic of Western Kentucky. In *Archaic Hunters and Gatherers in the American Midwest*, edited by J.L. Phillips and J.A. Brown. Academic Press, New York. Pages 323-339.

2005 The Green River Shell Mound Archaic: Conclusions. In *Archaeology of the Middle Green River Region, Kentucky*, edited by W.H. Marquardt and P.J. Watson. University of Florida, Gainesville. Pages 629-648.

Marriott, M.
1976 Hindu Transactions: Diversity without dualism. In *Transaction and Meaning: Directions in the anthropology of exchange and symbolic behavior*, edited by B. Kapferer. Institute for the Study of Human Issues, Philadelphia. Pages 109-137.

Matsumura, H. and T. Nishimoto
1996 Statistical analysis on kinship of the Nakazuma Jomon people using tooth crown measurements. *Zoo-archaeology* 6: 1-17.

Mauss, M.
1985 A Category of the Human Mind: The notion of person; the notion of self. In *The Category of the Person: Anthropology, philosophy, history*, edited by M. Carrithers, S. Collins, and S. Lukes. Cambridge University Press, New York. Pages 1-25.

McConaughy, M. A.
1990 Early Woodland Mortuary Practices in Western Pennsylvania. *West Virginia Archaeologist* 42: 1-10.

McCorriston, J. et al.
2012 Cattle cults of the Arabian Neolithic and early territorial societies. *American Anthropologist* 114: 45-63.

McKee, L.
2007 *Phase II Archaeological Testing at 40HK12, near Kyles Ford, Hancock County, Tennessee*. Submitted to Tennessee Stream Mitigation Program, Nashville, by TRC, Inc., Nashville.

McKern, W. C.
1939 The Midwest Taxonomic Method as an Aid to Archaeological Culture Study. *American Antiquity* 4: 301-313.

McMichael, E.V.
1971 Adena-East, an Appraisal of the More Easterly Extensions of the Spread of the Adena Phenomenon. In *Adena: The Seeking of an Identity*, edited by B.K. Swartz, Jr. Ball State University Press, Muncie. Pages 88-95.

McNiven, I. J.
2013 Between the Living and the Dead: Relational Ontologies and the Ritual Dimensions of Dugong Hunting across Torres Strait. In *Relational Archaeologies: Humans, Animals, Things*, edited by C. Watts. Routledge, London. Pages 97-116.

Meggitt, M. J.
1965a *The Lineage System of the Mae Enga of New Guinea*. Oliver and Boyd, Edinburgh.

1965b The Mae Enga of the Western Highlands. In *Gods, Ghosts and Men in Melanesia*, edited by P. Lawrence and M. J. Meggitt. Oxford University Press, New York. Pages 105-131.

Meindl, R. S. and C. O. Lovejoy
1985 Ectocranial suture closure: A revised method for the determination of skeletal age at death based on the lateral-anterior sutures. *American Journal of Physical Anthropolog*y 68: 57-66.

Merleau-Ponty, M.
1989 *Phenomenology of Perception*. Translated by Colin Smith. Routledge, London.

Meskell, L. M. and R. A. Joyce
2003 *Embodied Lives: Figuring Ancient Maya and Egyptian Experience*. Routledge, London.

Mickelson, A. M.
2002 *Changes in Prehistoric Settlement Patterns as a Result of Shifts in Subsistence Practices in Eastern Kentucky*. PhD Dissertation, Department of Anthropology, The Ohio State University, Columbus, Ohio.

Mills, W. C.
1902 Excavations of the Adena Mound. *Ohio Archaeological and Historical Quarterly* 10: 451-479.

1917 Explorations of the Westenhaver Mound. *Ohio Archaeological and Historical Quarterly* 26: 226-266.

Milner, G. R. and K. P. Jacobi
2006 A New Deal for Human Osteology. In *Bioarchaeology: The Contextual Analysis of Human Remains*, edited by J. E. Buikstra and L. A. Beck. Elsevier, New York. Pages 113-130.

Milner, G. R. and V. G. Smith
1986 *New Deal Archaeology in Kentucky: Excavations, Collections, and Research*. Occasional Papers in Anthropology No. 5. Program for Cultural Resource Assessment, Department of Anthropology, University of Kentucky, Lexington.

1998 Kentucky's New Deal Archaeological Excavations, Museum Collections, and Research. In *New Deal Era Archaeology and Current Research in Kentucky*, edited by D. Pollack and M. L. Powell. Kentucky Heritage Council, Frankfort. Pages 1-13.

Moore, C. R.
2015 Hunter-Gatherer Histories: The Role of Events in the Construction of the Chiggerville Shell Midden. In *The Archaeology of Events: Cultural Change and Continuity in the Pre- Columbian Southeast,* edited by Z. I. Gilmore and J.M. O'Donoughue. The University of Alabama Press, Tuscaloosa, AL. Pages 62-76.

Moorman, S., et al.
2013 Metamerism, morphogenesis, and the expression of Carabelli and other dental traits in humans. *American Journal of Physical Anthropology,* 150:400–408.

Morgan, L.H.
1985 *Ancient Society*. University of Arizona Press, Tucson, AZ.

Morgan, R. G.
1946 Review: The Adena People. *American Antiquity* 12: 54-58.

Morphy, H.
1995 Landscape and the Reproduction of the Ancestral Past. In *The Anthropology of Landscape: Perspectives on Place and Space*, edited by E. Hirsch and M. O'Hanlon. Clarendon Press, Oxford. Pages 184-209.

Morris, B.
1991 *Western Conceptions of the Individual*. Berg, Oxford.

1994 *Anthropology of the Self: The Individual in Cultural Perspective*. Pluto Press, London.

Morris, I.
1991 The Archaeology of Ancestors: The Saxe/Goldstein Hypothesis Revisited. *Cambridge Archaeological Journal* 1: 147-169.

Morrison, K.M.
2000 The Cosmos as Intersubjective: Native American other-than-human persons. In *Indigenous Religions: A Companion*, edited by G. Harvey. Cassell, New York. Pages 23-36.

Mugerauer, R.
1985 Language and the Emergence of Environment. In *Dwelling, Place and Environment*, edited by D. Seamon and R. Mugerauer. Martinus Nijhoff Publishers, Boston. Pages 51-70.

Murphy, J. L. and I. Stehli
1975 Age and Provenience of Adena Bone Combs. *Ohio Archaeologist* 25: 9-13.

National Park Service
2019 National NAGPRA Online Databases Home.
Retrieved from https://www.nps.gov/nagpra/ONLINEDB/index.htm

Navani, S., Shah, J. R., and P. S. Levy
1974 Determination of Sex by Costal Cartilage Calcification. *American Journal of Roentgenology* 108: 771-774.

Niquette, C. M., R. D. Boedy, and G. J. Fritz
1987 The Calloway Site (15MT8): A Woodland Camp in Martin County, Kentucky. *The West Virginia Archaeologist* 39: 21-56.

Niquette, C. M. and R. B. Clay (editors)
1989 *Phase III Excavations at the Niebert Site (46MS103) in the Gallipolis Locks and Dam Replacement Project, Mason County, West Virginia*. Cultural Resource Analysts, Inc. Contract Publication Series 89-06.

Noble, M.
2015 Beyond 10.11: Repatriation of Culturally Unidentifiable Remains from Areas Unknown. *The SAA Archaeological Record* 15: 17-20.

Norona, D.
1953 Skeletal Material from the Grave Creek Mounds. *The West Virginia Archaeologist* 6: 7-42.

O'Malley, N.
1988 Adena Mound Ceramics in Retrospect. In *New Deal Era Archaeology and Current Research in Kentucky*, edited by D. Pollack and M. L. Powell. Kentucky Heritage Council, Frankfort. Pages 46-62.

Osborne, D. L., Simmons, T. L., and S. P. Nawrocki
2004 Reconsidering the auricular surface as an indicator of age at death. *Journal of Forensic Sciences* 49: 905-911.

Owoc, M. A.
2004 A Phenomenology of the Buried Landscape: Soil as Material Culture in the Bronze Age of South-West Britain. In *Soils, Stones and Symbols: Cultural Perceptions of the Mineral World*, edited by N. Boivin and M. A. Owoc. UCL Press, London. Pages 107-121.

Pacheco, P. J.
2012 Personal Communication on December 3rd, 2012.

Pacheco, P. J. and J. Burks
2008 Early Woodland Ceremonialism in Context: Results of LCALS Research at The Munson Springs Site (33LI251). In *Transitions: Archaic and Early Woodland Research in the Ohio Country*, edited by MP Otto and BG Redmond. Ohio University Press, Athens. Pages 159-182.

Pacheco, P. J., J. Burks, and D. A. Wymer
2009a The 2006 Archaeological Investigations at Brown's Bottom #1 (33Ro1104). *Current Research in Ohio Archaeology 2009*.

2009b The 2007-2008 Archaeological Investigations at Lady's Run (33Ro1105). *Current Research in Ohio Archaeology 2009*.

Pacheco, P. J. and W. S. Dancey
2006 Integrating Mortuary and Settlement Data on Ohio Hopewell Society. In *Recreating Hopewell*, edited by D.K. Charles and J.E. Buikstra. University Press of Florida, Gainesville. Pages 3-25.

Parker, P. L. and T. F. King
1990 Guidelines for Evaluating and Documenting Traditional Cultural Properties. *National Register Bulletin* 38:1-28.

Patton, P.E.
2016 *Reconsidering the Question: Were the Hopewell Really Farmers? Evidence from the Periphery, Hocking Valley, Ohio*. Paper presented at The Third Chillicothe Conference on Hopewell Archaeology, Chillicothe, Ohio.

Patton, P. E. and S. Curran
2016 Archaic Period Domesticated Plants in the Mid-Ohio Valley: Archaeobotanical Remains from the County Home Site (33At40), Southeastern Ohio. *Midcontinental Journal of Archaeology* 41: 127-158.

Peacock, E. and J. K. Feathers
2009 Accelerator Mass Spectrometry Radiocarbon Dating of Temper in Shell-Tempered Ceramics: Test Cases from Mississippi, Southeastern United States. *American Antiquity* 74: 351-369.

Pecora, A. M. and J. Burks
2005 The Bremen Site: A Terminal Late Archaic Period Upland Occupation in Fairfield County, Ohio. In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio,* edited by E.M. Abrams and A.C. Freter. Ohio University Press, Athens. Pages 39-58.

Pedde, S. E. and O. H. Prufer
2001 The Kentucky Green River Archaic as Seen from the Ward Site. In *Archaic Transitions in Ohio and Kentucky Prehistory,* edited by O.H. Prufer, S.E. Pedde, and R.S. Meindl. The Kent State University Press, Kent. Pages 59-86.

Peebles, C. S. and S. M. Kus
1977 Some Archaeological Correlates of Ranked Societies. *American Antiquity* 42: 421-448.

Peters, R. L.
2006 Consulting with the Bone Keepers: NAGPRA Consultations and Archaeological Monitoring in the Wampanoag Territory. In *Cross-Cultural Collaboration: Native Peoples and Archaeology in the Northeastern United States*, edited by J. E. Kerber. University of Nebraska Press, Lincoln. Pages 32-43.

Phenice, T.W.
1969 A newly developed visual method of sexing in the *os pubis*. *American Journal of Physical Anthropology* 30: 297-301.

Pollack, D., E. J. Schlarb, W. E. Sharp, and T. W. Tune
2005 Walker-Noe: An Early Middle Woodland Adena Mound in Central Kentucky. In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D. Applegate and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 64-75.

Pollard, J.
2004 A 'movement of becoming': realms of existence in the early Neolithic of southern Britain. In *Stories from the Landscape: Archaeologies of Inhabitation*, edited by A. M. Chadwick. BAR International Series 1238. Archaeopress, Oxford. Pages 55-69.

Potter, M. A.
1971 Adena Culture Content and Settlement. In *Adena: The Seeking of an Identity*, edited by B.K. Swartz, Jr. Ball State University Press, Muncie. Pages 4-11.

Powell, M. L.
1985 *Health, disease, and social organization in the Mississippian community at Moundville.* PhD dissertation, Department of Anthropology, Northwestern University, Evanston.

Pred, A.
1985 The Social Becomes the Spatial, the Spatial Becomes the Social: Enclosures, social change and the becoming of places in Skåne. In *Social Relations and Spatial Structures*, edited by D. Gregory and J. Urry. Macmillan Publishers, London. Pages 337-365.

Purtill, M. P. (editor)
2012 *A Persistent Place: A Landscape Approach to the Prehistoric Archaeology of the Greenlee Tract in Southern Ohio*. Gray & Pape, Inc. Cincinnati, OH.

Purtill, M. P., J. A. Norr, and J. B. Frodge
2014 Open-Air "Adena" Paired-Post Ritual Features in the Middle Ohio Valley: A New Interpretation. *Midcontinental Journal of Archaeology* 39: 59-82.

Radin, P.
1970 *The Winnebago Tribe*. Johnson Reprint Corporation, New York. (Original work published 1923)

Rafferty, S. M.
2005 The Many Messages of Death: Mortuary Practices in the Ohio Valley and Northeast. In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D. Applegate and R. C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa. Pages 150-167.

Railey, J. A.
1991 Woodland Settlement Trends and Symbolic Architecture in the Kentucky Bluegrass. In *The Human Landscape in Kentucky's Past: Site Structure and Settlement Patterns*, edited by C. Stout and C. K. Hensley. Kentucky Heritage Council, Frankfort. Pages 56-77.

Rao, A.
1992 The Constraints of Nature or of Culture?: Pastoral Resources and Territorial Behavior in the Western Himalayas. In *Mobility and Territoriality: Social and Spatial Boundaries among Foragers, Fishers, Pastoralists and Peripatetics*, edited by M. Casimir and A. Rao. Berg, New York. Pages 91-134.

Redfield, R.
1952 The Primitive World View. *Proceedings of the American Philosophical Society* 96: 30-36.

Reimer, P. J. et al.
2013 IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0 - 50,000 Years cal BP. *Radiocarbon* 55: 1869-1887.

Relph, E.
1985 Geographical Experiences and Being-in-the-World: The phenomenological origins of geography. In *Dwelling, Place and Environment*, edited by D. Seamon and R. Mugerauer. Martinus Nijhoff Publishers, Boston. Pages 15-31.

Renfrew, C.
1976 Megaliths, Territories and Populations. In *Acculturation and Continuity in Atlantic Europe mainly during the Neolithic period and the Bronze Age*, edited by S. J. De Laet. De Tempel, Brugge. Pages 198-220.

Revelle, W.
2018 psych: Procedures for Personality and Psychological Research, Northwestern University, Evanston, Illinois, USA, https://CRAN.R-project.org/package=psych Version = 1.8.12.

Richmond, M. D. and J. P. Kerr.
2005 Middle Woodland Ritualism in the Central Bluegrass: Evidence from the Amburgey Site, Montgomery County, Kentucky. In *Woodland Period Systematics in the Middle Ohio Valley*, edited by D. Applegate and R.C. Mainfort, Jr. The University of Alabama Press, Tuscaloosa, AL. Pages 76-93.

Riordan, R. V.
2006 Altering a Middle Woodland Enclosure: Questions of Design and Environment. In *Recreating Hopewell*, edited by D. K. Charles and J. E. Buikstra. University Press of Florida, Gainesville. Pages 146-157.

Ritzenhaler, R. E.
1978 Southwestern Chippewa. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 743-759.

Roseman, C. C. and T. D. Weaver
2004 Multivariate apportionment of global human craniometric diversity. *American Journal of Physical Anthropology* 125(3):257–263.

Rosenthal, H. D.
1985 Indian Claims and the American Conscience: A Brief History of the Indian Claims Commission. In *Irredeemable America: The Indians' Estate and Land Claims*, edited by I. Sutton. University of New Mexico Press, Albuquerque. Pages 35-70.

Rousseeuw, P. J.
1987 Silhouettes: a Graphical Aid to the Interpretation and Validation of Cluster Analysis. *Computational and Applied Mathematics* 20: 53-65.

Royce, A. P.
1982 *Ethnic Identity: Strategies of Diversity*. Indiana University Press, Bloomington.

Sack, R. D.
1983 Human Territoriality: A Theory. *Annals of the Association of American Geographers* 73: 55-74.

Salazar-Ciudad, I., and J. Jernvall
2010 A computational model of teeth and the developmental origins of morphological variation. *Nature*, 464: 583–586

Sassaman, K. E. and M. J. Heckenberger
2004 Crossing the Symbolic Rubicon in the Southeast. In *Signs of Power: The Rise of Cultural Complexity in the Southeast*, edited by J. L. Gibson and P. J. Carr. The University of Alabama Press, Tuscaloosa. Pages 214-233.

Saunders, S. R. and D. L. Rainey
2008 Nonmetric Trait Variation in the Skeleton: Abnormalities, Anomalies, and Atavisms. In *Biological Anthropology of the Human Skeleton, Second Edition*, edited by M.A. Katzenberg and S.R. Saunders. Wiley-Liss, Hoboken. Pages 533-560.

Saxe, A. A.
1970 *Social Dimensions of Mortuary Practices*. PhD dissertation, Department of Anthropology, The University of Michigan, Ann Arbor.

Saxe, A. A. and P. L. Gall
1977 Ecological Determinants of Mortuary Practices: The Temuan of Malaysia. In *Cultural-Ecological Perspectives on Southeast Asia: A Symposium*, edited by W Wood. Ohio University Center for International Studies, Southeast Asia Series No. 41. Pages 74-82.

Scarre, C.
2002 A Place of Special Meaning: Interpreting Pre-Historic Monuments in the Landscape. In *Inscribed Landscapes: Marking and Making Place*, edited by B. David and M. Wilson University of Hawai'i Press, Honolulu. Pages 154-175.

Scheuer, L. and D. Black
2000 *Developmental Juvenile Osteology*. Elsevier/Academic Press, London.

Schillaci, M. A. and C. M. Stojanowski
2005 Craniometric variation and population history of the prehistoric Tewa. *American Journal of Physical Anthropology* 126: 404-412.

Schindelin, J., et al.
2012 Fiji: an open-source platform for biological-image analysis. *Nature methods* 9: 676-682.

Schlanger, S. H.
1992 Recognizing Persistent Places in Anasazi Settlement Systems. In *Space, Time, and Archaeological Landscapes*, edited by J Rossignol and L Wandsnider. Plenum Press, New York. Pages 91-112.

Schneider, C. A. et al.
2012 NIH Image to ImageJ: 25 years of image analysis. *Nature methods* 9: 671-675.

Schneider, T. D.
2015 Placing Refuge and the Archaeology of Indigenous Hinterlands in Colonial California. *American Antiquity* 80: 695-713.

Schoenwetter, J.
1974 Pollen Analysis of Human Paleofeces from Upper Salts Cave. In *Archaeology of the Mammoth Cave Area*, edited by PJ Watson. Academic Press, New York. Pages 49-58.

Sciulli, P. W.
1998 Evolution of the Dentition in Prehistoric Ohio Valley Native Americans: II. Morphology of the Deciduous Dentition. *American Journal of Physical Anthropology* 106: 189-205.

Sciulli, P. W. et al.
1984 An Analysis of Diversity in Glacial Kame and Adena Skeletal Samples. *Human Biology* 56: 603-616.

Sciulli, P. W. and M. C. Mahaney
1986 Evidence of Local Biological Continuity for an Ohio Hopewell Complex Population. *Midcontinental Journal of Archaeology* 11: 181-199.

Scott, C.
1988 Property, Practice, and Aboriginal Rights among Quebec Cree Hunters. In *Hunters and Gatherers: Property, Power, and Ideology*, edited by T. Ingold, D. Riches, and J. Woodburn. St. Martin’s Press, New York. Pages 35-51.

Seamon, D.
1980 Body-Subject, Time-Space Routines, and Place-Ballets. In *The Human Experience of Space and Place*, edited by A. Buttimer and D. Seamon. St. Martin’s Press, New York. Pages 148-165.

Seamon, D. and R. Mugerauer
1985 Dwelling, Place and Environment: An introduction. In *Dwelling, Place and Environment*, edited by D. Seamon and R. Mugerauer. Martinus Nijhoff Publishers, Boston. Pages 1-12.

Seeman, M. F.
1985 *The Locust Site (33Mu160): The 1983 Test Excavation of a Multicomponent Workshop in East Central Ohio*. Kent State Research Papers in Archaeology, No. 7. Department of Sociology and Anthropology, Kent State University, Kent, Ohio.

1986 Adena ‘Houses’ and their Implications for Early Woodland Settlement Models in the Ohio Valley. In *Early Woodland Archaeology*, edited by K. B. Farnsworth and T. E. Emerson. Center for American Archaeology Press, Kampsville. Pages 564-580.

Seeman, M. F. and J. L. Branch
2006 The Mounded Landscapes of Ohio: Hopewell Patterns and Placements. In *Recreating Hopewell*, edited by D. K. Charles and J. E. Buikstra. University Press of Florida, Gainesville, FL. Pages 106-121.

Sherwood, K. D.
2015 *Patterns and Timing in the Union of Cervical Vertebral Ring Epiphyses in Individuals Aged 10-30 Years at Death*. Honors Thesis, Department of Anthropology, University of North Carolina, Wilmington.

Shetrone, H. C.
1920 The Culture Problem in Ohio Archaeology. *American Anthropologist* 22: 144-172.

Shinoda, K. and S. Kanai
1999 Intracemetery genetic analysis at the Nakazuma Jomon site in Japan by mitochondrial DNA sequencing. *Anthropological Science* 107: 129-140.

Shinoda, K., H. Matzumura, and T. Nishimoto
1998 Genetical and morphological analysis on kinship of the Nakazuma Jomon people using mitochondrial DNA and tooth crown measurements. *Zoo-archaeology* 11: 1-21.

Shirley, N. R. and R. L. Jantz
2011 Spheno-Occipital Synchondrosis Fusion in Modern Americans. *Journal of Forensic Sciences* 56: 580-585.

Shryock, A. J.
1987 The Wright Mound Reexamined: Generative Structures and the Political Economy of a Simple Chiefdom. *Midcontinental Journal of Archaeology* 12: 243-268.

Smith, B. H.
1991 Standards of human tooth formation and dental age assessment. In *Advances in Dental Anthropology*, edited by M. A. Kelly and C. S. Larsen. Wiley-Liss, New York. Pages 143-168.

Smith, C.
1999 Ancestors, Place and People: Social Landscapes in Aboriginal Australia. In *The Archaeology and Anthropology of Landscape: Shaping Your Landscape*, edited by P. Ucko and R. Layton. Routledge, London. Pages 189-205.

Smith, B. D. and R. A. Yarnell
2009 Initial Formation of an Indigenous Crop Complex in Eastern North America at 3800 B.P. *Proceedings of the National Academy of Sciences of the United States of America* 106: 6561-6566.

Speck, F. G.
1915 The Family Hunting Band as the Basis of Algonkian Social Organization. *American Anthropologist* 17: 289-305.

Spence, M. W.
1996 Nonmetric trait distribution and the expression of familial relationships in a nineteenth century cemetery. *Northeast Anthropology* 52: 53-67.

Steponaitis, V.
1978 Location Theory and Complex Chiefdoms: A Mississippian Example. In *Mississippian Settlement Patterns*, edited by B. D. Smith. Academic Press, New York. Pages 417-453.

Stewart, K. C.
1996 An Occupied Place. In *Senses of Place*, edited by S. Feld and K. H. Basso. School of American Research Press, Santa Fe. Pages 137-165.

Stewart, R.B.
1974 Identification and Quantification of Components in Salts Cave Paleofeces, 1970-1972. In *Archaeology of the Mammoth Cave Area*, edited by P. J. Watson. Academic Press, New York. Pages 41-47.

Stoffle, R. W., M. N. Zedeño, and D. B. Halmo, eds.
2001 *American Indians and the Nevada Test Site: A model of research and consultation*. U.S. Government Printing Office, Washington D.C.

Stojanowski, C. M.
2001 *Cemetery Structure, Population Aggregation, and Biological Variability in the Mission Centers of La Florida*. Ph.D. dissertation, Department of Anthropology, The University of New Mexico, Albuquerque.

2003 Differential Phenotypic Variability among the Apalachee Mission Populations of La Florida: A Diachronic Perspective. *American Journal of Physical Anthropology* 120: 352-363.

2005 Biological Structure of the San Pedro y San Pablo de Patale Mission Cemetery. *Southeastern Archaeology* 24: 165-179.

2007 Comment on “Alternative Dental Measurements” by Hillson et al. *American Journal of Physical Anthropology* 132: 234-237.

Stojanowski, C. M., et al.
2017 Heritability and genetic integration of tooth size in the South Carolina Gullah. *American Journal of Physical Anthropology* 164: 505-521.

2018 Heritability and genetic integration of anterior tooth crown variants in the South Carolina Gullah. *American Journal of Physical Anthropology* 167: 124-143.

2019 Quantitative Genetic Analyses of Postcanine Morphological Crown Variants. *American Journal of Physical Anthropology*. Advance online publication. https://doi.org/10.1002/ajpa.23778

Stojanowski, C. M. and M. A. Schillaci
2006 Phenotypic Approaches for Understanding Patterns of Intracemetery Biological Variation. *Yearbook of Physical Anthropology* 49: 49-88.

Strathern, M.
1980 No Nature, No Culture: the Hagen case. In *Nature, Culture and Gender*, edited by C. MacCormack and M. Strathern. Cambridge University Press, Cambridge. Pages 174-222.

1988 *The Gender of the Gift: Problems with women and problems with society in Melanesia*. University of California Press, Berkeley.

Straus, A. S.
1982 The Structure of the Self in Norther Cheyenne Culture. In *Psychosocial Theories of the Self,* edited by B. Lee. Plenum Press, New York. Pages 111-128.

Strouhal, E.
1992 Anthropological and archaeological identification of an ancient Egyptian royal family (5th dynasty). *International Journal of Anthropology* 7: 43-63.

Stuiver, M., P. J. Reimer, and R W. Reimer
2019 CALIB 7.1 [WWW program] at http://calib.org, accessed 2019-3-15.

Stump, N. I. et al.
2005 A Preliminary GIS Analysis of Hocking Valley Archaic and Woodland Settlement Trends. In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by E. M. Abrams and A. C. Freter. Ohio University Press, Athens. Pages 25-38.

Sunderhaus, T. S. and J. K. Blosser
2006 Water and Mud and the Recreation of the World. In *Recreating Hopewell*, edited by D.K. Charles and J.E. Buikstra. The University Press of Florida, Gainesville, FL. Pages 134-145.

Sutton, I.
1985 Configurations of Land Claims: Toward a Model. In *Irredeemable America: The Indians' Estate and Land Claims,* edited by I. Sutton. University of New Mexico Press, Albuquerque. Pages 111-132.

Swanton, J. R.
1911 Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. *Bureau of American Ethnology Bulletin* 43. GPO, Washington DC.

1928 Social Organization and Social Usages of the Indians of the Creek Confederacy. In *Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1924-1925,* vol 42. Smithsonian Institution, Washington DC. Pages 23-472.

1931 Source Material for the Social and Ceremonial Life of the Choctaw Indians. *Bureau of American Ethnology Bulletin* 103. GPO, Washington DC.

1942 Source Material on the History and Ethnology of the Caddo Indians. *Bureau of American Ethnology Bulletin* 132. GPO, Washington DC.

1946 The Indians of the Southeastern United States. *Bureau of American Ethnology Bulletin* 137. GPO, Washington, DC.

Swartz, B. K., Jr., ed.
1971 *Adena: The Seeking of an Identity*, edited by BK Swartz, Jr. Ball State University Press, Muncie.

Tainter, J. A.
1977 Woodland Social Change in West-Central Illinois. *Midcontinental Journal of Archaeology* 2: 67-98.

Taxman, S. M.
1990 *Biological Variation in the Adena Peoples of the Ohio Drainage*. M.A. Thesis, Department of Anthropology, Arizona State University, Tempe.

1994 Nonmetric Trait Variation in the Adena Peoples of the Ohio River Drainage. *Midcontinental Journal of Archaeology* 19: 71-98.

Thesleff, I., et al.
2001 Enamel Knots as Signaling Centers Linking Tooth Morphogenesis and Odontoblast Differentiation. *Advances in Dental Research* 15(1):14–18.

Thomas, J.
2001 Archaeologies of Place and Landscape. In *Archaeological Theory Today*, edited by I. Hodder. Polity Press, Cambridge. Pages 165-186.

2007 Archaeology's Humanism and the Materiality of the Body. In *The Archaeology of Identities*, edited by T. Insoll. Routledge, New York. Pages 211-224.

Thompson, V. D.
2010 The Rhythms of Space-Time and the Making of Monuments and Places during the Archaic. In *Trend, Tradition, and Turmoil: What Happened to the Southeastern Archaic*?, edited by D. H. Thomas and M. C. Sanger. American Museum of Natural History Anthropological Papers Number 93. Pages 217-228.

Tilley, C.
1994 *A Phenomenology of Landscape: Places, Paths and Monuments*. Berg, Oxford.

Tooker, E.
1964 An Ethnography of the Huron Indians, 1615-1649. *Bureau of American Ethnology Bulletin* 190. GPO, Washington DC.

1978 The League of the Iroquois: Its History, Politics and Ritual. In *Handbook of North American Indians*, volume 15: Northeast, edited by B. G. Trigger. Smithsonian Institution Press, Washington DC. Pages 418-441.

Townsend, G. et al.
2003 Molar Intercuspal Dimensions: Genetic Input to Phenotypic Variation. *Journal of Dental Research* 82: 350-355.

Townsend, G. et al.
2005 Epigenetic influences may explain dental differences in monozygotic twin pairs. *Australian Dental Journal* 50:95–100.

Trigger, B. G.
1969 *The Huron: Farmers of the North*. Holt, Rinehart and Winston, New York.

Tsosie, R.
2012 NAGPRA and the Problem of "Culturally Unidentifiable" Remains: The Argument for a Human Rights Framework. *Arizona State Law Journal* 44: 809-905.

Tuan, Y.
1977 *Space and Place: The Perspective of Experience*. University of Minnesota Press, Minneapolis.

Turnbow, C.
1981 *Cultural Radiocarbon Determinations in Kentucky*. Occasional Papers in Anthropology No. 3. Department of Anthropology, University of Kentucky.

Turner, C. G.
1985 Dental evidence for the peopling of the Americas. *National Geographic Society Research Reports* 19: 573-596.

1986 The first Americans: The dental evidence. *National Geographic Research* 2: 37-46.

Turner, C.G., Nichol, C. R., and G. R. Scott
1991 Scoring procedures for key morphological traits of the permanent dentition: the Arizona State University dental anthropology system. In *Advances in Dental Anthropology*, edited by M. A. Kelley and C. S. Larson. Wiley-Liss, New York. Pages 13-31.

Tylor, E. B.
1958 [1871] *Primitive Culture,* Vol I: *Religion in Primitive Culture*. Harper & Row, New York.

Vach, W. and K. W. Alt
1993 Detection of Kinship Structures in Prehistoric Burial Sites Based on Odontological Traits. In *Computing the Past: Computer Applications and Quantitative Methods in Archaeology*, edited by J. Andresen, T. Madsen, and I. Scollar. Aarhus University Press, Aarhus. Pages 287-292.

Van Valkenburgh, P. and J. F. Osborne
2013 Home Turf: Archaeology, Territoriality, and Politics. *Archaeological Papers of the American Anthropological Association* 22: 1-27.

Velemìnksỳ, P. and M. Dobisiková
2005 Morphological likeness of the skeletal remains in a central European family from 17th to 19th century. *Homo* 56: 173-196.

Venables, W. N. and B. D. Ripley
2002 *Modern Applied Statistics with S*, Fourth Edition. Springer, New York.

Vitzthum, V. J.
2003 A Number No Greater than the Sum of Its Parts: The Use and Abuse of Heritability. *Human Biology* 75: 539-558.

Viveiros de Castro, E.
1998 Cosmological Deixis and Amerindian Perspectivism. *Journal of the Royal Anthropological Institute* 4: 469-488.

2004 Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies. *Common Knowledge* 10: 463-484.

von Cramon-Taubadel, N.

2009 Congruence of individual cranial bone morphology and neutral molecular affinity patterns in modern humans. *American Journal of Physical Anthropology* 140:205–15.

2011 The relative efficacy of functional and developmental cranial modules for reconstructing global human population history. *American Journal of Physical Anthropology* 146:83–93.

Waldron, J. and E. M. Abrams

1999 Adena Burial Mounds and Inter-Hamlet Visibility: A GIS Approach. *Midcontinental Journal of Archaeology* 24: 97-111.

Walker, W. H.

1995 Ceremonial Trash? In *Expanding Archaeology*, edited by J.M. Skibo, W.H. Walker, and A.E. Nielsen. University of Utah Press, Salt Lake City. Pages 67-79.

2008 Practice and Nonhuman Social Actors: The Afterlife Histories of Witches and Dogs in the American Southwest. In *Memory Work: Archaeologies of Material Practices*, edited by B.J. Mills and W.H. Walker. School for Advanced Research Press, Santa Fe. Pages 137-158.

Watts, C.

2013 Relational archaeologies: roots and routes. In *Relational Archaeologies: Humans, Animals, Things,* edited by C. Watts. Routledge, London. Pages 1-20.

Weaver, S. A., E. M. Abrams, A. C. Freter, and D. Sack

2011 Middle Woodland Domestic Architecture and the Issue of Sedentism: Evidence from the Patton Site (33At990), Hocking Valley, Ohio. *Journal of Ohio Archaeology* 1: 22-40.

Webb, W. S.

1940 *The Wright Mounds, Sites 6 and 7, Montgomery County, Kentucky*. Reports in Anthropology 5(1). The University of Kentucky, Lexington.

1941a *Mt. Horeb Earthworks, Site 1, and the Drake Mound, Site 11, Fayette County, Kentucky*. Reports in Anthropology and Archaeology 5(2). The University of Kentucky, Lexington.

1941b *The Morgan Stone Mound, Site 15, Bath County, Kentucky*. Reports in Anthropology and Archaeology 5(3). The University of Kentucky, Lexington.

1942 *The C. and O. Mounds at Paintsville, Sites Jo 2 and Jo 9, Johnson County, Kentucky*. Reports in Anthropology and Archaeology 5(4). The University of Kentucky, Lexington.

1943a *The Crigler Mounds, Sites Be 20 and Be 27, and the Hartman Mound, Site Be 32, Boone County, Kentucky*. Reports in Anthropology and Archaeology 5(6). The University of Kentucky, Lexington.

1943b *The Riley Mound, Site Be 15, and the Landing Mound, Site Be 17, Boone County, Kentucky*. Reports in Anthropology and Archaeology 5(7). The University of Kentucky, Lexington.

Webb, W. S. and R. S. Baby.
1957 *The Adena People, No. 2*. The Ohio State University Press, Columbus.

Webb, W. S. and J. B. Elliott
1942 *The Robbins Mounds, Sites Be 3 and Be 14, Boone County, Kentucky*. Reports in Anthropology and Archaeology 5(5). The University of Kentucky, Lexington.

Webb, W. S. and W. D. Funkhouser
1940 *Ricketts Site Revisited, Site 3, Montgomery County, Kentucky*. Reports in Anthropology and Archaeology 3(6). The University of Kentucky, Lexington.

Webb, W. S. and W. G. Haag
1947 *The Fisher Site, Fayette County, Kentucky*. Reports in Anthropology 7(2). The University of Kentucky, Lexington.

Webb, W. S. and C. E. Snow
1945 *The Adena People*. The University of Kentucky Reports in Anthropology and Archaeology, Vol. VI. Publications of the Department of Anthropology and Archaeology, University of Kentucky, Lexington.

1959 *The Dover Mound*. University of Kentucky Press, Lexington.

1974 *The Adena People*. The University of Tennessee Press, Knoxville.

Weismantel, M.
2013 Inhuman Eyes: Looking at Chavín de Huantar. In *Relational Archaeologies: Humans, Animals, Things,* edited by C. Watts. Routledge, London. Pages 21-41.

Weiss, K. M.
1972 On the systematic bias in skeletal sexing. *American Journal of Physical Anthropology* 37: 239-250.

Welch, J. R. and T. J. Ferguson

2007 Putting patria back into repatriation: Cultural affiliation assessment of White Mountain Apache tribal lands. *Journal of Social Archaeology* 7: 171-198.

Whiting, J. W. M., and B. Ayres

1968 Inferences from the Shape of Dwellings. In *Settlement Archaeology*, edited by K. C. Chang. National Press Books, Palo Alto. Pages 117-133.

Whittlesey, S. M.

2009 Mountains, Mounds, and Meaning: Metaphor in Hohokam cultural landscape. In *The Archaeology of Meaningful Places*, edited by B. J. Bowser and M. N. Zedeño. The University of Utah Press, Salt Lake City. Pages 73-89.

Wilbur, A. K.

1998 The Utility of Hand and Foot Bones for the Determination of Sex and the Estimation of Stature in a Prehistoric Population from West-Central Illinois. *International Journal of Osteoarchaeology* 8: 180-191.

Willerselv, R.

2007 *Soul Hunters: Hunting, animism, and personhood among the Siberian Yukaghirs*. University of California Press, Berkeley.

William S. Webb Museum of Anthropology, University of Kentucky

2004 189BE3. Digital Image, ID wsw04689. Retrieved January 29, 2019 from http://diglib.lib.utk.edu/cgi/i/image/image-idx?sid=c3039f24b06e82f0a742c46d449b1bcf;q1=robbins;rgn1=All%20Categories;op2=And;rgn2=All%20Categories;op3=And;rgn3=All%20Categories;g=wpa;bbdbid=1006;c=uky;evl=full-image;quality=m600;view=bbentry;subview=detail;lasttype=bbaglist;cc=uky;entryid=x-wsw04689;viewid=WSW04689;start=61;resnum=61

2004 88JO2a. Digital Image, ID wsw01642. Retrieved January 29, 2019 from http://diglib.lib.utk.edu/cgi/i/image/image-idx?sid=c3039f24b06e82f0a742c46d449b1bcf;q1=adena;rgn1=All%20Categories;op2=And;rgn2=All%20Categories;op3=And;rgn3=All%20Categories;g=wpa;size=20;c=uky&lasttype=boolean;view=entry;lastview=thumbnail;subview=detail;cc=uky;entryid=x-wsw01642;viewid=WSW01642;start=81;resnum=85

Williams, D.

2012 *Speaking Place, Saving Place: Western Apache cultural diversity and public discourse*. PhD Dissertation, School of Human Evolution and Social Change, Arizona State University, Tempe, Arizona.

Winquist, C. E.
1998 *Person*. In Critical Terms for Religious Studies, edited by M. C. Taylor. The University of Chicago Press, Chicago, Illinois. Pages 225-238.

Winters, H. D.
1969 The Riverton Culture: A Second Millennium Occupation in the Central Wabash Valley. *Illinois State Museum Reports of Investigations* 13.

1974 Introduction to the New Edition. In *Indian Knoll*, by W.S. Webb. The University of Tennessee Press, Knoxville. Pages v-xxvii.

Wobst, H. M.
2005 Power to the (Indigenous) Past and Present! Or: The Theory and Method behind Archaeological Theory and Method. In *Indigenous Archaeologies: Decolonizing Theory and Practice*, edited by C. Smith and H. M. Wobst. Routledge, London. Pages 17-32.

Wymer, D. A.
1987 *The Paleoethnobotanical Record of Central Ohio – 100 B.C. to A.D. 800: Subsistence Continuity and Cultural Change.* PhD Dissertation, Department of Anthropology, The Ohio State University, Columbus, OH.

1989 The Paleoethnobotanical Record at Niebert. In *Phase III Excavations at the Niebert Site (46MS103) in the Gallipolis Locks and Dam Replacement Project, Mason County, West Virginia*, edited by CM Niquette and RB Clay. Cultural Resource Analysts, Inc. Contract Publication Series 89-06. Pages 130-158.

1992 Trends and Disparities: The Woodland Paleoethnobotanical Record of the Mid-Ohio Valley. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*. Midcontinental Journal of Archaeology Special Paper No. 7, edited by M.F. Seeman. Kent State University Press, Kent. Pages 65-76.

1996 The Ohio Hopewell Econiche: Human-Land Interaction in the Core Area. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by P.J. Pacheco. Ohio Archaeological Council Monographs, Columbus. Pages 36-52.

2016 *Yes, Virginia – the Hopewell Had Been Food Producers*. Paper presented at The Third Chillicothe Conference on Hopewell Archaeology, Chillicothe, Ohio.

Wymer, D. A. and E. M. Abrams
2003 Early Woodland Plant Use and Gardening: Evidence from an Adena Hamlet in Southeastern Ohio. *Midcontinental Journal of Archaeology* 28: 175-194.

Yarnell, R. A.

1974a Intestinal Contents of the Salts Cave Mummy and Analysis of the Initial Salts Cave Flotation Series. In *Archaeology of the Mammoth Cave Area*, edited by P. J. Watson. Academic Press, New York. Pages 109-112.

1974b Plant Food and Cultivation of the Salts Cavers. In *Archaeology of the Mammoth Cave Area*, edited by P. J. Watson. Academic Press, New York. Pages 113-122.

Yerkes, R. W.

2006 Middle Woodland Settlements and Social Organization in the Central Ohio Valley: Were the Hopewell Really Farmers? In *Recreating Hopewell*, edited by D.K. Charles and J.E. Buikstra. University Press of Florida, Gainesville, FL. Pages 50-61.

Zedeño, M. N.

2000 On What People Make of Places: A behavioral cartography. In *Social Theory in Archaeology*, edited by M. B. Schiffer. University of Utah Press, Salt Lake City. Pages 97-111.

2009 Animating by Association: Index objects and relational taxonomies. *Cambridge Archaeological Journal* 19: 407-417.

2013 Methodological and Analytical Challenges in Relational Archaeologies: A View from the Hunting Ground. In *Relational Archaeologies: Humans, Animals, Things*. Edited by C. Watts. Routledge, London. Pages 117-134.

APPENDIX A:

TRAIT LIST DEFINITIONS OF ADENA

The following tables present the trait-list definitions of Adena provided by Greenman (Table A.1), Webb and colleagues (Table A.2), and Dragoo (Table A.3). Comparison of these tables illustrates the changes in the Adena concept through time as well as what information was deemed important by these influential researchers. For detailed descriptions of each trait, readers are referred to the original sources.

Table A.1

Greenman's Adena Trait List (1932)

Trait Number	Trait Description
1.	Mound Conical
2.	Log Tombs
3.	Stone Gorgets
4.	Copper Bracelets
5.	Sub-floor Graves
6.	Skeleton with Beads
7.	Important Central Graves
8.	Leaf-Shaped Projectile Points
9.	Stemmed Projectile Points
10.	Tubular Pipes
11.	Bark-Prepared Graves
12.	Disc Shell Beads
13.	Cremations
14.	Mica Designs or Fragments
15.	Grooved Stones
16.	Primary Strata
17.	Red Ochre on Skeletons
18.	Awls, Bone or Antler
19.	Animal Teeth
20.	Impressions of Leaves, Grass, etc.
21.	Constructional Use of Stone

Table A.1, *continued*

Trait Number	**Trait Description**
22.	Pitted Stones
23.	Marginella Beads
24.	Wall around Sub-Floor Tomb
25.	Knives, Flint Flake
26.	Beads, Bone
27.	Flaking Tools, Antler or Bone
28.	Claws, Animal
29.	Copper Rings
30.	Stone Balls
31.	Pearl Beads
32.	Antler Projectile Points
33.	Concretions or Fossils
34.	Stone Celts
35.	Copper Beads
36.	Notched Projectile Points, Flint
37.	Hematite Celts
38.	Red Ochre, Lump or Granular
39.	Handles, Bone, Antler or Stone
40.	Stone Discs
41.	Mounds in an Inclosure *(sic)*
42.	Copper Gorgets
43.	Hematite Hemispheres
44.	Stones with Incised Characters
45.	In a Group of Three Mounds
46.	Spatulas, Bone
47.	Altars
48.	Flint Drills
49.	Red Ochre on Artifacts
50.	Flint Scrapers, "Thumb-Nail" Type
51.	Skulls Artificially Deformed
52.	Geodes, Cup-Like
53.	Abrading Stones
54.	Pestles, Stone

Table A.1, *continued*

Trait Number	**Trait Description**
55.	Steatite Platform Pipes
56.	Log Tombs, Passageway at East
57.	Skeletons Flexed
58.	Graphite, Lump or Granular
59.	Obsidian Flakes

Table A.2

Adena Trait List of Webb and Colleagues (1945, 1957)

Trait Number	**Trait Description**	**Corresponding Number in Greenman (1932a)**
	Earthwork Traits	
1.	Large earthworks associated with other Adena manifestations	
2.	"Sacred circles" associated with large earthworks	
3.	"Sacred circles" have embankments exterior to the ditch	
4.	"Sacred circles" usually have entrance or gateway	
5.	"Sacred circles" once enclosed a circular structure of vertical posts	
6.	"Sacred circles" usually occur in groups of two to eight	
	Mound Traits	
7.	Mound conical	1.
8.	Mound one of a group	45.
9.	Mound in or near "sacred circles"	41.
10.	Mound in or near large earthworks	41.
11.	Mound built on their own villages	
12.	Mound on site of burned house	
13.	Mound shows stratigraphy	16.
14.	Primary mound contains midden	
15.	Secondary and later sections of mound built of sterile clays	
16.	Earth quarries formed near mound	
17.	Village midden in situ under mound	
18.	Mound shows individual earth loads	
19.	Impressions of grass, twigs, leaves	20.
20.	Fired areas at mound base	
21.	Fired areas on mound surface	
22.	Primary purpose of mound to cover burials	
23.	Mound built by increments as burials were added	
24.	Constructional use of stone	21.

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
	Tomb Traits	
25.	Horizontal log tombs built on bark covered clay floor	2.
26.	Single log rectangle about body	
27.	Multiple parallel logs about body	
28.	Tomb walls shored up with horizontal logs	
29.	Tomb walls of vertical posts in rectangular pattern	
30.	Vertical tomb-posts in corners of rectangular horizontal patterns	
31.	Horizontal log burial platform in tomb	
32.	Log tomb burial on house floor	
33.	Log tomb has log supported earth roof	
34.	Vertical post-molds at grave	
35.	Log head and foot rests	
36.	Log tomb passageway at east	56.
37.	Pit tomb dug below earth surface	5.
38.	Earth or stone embankment about subfloor tomb	24.
39.	Subfloor tomb closed by log roof	
40.	Mound erected over subfloor tomb	
41.	Fire-hardened clay dome or "vault"	Table C
	House Traits	
42.	Post-mold pattern circular, diameter 97 feet or more	
43.	Post-mold pattern circular, diameter 60 feet or less	
44.	Single post set in individual hole	
45.	Posts set in pairs	
46.	Posts of a pair in line with pattern	
47.	Two posts set in same hole	
48.	Pairs regularly spaced in circle	
49.	Posts incline outward from center of circle	
50.	Multiple occupancy of house sites	
51.	Interior concentric circle of single post-molds	

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
52.	Floor area discolored by heat	
53.	Ash pile on center of house floor	
54.	Fire basins in village, circular	
55.	Fire basins held burned, broken stones in ashes	
56.	Clay fire basins, raised clay rims, "Altars"	47.
57.	Fire basin, flat sandstones set on edge about basin rim	
58.	Fire basin had potsherds in ashes	
59.	House burned intentionally	
60.	Post-mold pattern rectilinear	
	Cremation Traits	
61.	Cremation partial, remains in situ, house burned over log tomb	
62.	Cremation total, in clay basins	Table C
63.	Cremation total, left in situ	13.
64.	Cremation partial, extended body in bark lined pit	
65.	Cremation in rectangular log tomb, logs burned	
66.	Cremated remains redeposited separately in mounds	
67.	Cremated remains redeposited in village	
68.	Cremated remains redeposited with extended inhumation in log tomb	
69.	Cremated remains redeposited separately in log tomb	
70.	Cremated remains deposited with extended burial in subsurface pit	
71.	Cremated remains spread or scattered on floor of town-house	
72.	Communal deposit of cremated remains	
73.	Artifacts burned with body	
74.	Unburned artifacts placed with redeposited cremations	
75.	Artifacts intentionally mutilated when deposited with cremation	
76.	Cremated remains associated with red ochre	
	Inhumation Traits	
77.	Body extended in flesh, on back, no tomb	
78.	body extended on back in earth-walled tombs	
79.	Body extended, singly in log tombs	2.
80.	Two extended bodies in same log tomb	

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
81.	Three extended bodies in same log tomb	
82.	Important central graves	7.
83.	Use of bark in graves	11.
84.	Use of puddled clay in graves	
85.	Red ochre on skeleton	17.
86.	Red ochre, lumps or granular in mound	38.
87.	Red ochre on artifacts	49.
88.	Red ochre applied to skull or long bones	
89.	Graphite in graves	58.
90.	Graphite applied to skull or long bones	
91.	Separate skull in grave with burial - "trophy"?	Table C
92.	Burial of isolated skulls	
93.	Decapitation, head buried between femora	
94.	Skeletons flexed	59.
95.	Extended skeletons arranged in circle	
96.	Skeletons bundled	Table C
	Flint Traits	
97.	Blanks, flint	
98.	Celts, flint	
99.	Cores, flint	
100.	Gravers, flint	
101.	Leaf-shaped blades, knives	8.
102.	Leaf-shaped blades deposited in cache	
103.	Stemmed projectile points deposited in cache	
104.	Projectile points, stem with parallel sides	9.
105.	Stemmed points, and scrapers ground smooth on stem edge	
106.	Projectile points, side notched	36.
107.	Drills and reamers	48.
108.	Scrapers, flint, hafted	
109.	Scrapers, thumbnail	50.
110.	Scrapers, side, flake	25.

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
	Ground Stone Traits	
111.	Gorget, bar, expanded center	3.
112.	Gorget, reel-shaped	3.
113.	Gorget, concave side, convex ends	3.
114.	Gorget, truncated pyramid and semi-keeled	Table B
115.	Gorget, flat, varius form, elliptical, triangular, diamond shape	Table C
116.	Gorget, conically perforated from one side only	
117.	Pipes, tubular, constricted mouth	10.
118.	Pipes, tubular, slate, long flared mouth	
119.	Pipes, elbow, biconical	Table C
120.	Pipes, platform	55.
121.	Pitted stones, cupped stones	22.
122.	Stone balls	30.
123.	Celts, granite, and igneous rock	34.
124.	Celts, hematite	37.
125.	Hoes, limestone, sandstone, slabs	Table C
126.	Hammerstones	
127.	Abrading stones	53.
128.	Grooved semi-cylinders	
129.	Stone discs	40.
130.	Hemispheres, lime, sandstone	
131.	Hemispheres, barite, basalt	Table C
132.	Hemispheres, hematite	43.
133.	Boat-shaped barite bars	
134.	Pestles	54.
135.	Steatite vessel fragments	Table C
136.	Galena, barite fragments, worked	
137.	Concretions or fossils	33.
138.	Stones with incised characters	44.
139.	Geodes, cuplike	52.
140.	Obsidian flakes	59.

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
141.	Saws, sandstone, lime, granite	
	Tablet Traits	
142.	Tablets, rectangular	15.
143.	Tablets, rectanguloid, engraved	Table C
144.	Engraved in relief, one side	
145.	One side of tablet grooved	
146.	Tablet engraved on both sides	
147.	Zoomorphic figure duplicated on same plane	
148.	Engraving bilaterally symmetric about a median line	
149.	Head and beak of a raptorial bird	
150.	Joints in zoomorphic form represented by dots or circles	
151.	Claws of bird	
152.	Five digits in foot form	
153.	Representation of the serpent motif	
154.	Human facial mask of death motif	
155.	Hand-eye design	
156.	Row of notches at base of tablet	
	Bone and Antler Traits	
157.	Awls, cannon bone or scapula of elk	
158.	Awls, scapula, deer	
159.	Awls, bone or antler	18.
160.	Beads, bone	26.
161.	Bone combs	Table C
162.	Flaking tool, antler or bone	27.
163.	Teeth, animal	19.
164.	Claws, animal	28.
165.	Projectile points, antler	32.
166.	Spatula, metapodal bone of elk	46.
167.	Spatula, flat bone section	
168.	Animal jaws, worked	Table C
169.	Cut antler sections, drifts	

Table A.2, *continued*

Trait Number	**Trait Description**	**Corresponding Number in Greenman (1932a)**
170.	Gorget, human parietal	Table C
171.	Handles, bone or antler	39.
172.	Spoons, carapace of terrapin	
	Shell Traits	
173.	Spoons, bivalve shell	Table C
174.	Hoes, bivalve shell	Table C
175.	Beads, disk	12.
176.	Beads, marginella	23.
177.	Pearl beads	31.
178.	Beads, large columella, tubular	Table C
	Copper Traits	
179.	Bracelet	4.
180.	Rings, finger, spiral	29.
181.	Beads, rolled sheet	35.
182.	Beads, drilled nuggets	35.
183.	Pins, long pointed rods	
184.	Crescent, head ornament?	Table C
185.	Pendants, long strips	
186.	Gorgets, rectangular	42.
187.	Gorgets, reel-shaped	Table B
188.	Celts	Table B
	Mica Traits	
189.	Fragments of designs	14.
190.	Crescent	Table C
	Pottery Traits	
191.	Adena Plain	
192.	Limestone tempered check stamp	
193.	Sand tempered plain	
194.	Sand tempered check stamp	
195.	Montgomery Incised	
196.	Grit tempered 5-line diamond	

Table A.2, *continued*

Trait Number	Trait Description	Corresponding Number in Greenman (1932a)
197.	Johnson Plain	
198.	Levissa Cord Marked	
199.	Paintsville Simple Stamped	
200.	Fayette Thick	
201.	Woodland Plain, Adena variety	
202.	Woodland Cord Marked	
203.	Grit tempered check stamp	
204.	Grit tempered fabric marked	
205.	Pottery vessels not used as mortuary offerings	
	Textile Traits	
206.	Plain plaiting	
207.	Twilled plaiting, rectangular	
208.	Twilled plaiting, oblique	
209.	Multiple braid plaiting	
210.	Plain twining	
211.	Twilled twining	
212	Diamond twilled twining	
213.	Chevron plain twining	
214.	Lattice (bird cage) twining	
215.	Rope, three ply	
	Physical Characteristics	
216.	Physical type. Adena people basically a medium sized brachycephal	
217.	Head deformation. Occipital vertical flattening	
218.	Head deformation. Bifrontal planes on each side of forehead	
	Traits Included in Subsequent Expansions	
219/118.	Pipes, modified tubular	
220/117.	Pipes, tubular, without constricted mouth, stone	
221/117.	Pipes, tubular, without constricted mouth, clay	
222/186.	Gorget, copper, concave sides, convex ends	
223/188.	Boatstone, copper	
224/188.	Antler headdress, copper	

Table A.2, *continued*

Trait Number	**Trait Description**	**Corresponding Number in Greenman (1932a)**
225/188.	Bars, copper	
226/170.	Bowls cut from human calvaria	
227/134.	Grinding stones, sandstone	
228/170.	Painted human bones	
229/190.	Human teeth, drilled or notched	
230/127.	Whetstone, sandstone	
231/133.	Axes, Grooved	
232/4.	"Sacred circles" show storage or refuse pits inside of earthworks	
233/21.	Extensive burning over earth-covered burials or tombs	
234/116.	Birdstone, bust type	
235/168.	Spatulas cut from wolf maxillae	
236/168.	Animal jaws, unworked	
237/190.	Mica sheets, unworked, in grave association	
238/120.	Pipe, curved base	
239/176.	Beads, cassis shell	
240/167.	Gorgets, sub-rectangular, bone	
241/123.	Adze, stone	
242	--no trait listed for this number--	
243.	Adena Punctate	
244.	Plain twining, large warp	

Table A.3

Dragoo's Adena Trait List (1963)

Trait Number	Trait Description	Categories
1.	Flint blades	A. "Cresap blade" B. "Adena blade." C. "Robbins blade" D. "Adena leaf-shaped blade" E. "Robbins leaf-shaped blade"
2.	Stone tablets	A. Irregular tablets B. Formal tablet C. Engraved tablet D. Zoömorphic tablet
3.	Gorgets	A. Quadri-concave B. Reel-shaped C. Semi-keeled D. Expanded-center bar E. Rectangular F. Elliptical G. Bow tie
4.	Pedants	A. Trapezoidal B. Bell-shaped with flat base C. Bell-shaped with rounded base D. Rectangular
5.	Pipes	A. Cigar-shaped B. Straight tubular C. Constricted tubular D. Modified tubular E. Flared tubular F. Effigy tubular G. Elbow pipe

Table A.3, *continued*

Trait Number	Trait Description	Categories
6.	Copper objects	A. Quadriconcave copper gorget
		B. Rolled copper beads
		C. C-shaped copper bracelet
		D. Copper finger ring
		E. Unusual copper forms
7.	Pottery	A. "Fayette Thick"
		B. "Adena Plain"
		C. Decorated
8.	Mica	A. Crescent
		B. Worked mica
9.	Burial traits	A. Subfloor pit
		B. Log tomb
		C. Extended burial
		D. Cremation
		E. Bundle burial
10.	Houses	A. Single post-mold pattern
		B. Paired post-mold pattern
		C. House pattern absent or not recorded

APPENDIX B

RE-EVALUATIONS OF SEX AND AGE-AT-DEATH

This appendix lists the individuals as numbered for the current research, their original identification, their originally published demographic information, re-assessments (where possible), and information pertinent to any revisions made. References to scores pertaining to cranial and mandibular morphology as well as to the width of the greater sciatic notch are in accordance with the standards presented by Buikstra and Ubleaker (1994). Descriptions of pubic bone morphology are made with reference to Phenice (1969). References to grades of dental wear are in accordance with the descriptions presented by Turner and colleagues (1991). Revised age-at-death is the likely range in which an individual falls, not the full range covered by their osteological age indicators (although these are provided under "relevant observations"). For further details regarding the re-evaluation of skeletal remains, see Chapter 5.

Be3.1
Robbins Mound (15Be3) Burial 1
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**
Relevant observations:

Age:

- Cervical ring epiphyses are fused (18+; Sherwood, 2015)
- Osteophytic lipping present on uncinated processes

Additional notes: Accompanied by a single thoracic vertebra from a younger individual (as indicated by the fact that the vertebral ring epiphysis has not fused, the size is too small, and the preservation is markedly different).

Be3.2
Robbins Mound (15Be3) Burial 2
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments and fragments of the first and second cervical vertebrae.

Be3.3
Robbins Mound (15Be3) Burial 3
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **18-23**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5

Age:

- Vertebral ring epiphyses are fused (18+; Albert & Maples, 1995)
- Iliac crest is fusing (17-23; Scheuer & Black, 2000)
- Auricular surface is fine-grained and exhibits slight billowing (≤ 27; Osborne et al., 2004)

Be3.4
Robbins Mound (15Be3) Burial 4
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be3.5
Robbins Mound (15Be3) Burial 5
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by miscellaneous bone fragments.

Be3.6
Robbins Mound (15Be3) Burial 6
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by long bone fragments.

Be3.7
Robbins Mound (15Be3) Burial 7
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **38-59**
Relevant observations:

Sex:

- Glabellar region: 4.5
- Supraorbital margins: 4

Age:

- Lambdoidal and sagittal sutures are nearly obliterated (48.8 ± 10.5; Meindl & Lovejoy, 1985)

Be3.8
Robbins Mound (15Be3) Burial 8
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a very fragmentary and poorly preserved cranium and long bone fragments.

Be3.9
Robbins Mound (15Be3) Burial 9
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**
Relevant observations:

Age:

- Cervical vertebral ring epiphyses are fused (18+; Sherwood, 2015)

Be3.10
Robbins Mound (15Be3) Burial 10
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by long bone fragments and one mandibular fragment.

Be3.11
Robbins Mound (15Be3) Burial 3
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be3.12
Robbins Mound (15Be3) Burial 12
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented by a highly fragmentary cranium, the first and second cervical vertebrae, fragments of both femora, an unsided tibial fragment, and miscellaneous other long bone fragments.

Be3.13
Robbins Mound (15Be3) Burial 13
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **17-23**
Relevant observations:

Sex:

- Greater sciatic notch: 5

Age:

- Iliac crest is fusing (17-23; Scheuer & Black, 2000)
- Ischial tuberosity has recently completed fusion (>16; Scheuer & Black, 2000)

Be3.14
Robbins Mound (15Be3) Burial 14
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by long bone and cranial fragments.

Be3.15
Robbins Mound (15Be3) Burial 15
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by heavily eroded long bone fragments.

Be3.16
Robbins Mound (15Be3) Burial 16
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by heavily eroded cranial fragments.

Be3.17
Robbins Mound (15Be3) Burial 17
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by heavily eroded cranial fragments.

Be3.18
Robbins Mound (15Be3) Burial 18
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **19+**
Relevant observations:

Age:

- Cervical vertebral ring epiphyses are fused (18+; Sherwood, 2015)
- Third molars are erupted, roots are complete (19+; Smith, 1991), and very little wear is evident

Be3.19
Robbins Mound (15Be3) Burial 19
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a highly fragmentary cranium, fragments of the first and second cervical vertebrae, and miscellaneous long bone fragments.

Be3.20
Robbins Mound (15Be3) Burial 20
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Glabellar region: 4.5

Age:

- Vertebral ring epiphyses are fused (>18; Albert & Maples, 1995)

Be3.21
Robbins Mound (15Be3) Burial 21
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be3.22
Robbins Mound (15Be3) Burial 22
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Mastoid processes: 4

Age:

- Only tooth present is a maxillary premolar exhibiting grade 3 wear

Be3.23
Robbins Mound (15Be3) Burial 23
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be3.24
Robbins Mound (15Be3) Burial 24
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **23-39**
Relevant observations:

Sex:

- Greater sciatic notch: 2.5
- Glabellar region: 2
- Supraorbital margins: 2

Age:

- Vertebral ring epiphyses are fused (>18; Albert & Maples, 1995)
- No groove formation on lunate surface of acetabulum (17-39; Calce, 2012)
- Auricular surface is primarily fine-grained, but transitioning to coarse-grained; transverse organization is minimal; some retroauricular activity (mean = 29.5, SD = 8.20; Osborne et al., 2004)
- S1-S2 almost fused (>20; Scheuer & Black, 2000)
- Medial clavicle is fused (23-29; Baker et al., 2005; Scheuer & Black, 2000)
- Sternal pit of first rib has nearly formed a complete bony ring (30s – early 40s; Kunos et al., 1999)

Be3.24b
Robbins Mound (15Be3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **15-18**
Relevant observations:

Age:

- Second molars exhibit grade 1 wear
- Third molars exhibit grade 0 wear (unerupted, so <18; Smith, 1991)

Be3.25
Robbins Mound (15Be3) Burial 25
Published Sex: Female
Published Age-at-Death: Child
Revised Sex: **Male**
Revised Age-at-Death: **10-12**
Relevant observations:

Sex:

- Mandibular canines (BL = 8.49 mm, MD = 6.18 mm; 99.9% probability of being male based on linear discriminant analysis)

Age:

- Dens of axis is complete (10-12; Baker et al., 2005)
- Spheno-occipital synchondrosis is open (<19; Shirley & Jantz, 2011)
- No vertebral ring epiphyses have commenced fusion (<11; Sherwood, 2015)
- Second molar crowns are complete, roots approximately half (>10; Smith, 1991)
- Apex of root of left maxillary second incisor is open (>9; Smith, 1991)

Be3.26
Robbins Mound (15Be3) Burial 26
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **14-17**
Relevant observations:

Sex:

- Long bones are very gracile
- Mastoid processes: 2.5

Age:

- Spheno-occipital synchondrosis is in the process of fusing (11-17)
- Observable long bone epiphyses are fused (>14; Scheuer & Black, 2000)

Be3.27
Robbins Mound (15Be3) Burial 27
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **>24**
Relevant observations:

Sex:

- Greater sciatic notch: 1
- Mental eminence: 1.5
- Glabellar region: 1.5
- Supraorbital margins: 1
- Gonial angle is oblique

Age:

- Vertebral ring epiphyses are fused (>24; Albert & Maples, 1995)
- Arthritic lipping and compression of cervical vertebrae
- Bilateral arthritis of temporomandibular joint
- Mandibular molars exhibit grade 3 wear

Be3.28
Robbins Mound (15Be3) Burial 28
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be3.29
Robbins Mound (15Be3) Burial 29
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Talus (max length = 43.47, trochlea length = 27.69, trochlea width = 28.45; 99.9% probability of being female based on linear discriminant analysis)

Be3.30
Robbins Mound (15Be3) Burial 30
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **20-26**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Glabellar region: 3
- Supraorbital margins: 4
- Mental eminence: 5
- Gonial angles are square

Age:

- Medial clavicle is unfused (<29; Scheuer & Black, 2000)
- Rib heads are fused (>17; Scheuer & Black, 2000)
- Vertebral ring epiphyses are fused, but fusion scar is still evident in some case (18-26; Albert & Maples, 1995)
- S2-S3 is fusing (>20; Baker et al., 2005)
- Auricular surface is fine-grained and slightly billowy (≤ 27; Osborne et al., 2004)
- Third molars are in occlusion and slightly worn (>18; Smith, 1991)

Be3.31a
Robbins Mound (15Be3), Burial 31
Published Sex: Probable Male
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **7-9**
Relevant observations:

Age:

- Observable maxillary lateral incisors are unerupted, as are all observable premolars and second molars (although crowns are complete). All observable first molars exhibit grade 0.5 wear (7-9; Smith, 1991)

Be3.31b
Robbins Mound (15Be3) Burial 31
Published Sex: Probable Male
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**

Relevant observations:

Age:

- Vertebral ring epiphyses are fused (18+; Albert & Maples, 1995)

Additional notes: The thoracic and cervical vertebrae inventoried under this burial number belong to an older individual than the child that these remains are supposed to represent.

Be3.32
Robbins Mound (15Be3) Burial 32
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4
- Mental eminence: 3.5

Age:

- Cervical vertebrae exhibit osteophytic lipping and compression
- Maxillary fragments exhibit extensive antemortem tooth loss
- Remaining dentition exhibits grade 3 wear or above

Be3.33
Robbins Mound (15Be3) Burial 33
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **20-39**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Glabellar region: 1
- Supraorbital margins: 1.5
- Talus (max length = 44.75 mm, trochlea length = 29.93 mm, trochlea width = 28.51 mm; 99.2% probability of being female based on linear discriminant analysis)

Age:

- Iliac crest fused (>20; Scheuer & Black, 2000)
- Shallow groove formation on lunate surface of the acetabulum (17-39; Calce, 2012)

    - Observable third molars exhibit grade 2 wear

Be3.34
Robbins Mound (15Be3) Burial 34
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by small fragments of the cranium, cervical vertebrae, and the right femur.

Be3.35
Robbins Mound (15Be3) Burial 35
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a highly fragmentary cranium as well as small fragments of the left scapula, both ossa coxae, and an unsided fibula.

Be3.36
Robbins Mound (15Be3) Burial 36
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **40-48**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc
- Ischiopubic ramus is thick
- Greater sciatic notch: 4.5
- Glabellar region: 4
- Supraorbital margins: 4
- Mental eminence: 3

Age:

- Pubic symphyseal face is flattened, rim is complete, some remnants of ridge and furrow system, slight activity on the margin of the obturator foramen (27-61, mean = 42.54; Hartnett, 2010a)

- Sternal pits of ribs are moderately deep and U-shaped, exhibiting slight flaring. Pit margin is firm, but slightly irregular (36-48, mean = 42.43; Hartnett 2010b)
- Auricular surface is coarse grained with the beginnings of densification, some retroauricular and apical activity is present (20-75, mean = 47.8; Osborne et al., 2004)
- Medial clavicle is fused (25+; Baker et al., 2005)
- Observable third molars exhibit grade 2 wear

Be3.37

Robbins Mound (15Be3) Burial 37
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **17-39**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Glabellar region: 1
- Supraorbital margins: 2
- Talus (max length = 56.3 mm, trochlea length = 37.4 mm, trochlea width = 30.3 mm; 99.7% probability of being male based on linear discriminant analysis)

Age:

- No groove formation on lunate surface of acetabulum (17-39; Calce, 2012)
- No apical activity on auricular surface (surface itself is too eroded to be observable) (≤ 46, mean 29.5; Osborne et al., 2004)

Be3.38

Robbins Mound (15Be3) Burial 38
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 2
- Mental eminence: 2
- Mandibular corpus is not very tall
- Short root anomaly (Lind, 1972)

    - Mandibular canines (BL = 7.18, MD = 5.35; 57.6% probability of being male based on linear discriminant analysis

Age:

- Majority of the observable dentition exhibits grade 3 wear, although maxillary third molars exhibit grade 2 wear and mandibular third molars exhibit grade 1 wear (but these latter are impacted)

Be3.39
Robbins Mound (15Be3) Burial 39
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **52-59**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc
- Ischiopubic ramus is rounded
- Greater sciatic notch: 5
- Glabellar region: 5
- Supraorbital margins: 3
- Mastoid processes: 5
- Sternal ribs are ossifying along the superior and inferior margins of the costal cartilage (Navani et al., 1974)

Age:

- Pubic symphyseal face is depressed, rim is complete (37-72, mean 53.87; Hartnett, 2010a)
- Extensions forming from superior and inferior margins of sternal ribs (45-59, mean 52.05; Hartnett, 2010b)
- Extensive antemortem tooth loss; remaining dentition exhibits grade 3 wear
- Extensive osteophytic lipping and compression of lumbar vertebrae
- Arthritic lipping on patella, medial clavicle

Additional notes: These remains are accompanied by a fetal first rib as well as a piece of a fetal cranial vault.

Be3.40
Robbins Mound (15Be3) Burial 40
Published Sex: Probable Male
Published Age-at-Death: Young Adult

Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by fragments of cranium and long bones.

Be3.41
Robbins Mound (15Be3) Burial 41
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by fragments of cranium and long bones.

Be3.42
Robbins Mound (15Be3) Burial 42
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Mental eminence: 4

Age:

- Observable first molars exhibit grade 2 wear, observable third molars exhibit grade 0.5 wear

Be3.43
Robbins Mound (15Be3) Burial 43
Published Sex: Female
Published Age-at-Death: Mature Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a very fragmentary cranium.

Be3.44
Robbins Mound (15Be3) Burial 44
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**

Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be3.45
Robbins Mound (15Be3) Burial 45
Published Sex: Female
Published Age-at-Death: Infant
Revised Sex: **Indeterminate**
Revised Age-at-Death: **2-2.5**
Relevant observations:

Age:

- Femoral diaphysis length = 158mm (1.5-2; Scheuer & Black, 2000)
- Neural arches unfused (< 4; Scheuer & Black, 2000)
- Maxillary first molar crowns are almost complete (2-2.5; Smith, 1991)
- Deciduous second molars are unworn, roots incomplete (< 3; Smith, 1991)

Be3.46
Robbins Mound (15Be3) Burial 46
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **18-22**
Relevant observations:

Sex:

- Glabellar region: 1.5
- Supraorbital margins: 1.5
- Mandibular canines (BL = 7.35 mm, MD = 5.26 mm; 62% probability of being male based on linear discriminant analysis)
- Talus (max length = 47.8 mm, trochlea length = 32.9 mm, trochlea width = 30.8 mm; 66.9% probability of being female based on linear discriminant analysis)

Age:

- Sternal rib ends are billowy and exhibit only a slight indentation (18-22; Hartnett, 2010b)
- Humeral head is recently fused, with a visible scar (> 17; Scheuer & Black, 2004)
- Observable third molars exhibit grade 1 wear

Additional notes: Maxillary deciduous second molars are retained, giving the impression of anomalously sever dental wear in this individual.

Be3.47
Robbins Mound (15Be3) Burial 47
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **34-50**
Relevant observations:

Sex:

- Subpubic angle is narrow
- Greater sciatic notch: 5
- Supraorbital margins: 2
- Mastoid processes: 3
- Bilateral septal apertures

Age:

- Pubic symphyseal face is flat to slightly depressed, with only a small ventral hiatus in the rim formation (27-61, mean = 42.54; Hartnett, 2010a)
- Transverse organization of the auricular surface is absent, exhibits densification and retroauricular activity (20-75, mean = 47.8; Osborne et al., 2004)
- Medial clavicle is fused (25+; Baker et al., 2005)
- Observable third molars exhibit grade 1 wear

Be3.48
Robbins Mound (15Be3) Burial 48
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **51-72**
Relevant observations:

Sex:

- Pubic bone is square
- Greater sciatic notch: 2.5
- Supraorbital margins: 2
- Mastoid processes: 2

Age:

- Pubic symphyseal face is depressed, with rim breaking down and pronounced dorsal lipping (Phase V/VI, combined range: 44-86, means: 51.47, 72.34; Hartnett, 2010a)
- Auricular surface has lost all transverse organization, exhibits macroporosity and a moderate amount of retroauricular activity (24-82, mean = 53.1; Osborne et al., 2004)
- Lumbar vertebrae exhibit extreme osteophytic lipping
- Mandible exhibits extensive antemortem tooth loss

- Remaining dentition (a right maxillary canine and premolar) exhibits grade 3 wear

Be3.49
Robbins Mound (15Be3) Burial 49
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **44-64**
Relevant observations:

Sex:

- Greater sciatic notch: 2
- Glabellar region: 1.5
- Supraorbital margins: 1.5
- Mastoid processes: 3
- Septal aperture

Age:

- Pubic symphyseal face is depressed and losing its oval shape, with rim breaking down and dorsal lipping present. Bone quality is fair (Phase V/VI, combined range: 44-86, means: 51.47, 72.34; Hartnett, 2010a)
- Auricular surface is coarse-grained, but still exhibits striae (≤ 69, mean = 42; Osborne et al., 2004)
- Groove is present on the lunate surface of the acetabulum (40-64; Calce, 2012).
- Slight osteophytic lipping evident on lumbar vertebrae
- Observable maxillary third molars exhibit grade 2 wear, while mandibular third molars exhibit grade 3 wear

Be3.50
Robbins Mound (15Be3) Burial 50
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18-23**
Relevant observations:

Age:

- Vertebral ring epiphyses are fused, but fusion scar is still visible (>18; Albert & Maples, 1995)
- Iliac crest is fused, but fusion scar is still visible (≤ 23; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Be3.51
Robbins Mound (15Be3) Burial 51
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Female**
Revised Age-at-Death: **12-13**
Relevant observations:

Sex:

- Mandibular canines (BL = 7.13 mm, MD = 5.04 mm; 75.1% probability of being female based on linear discriminant analysis

Age:

- Vertebral ring epiphyses are unfused (< 17; Albert & Maples, 1995)
- Rib heads are unfused (< 17; Scheuer & Black, 2000)
- Coracoid process is unfused (< 16; Scheuer & Black, 2000)
- Humeral head is open (< 17; Scheuer & Black, 2000)
- Femoral epiphyses are open (< 16; Scheuer & Black, 2000)
- Tibial epiphyses are open (< 16; Scheuer & Black, 2000)
- Fibular epiphyses are open (< 15; Scheuer & Black, 2000)
- Metatarsal heads are unfused (< 13; Scheuer & Black, 2000)
- Phalangeal bases are unfused (< 15; Scheuer & Black, 2000)
- Maxillary third molar crowns are complete (> 12; Smith, 1991)

Be3.52
Robbins Mound (15Be3) Burial 52
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **20-22**
Relevant observations:

Sex:

- Greater sciatic notch: 3.5
- Sacrum is slightly curved
- Talus (max length = 46.9 mm, trochlea length = 27.7 mm, trochlea width = 26.3 mm; 99.6% probability of being female based on linear discriminant analysis)

Age:

- Pubic symphyseal face shows pronounced ridge and furrow system (18-22; Hartnett, 2010a)
- Sternal rib is not indented and is billowy (18-22; Hartnett, 2010b)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Rib heads are fused (> 17; Scheuer & Black, 2000)

- Iliac crest is fused (≥ 20; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Be3.53
Robbins Mound (15Be3) Burial 53
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by fragments of tibia as well as one mandibular fragment and one fragment of a temporal bone.

Be3.54
Robbins Mound (15Be3) Burial 54
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**
Relevant observations:

Age:

- Ischial tuberosity is complete (18+; Scheuer & Black, 2000)

Additional notes: Represented primarily by long bone fragments.

Be3.55
Robbins Mound (15Be3) Burial 55
Published Sex: Probable Female
Published Age-at-Death: Child
Revised Sex: **Probable Female**
Revised Age-at-Death: **6-7**
Relevant observations:

Sex:

- Mandibular canines (BL = 7.29 mm, MD = 5.02 mm; 66.2% probability of being female based on linear discriminant analysis)

Age:

- Heads of metatarsals are unfused (≤ 13; Scheuer & Black, 2000)
- Base of proximal pedal phalanx is unfused (≤ 15; Scheuer & Black, 2000)
- Observable first molars are in occlusion, root not yet complete (< 7; Smith, 1991)

    - Observable second molar crowns are complete (> 6; Smith, 1991)

Be3.56
Robbins Mound (15Be3) Burial 56
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: Noted in original forms as not saved; no remains with this number were encountered during data collection.

Be3.57
Robbins Mound (15Be3) Burial 57
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**
Relevant observations:

Age:

- Lumbar vertebra exhibits collapse and extensive osteophytic outgrowth

Additional notes: Represented only by cranial fragments and one lumbar vertebra.

Be3.58
Robbins Mound (15Be3) Burial 58
Published Sex: Male
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **3-5**
Relevant observations:

Age:

- Mandibular first molar crowns are complete, roots just initiated (> 3; Smith, 1991)
- Mandibular lateral incisors have completed crown formation (< 5; Smith, 1991)

Be3.59
Robbins Mound (15Be3) Burial 59
Published Sex: Female

Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **40-50**
Relevant observations:

Sex:

- Subpubic angle is wide
- Ventral arc is evident
- Ischiopubic ramus is ridge-like
- Greater sciatic notch: 2
- Glabellar region: 2
- Supraorbital margins: 1.5
- Mastoid processes: 3
- Mental eminence: 3

Age:

- Pubic symphyseal face is flattened, with complete rim, slight dorsal lipping, and minimal osteophytic activity on the margin of the obturator foramen (33-58, mean = 42.36; Hartnett, 2010a)
- Sternal ribs are flared, rim is irregular (39-49, mean = 43.52; Hartnett, 2010b)
- Auricular surface is coarsely granular and has lost transverse organization (20-75, mean = 47.8; Osborne et al., 2004)
- Medial clavicle is fused (25+; Baker et al., 2005)
- Vertebral ring epiphyses are fused (18+; Albert & Maples, 1995)
- Observable third molars exhibit grade 3 wear

Be3.60
Robbins Mound (15Be3) Burial 60
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4

Age:

- Observable first and second molars exhibit grade 3 wear, observable third molars exhibit grade 2 wear

Be3.61
Robbins Mound (15Be3) Burial 61
Published Sex: Male
Published Age-at-Death: Old Adult
Revised Sex: **Female**
Revised Age-at-Death: **44-52**
Relevant observations:

Sex:

- Subpubic angle is wide
- Ventral arc is evident
- Ischiopubic ramus is ridge-like
- Greater sciatic notch: 2
- Glabellar region: 2
- Supraorbital margins: 2

Age:

- Pubic symphyseal face is depressed, with a complete rim, minimal dorsal lipping, and minimal activity on the margin of the obturator foramen (44-60, mean = 51.47; Hartnett, 2010a)
- Sternal pit is U-shaped and rim edges are firm (39-49, mean = 43.52)
- Auricular surface is coarse-grained, with a loss of transverse organization and slight apical lipping (20-75, mean = 47.8; Osborne et al., 2004)
- Osteophytic lipping of thoracic and lumbar vertebrae
- Extensive antemortem tooth loss

Be3.62
Robbins Mound (15Be3) Burial 62
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Female**
Revised Age-at-Death: **16-17**
Relevant observations:

Sex:

- Greater sciatic notch: 3
- Glabellar region: 1.5
- Supraorbital margins: 1.5
- Mandibular canines (BL = 7.18 mm, MD = 5.04 mm; 72% probability of being female based on linear discriminant analysis

Age:

- Vertebral ring epiphyses are present, but open (> 14; Albert & Maples, 1995)
- Rib head epiphyses are unfused (< 25; Scheuer & Black, 2000)
- Distal humerus is fused (> 11; Scheuer & Black, 2000)
- Radial head is fused (> 11.5; Scheuer & Black, 2000)

- Line of fusion still evident at distal femur and distal tibia (> 14; Scheuer & Black, 2000)
- Observable third molar crowns are complete, roots approximately 2/3 complete (16-17; Smith, 1991)

Be3.63
Robbins Mound (15Be3) Burial 63
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **18-23**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5
- Glabellar region: 1
- Supraorbital margins: 2
- Mastoid processes: 3.5

Age:

- Medial clavicle epiphysis is fusing (>16; Scheuer & Black, 2000)
- Vertebral ring epiphyses have recently fused (18-25; Albert & Maples, 1995)
- Rib head epiphyses have recently fused, but scar is visible (> 17; Scheuer & Black, 2000)
- Iliac crest is fusing (< 23; Scheuer & Black, 2000)
- Observable third molars exhibit grade 1 wear

Be3.64
Robbins Mound (15Be3) Burial 64
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **34-62**
Relevant observations:

Sex:

- Greater sciatic notch: 3
- Glabellar region: 3
- Supraorbital margins: 2
- Mastoid processes: 2
- Mandibular canines (BL = 6.76 mm, MD = 4.83mm; 95.9% probability of being female based on linear discriminant analysis)

Age:
- Auricular surface is coarsely granular with islands of densification, remnants of transverse organization, and some retroauricular activity (20-75, mean = 47.8; Osborne et al., 2004)
- S1-S2 fused (25+; Scheuer & Black, 2000)
- Medial clavicle is fused (25+; Baker et al., 2005)
- Arthritic lipping on rib heads
- Osteophytic lipping evident on lower thoracic and lumbar vertebrae
- Antemortem loss of maxillary first molars

Be3.64b
Robbins Mound (15Be3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **4-6**
Relevant observations:

Age:
- Maxillary central incisors have not erupted (< 6.6; Smith, 1991)
- Maxillary first molars have not erupted (< 6; Smith, 1991)
- Maxillary right deciduous first molar is in place (> 2; Smith, 1991)
- Maxillary deciduous second molars are erupted and lightly worn (> 3; Smith, 1991)

Additional notes: This burial is labeled as 64-9, but is not consistent with the descriptions of Burials 9, 64, or even 49. These remains may, however, be those described as Burial 89 from the Robbins Mound.

Be3.65
Robbins Mound (15Be3) Burial 65
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **21-37**
Relevant observations:

Sex:
- Greater sciatic notch: 4.5
- Glabellar region: 4
- Mastoid processes: 3

Age:
- Auricular surface is becoming coarse-grained, but some striae are still evident (≤ 46, mean = 29.5; Osborne et al., 2004)

- Iliac crest is fused (>20, Scheuer & Black, 2000)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)

Be3.66
Robbins Mound (15Be3) Burial 66
Published Sex: Male
Published Age-at-Death: Infant
Revised Sex: **Indeterminate**
Revised Age-at-Death: **10-16 months**
Relevant observations:

Age:

- Tibial diaphysis measures 105.1 mm (6-9 months; Scheuer & Black, 2000)
- Mandibular deciduous second molar roots have just initiated (> 8.5 months; Smith, 1991)
- Mandibular first molar crown formation is between 1/3 to 1/2 complete (9.6 – 16 months; Smith, 1991)

Be3.67
Robbins Mound (15Be3) Burial 67
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by long bone fragments and some eroded tarsals.

Be3.68
Robbins Mound (15Be3) Burial 68
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **34-62**
Relevant observations:

Sex:

- Greater sciatic notch: 2
- Glabellar region: 4
- Supraorbital margins: 3.5
- Mastoid processes: 2
- Pronounced preauricular sulcus
- Mandibular corpus is fairly short

Age:
- Auricular surface is predominately coarse-grained with no transverse organization (20-75, mean = 47.8; Osborne et al., 2004)
- Osteophytic lipping and compression evident in lumbar vertebrae

Be3.69

Robbins Mound (15Be3) Burial 69
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:
- Glabellar region: 1
- Supraorbital margins: 1.5
- Mastoid processes: 3
- Mental eminence: 1
- Mandibular corpus is short
- Pronounced septal aperture

Age:
- Extensive osteophytic lipping on thoracic vertebrae
- Extensive antemortem tooth loss
- Arthritis on temporomandibular joint

Be3.70

Robbins Mound (15Be3) Burial 70
Published Sex: Female
Published Age-at-Death: Mature Adult
Revised Sex: **Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:
- Glabellar region: 1
- Supraorbital margins: 2.5
- Mastoid processes: 2
- Mental eminence: 1
- Hyperostosis frontalis interna

Age:
- Cervical vertebrae exhibit arthritic lipping
- Extensive antemortem tooth loss

Be3.71
Robbins Mound (15Be3) Burial 71
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **18-30**
Relevant observations:

Sex:

- Mandibular corpus is short
- Mandibular canines (BL = 6.96 mm, MD = 5.15 mm; 77% probability of being female based on linear discriminant analysis

Age:

- Cervical vertebral ring epiphyses are fused, but scar is still visible (18-30; Sherwood, 2015)
- Observable third molars exhibit grade 0.5 wear

Be3.72
Robbins Mound (15Be3) Burial 72
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**
Relevant observations:

Age:

- Observable second molars exhibit grade 1 wear
- Observable third molars exhibit grade 0.5 wear

Be3.73
Robbins Mound (15Be3) Burial 73
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by fragmentary tooth crowns.

Be3.74
Robbins Mound (15Be3) Burial 74 and Burial 76
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**

Revised Age-at-Death: **40-50**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Greater sciatic notch: 4.5
- Glabellar region: 2.5
- Supraorbital margins: 4
- Mastoid processes: 3

Age:

- Pubic symphyseal face is flattened but remnants of ridges and furrows remain, rim is complete aside from a ventral hiatus, slight dorsal lipping and minimal osteophytic activity on the margin of the obturator foramen (27-61, mean = 42.54; Hartnett, 2010a)
- Auricular surfaces are coarse-grained with moderate retroauricular activity (20-75, mean = 47.8; Osborne et al., 2004)
- Slight osteophytic lipping of cervical vertebrae
- Arthritic lipping of glenoid fossa and humeral head

Additional notes: Original excavation notes suggest that the remains assigned to Burial 76 were associated with those assigned to Burial 74. Given that these remains do not reduplicate the elements of Burial 74 and the occurrence of arthritis in the glenohumeral joints of the remains assigned to each number, both sets of remains are combined here.

Be3.75
Robbins Mound (15Be3) Burial 75
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **44-60**
Relevant observations:

Sex:

- Subpubic angle is wide
- Ventral arcs are evident
- Ischiopubic ramus is ridge-like
- Glabellar region: 1
- Supraorbital margins: 2.5
- Mastoid processes: 1
- Mandibular corpus is short
- Prominent frontal bosses

Age:

- Pubic symphyseal face is flat to slightly depressed with a complete rim, dorsal lipping, and osteophytic activity on the margin of the obturator foramen (44-60, mean = 51.47; Hartnett, 2010a)
- Extensive osteophytic lipping throughout the vertebral column, with one collapsed lower thoracic vertebra
- Arthritic lipping evident on glenoid fossa and tibial condyles
- Extensive antemortem maxillary tooth loss

Be3.76
Robbins Mound (15Be3) Burial 76
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **See Be3.74**
Revised Age-at-Death: **See Be3.74**

Be3.77
Robbins Mound (15Be3) Burial 77
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be3.78
Robbins Mound (15Be3) Burial 78
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18-29**
Relevant observations:

Age:

- Cervical vertebral ring epiphyses are fusing, but not complete (< 29; Sherwood, 2015)
- Maxillary third molars exhibit grade 0.5 wear (> 18; Smith, 1991)
- Maxillary second molars exhibit grade 1 wear

Be3.79
Robbins Mound (15Be3) Burial 79
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **44-60**
Relevant observations:

Sex:

- Subpubic angle is wide
- Ventral arc is evident
- Glabellar region: 1.5
- Supraorbital margins: 2
- Mental eminence: 1

Age:

- Pubic symphyseal face is depressed, with complete rim and moderate dorsal lipping (44-60, mean = 51.47; Hartnett, 2010a)
- Slight osteophytic lipping of lumbar vertebrae
- Observable third molars exhibit grade 2.5 wear
- Observable first molars exhibit grade 4 wear

Be3.80
Robbins Mound (15Be3) Burial 80
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments and some broken teeth.

Be3.81
Robbins Mound (15Be3) Burial 81
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a few cranial fragments and a few broken mandibular teeth.

Be3.82
Robbins Mound (15Be3) Burial 82
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be3.83
Robbins Mound (15Be3) Burial 83
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 1
- Supraorbital margins: 1
- Small mastoids: 1.5
- Mental eminence: 1

Age:

- Much of the dentition exhibits grade 3 wear

Be3.84
Robbins Mound (15Be3) Burial 84
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by some fragmentary tooth crowns

Be3.85
Robbins Mound (15Be3) Burial 85
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **Adult**

Relevant observations:

Sex:

- Talus (max length = 44.4 mm, trochlea length = 26.6 mm, trochlea width = 27.6 mm; 99.9% probability of being a female based on linear discriminate analysis)

Be3.86
Robbins Mound (15Be3) Burial 86
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by fragments of the lower extremities.

Be3.87
Robbins Mound (15Be3) Burial 87
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by fragments of a left tibia, miscellaneous long bone fragments, and broken tarsals and metatarsals.

Be3.88
Robbins Mound (15Be3) Burial 88
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Female**
Revised Age-at-Death: **13-14**
Relevant observations:

Sex:

- Mandibular canines (BL = 5.86 mm, MD = 4.32 mm; 99.9% probability of being female based on linear discriminate analysis)

Age:

- Neural arches are fused to vertebral centra (> 4; Scheuer & Black, 2000)
- No vertebral ring epiphyses (<18; Sherwood, 2015)
- Observable second molars exhibit grade 0.5 wear (> 12; Smith, 1991)
- Observable third molars have completed crown formation and initiated root formation (13-14; Smith, 1991)

Be3.88a
Robbins Mound (15Be3) Burial 88A
Published Sex: Male
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **2.5-3.5**
Relevant observations:

Age:

- Observable first molars have complete crowns and have initiated root formation (2.5-3.5; Smith, 1991)
- Observable deciduous second molars are complete, but minimally worn (> 2.5; Smith, 1991)

Be3.89
Robbins Mound (15Be3) Burial 89
Published Sex: Male
Published Age-at-Death: Child
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection. However, these may be the remains designated Burial 64-9, or Be3.64b.

Be15.1
Riley Mound (15Be15) Burial 1
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **20-22**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Mental eminence: 4

Age:

- Sternal pits of ribs are shallow and exhibit billowing, but rim is present (18-22; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing; there is no apical activity (≤ 27, mean = 21.1; Osborne et al., 2004)
- Rib head epiphyses are fusing (17-25; Scheuer & Black, 2000)
- Iliac crest and ischial tuberosities are fusing (almost complete) (20-23; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Be15.2
Riley Mound (15Be15) Burial 2
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Probable Male**
Revised Age-at-Death: **18-27**
Relevant observations:

Sex:

- Greater sciatic notch: 5

Age:

- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on lunate surface of acetabulum (17-39; Calce, 2012)
- Mandibular third molars exhibit grade 0.5 wear

Be15.3
Riley Mound (15Be15) Burial 3
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be15.4
Riley Mound (15Be15) Burial 4
Published Sex: Indeterminate
Published Age-at-Death: Probable Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be15.5
Riley Mound (15Be15) Burial 5
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **20-22**

Relevant observations:

Sex:

- Greater sciatic notch: 4.5

Age:

- Sternal rib is faintly indented and exhibits billowing (18-22; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on lunate surface of the acetabulum (17-39; Calce, 2012)
- Vertebral ring epiphyses are actively fusing (18-26; Albert & Maples, 1995)
- Iliac crest is fusing, ischial tuberosity is fused (20-23; Scheuer & Black, 2000)

Be15.6

Riley Mound (15Be15) Burial 6
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be15.7

Riley Mound (15Be15) Burial 7
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be15.8

Riley Mound (15Be15) Burial 8
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Cremated remains; too fragmentary for evaluation.

Be17.1
Landing Mound (15Be17) Burial 1
Published Sex: Probable Female
Published Age-at-Death: 22
Revised Sex: N/A
Revised Age-at-Death: N/A

Additional notes: The remains given this number (Burial 23-1) are not consistent with the description of this burial (it was originally described as only a fragment of an occipital bone). They are most consistent with the description of Burial 2 and have been treated as such for the analyses undertaken in this research.

Be17.2
Landing Mound (15Be17) Burial 2
Published Sex: Probable Male
Published Age-at-Death: 22
Revised Sex: **Indeterminate**
Revised Age-at-Death: **25+**
Relevant observations:
Sex:
Mastoid processes: 3
Gonial angle is oblique
Age:
Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
Mandibular fourth premolars and first molars exhibit grade 3 wear

Additional notes: These remains (labeled as Burial 23-1) are most consistent with the description of Burial 2 and have been reassigned to this number for the analyses undertaken in this research

Be17.3
Landing Mound (15Be17) Burial 3
Published Sex: Probable Female
Published Age-at-Death: 16-17
Revised Sex: **Indeterminate**
Revised Age-at-Death: **14-16**
Relevant observations:

Age:

- Rib head epiphyses are unfused (< 25; Scheuer & Black, 2000)
- No vertebral ring epiphyses are present (< 16; Scheuer & Black, 2000)

- Epiphysis for proximal humerus has initiated fusion (< 20; Scheuer & Black, 2000)
- Radial head is fusing, distal epiphysis is unfused (11.5 – 20; Scheuer & Black, 2000)
- Epiphysis for olecranon process is fusing (12-16; Scheuer & Black, 2000)
- Bases for manual phalanges are unfused (< 16.5; Scheuer & Black, 2000)
- Iliac crest is unfused (< 20; Scheuer & Black, 2000)
- Ischial tuberosity is unfused (< 18; Scheuer & Black, 2000)
- Epiphyses for greater trochanter has initiated fusion (14-18; Scheuer & Black, 2000)
- Femoral head has initiated fusion (12-19; Scheuer & Black, 2000)
- Femoral condyles have initiated fusion (14-20; Scheuer & Black, 2000)
- Epiphyses for tibial plateaus have initiated fusion (13-19; Scheuer & Black, 2000)
- Distal tibial epiphyses have initiated fusion (14-18; Scheuer & Black, 2000)
- Epiphysis for fibular head has initiated fusion (12-20; Scheuer & Black, 2000)
- Calcaneal epiphysis is fusing (10-20; Scheuer & Black, 2000)
- Bases of third through fifth metatarsals have fused, base of first metatarsal has not (11-18; Scheuer & Black, 2000)
- Observable third molars are not in occlusion and their roots are approximately half complete (14-16; Smith, 1991)

Additional notes: These remains, although labeled as Burial 23-2, belong to Burial 3 (they have been matched using photographic evidence) and are treated as such within the analyses undertaken in this research. They are most likely associated with the cranium labeled Burial 23-3, whose dental remains are consistent with the age-at-death suggested by the post-cranial remains.

Be17.4
Landing Mound (15Be17) Burial 4
Published Sex: Probable Male
Published Age-at-Death: 4-5
Revised Sex: **Indeterminate**
Revised Age-at-Death: **2-3**
Relevant observations:

Age:

- Neural arches are complete, but generally not fused to vertebral centra (aside from one lumbar vertebra that has partially achieved neurocentral union) (2-3; Scheuer & Black, 2000)
- Humeral diaphyseal length is 136 mm (2-2.5; Scheuer & Black, 2000)

- Radial diaphyseal length of 103.3 mm (2-3; Scheuer & Black, 2000)
- Ulnar diaphyseal length of 117.34 mm (2.5-3; Scheuer & Black, 2000)
- Deciduous first molars are in occlusion but exhibit minimal wear (> 2; Smith, 1991)
- Maxillary deciduous second molar has a complete root (2.5-3.5; Smith, 1991)
- Observable first molar crowns are complete (2-2.5; Smith, 1991)

Be17.5
Landing Mound (15Be17) Burial 5
Published Sex: Male
Published Age-at-Death: 24
Revised Sex: **Male**
Revised Age-at-Death: **20-22**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arcs are evident
- Greater sciatic notch: 4.5
- Mental eminence: 5
- Gonial angle is square

Age:

- Pubic symphyseal face exhibits strong ridge and furrow system, with dorsal demi-face beginning to fill in (20-25, mean = 23.2; Hartnett, 2010a)
- Sternal pits exhibit a slight indentation but still exhibit billowing (18-22; Hartnett, 2010b)
- Medial clavicle is fusing (> 16; Scheuer & Black, 2000)
- Femoral head has fused, but scar is still visible (> 19; Scheuer & Black, 2000)

Be17.6
Landing Mound (15Be17) Burial 6
Published Sex: Male
Published Age-at-Death: 30-35
Revised Sex: **Male**
Revised Age-at-Death: **45-59**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident

- Ischiopubic ramus is very broad
- Greater sciatic notch: 4.5
- Glabellar region: 2
- Mastoid processes: 2
- Mental eminence: 3
- Gonial angle is oblique

Age:

- Pubic symphyseal face is flattened, exhibiting a complete rim and remnants of the ridge and furrow system (27-61, mean = 42.54; Hartnett, 2010a)
- Sternal ribs exhibit a deep, U-shaped pit with an irregular rim (consistent with Phase IV/V; combined range of 36-59, with means equal to 42.43 and 52.05; Hartnett, 2010b)
- Auricular surface exhibits islands of densification, remnants of transverse organization, and moderate retroauricular activity (20-75, mean = 47.8; Osborne et al., 2004)
- Vertebrae exhibit osteophytic lipping and compression of the vertebral bodies, especially in the cervical and lumbar regions
- Maxilla is completely edentulous and the mandibular incisors and molars have all been lost antemortem

Be17.7
Landing Mound (15Be17) Burial 7
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **25-30**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Ischiopubic ramus is thick
- Greater sciatic notch: 5

Age:

- Pubic symphyseal face exhibits marked ridges and furrows but appears slightly irregular, rim has built up on the dorsal margin but exhibits a sizeable ventral hiatus (21-44, mean = 29.53; Hartnett, 2010a)
- Auricular surface exhibits striae and residual fine granularity (≤ 46, mean = 29.5; Osborne et al., 2004)

- Acetabulum shows minor groove development on the lunate surface, no osteophytic activity below the anterior inferior iliac spine (17-39; Calce, 2012)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Epiphysis for medial clavicle is present and fusing (16-30; Scheuer & Black, 2000)

Additional notes: The cranium labeled as belonging to Burial 5b is likely associated with Burial 7 and is treated as such for the analyses undertaken in this research.

Be17.8
Landing Mound (15Be17) Burial 8
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be17.9
Landing Mound (15Be17) Burial 9
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a heavily eroded portion of cranial vault.

Be17.10
Landing Mound (15Be17) Burial 10
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be17.11
Landing Mound (15Be17) Burial 11
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be17.12
Landing Mound (15Be17) Burial 12
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Be17.13
Landing Mound (15Be17) Burial 13
Published Sex: Male
Published Age-at-Death: 30
Revised Sex: **Male**
Revised Age-at-Death: **40-55**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Glabellar region: 4.5
- Supraorbital margins: 4.5
- Mastoid processes: 4.5
- Mental eminence: 2
- Gonial angle is oblique

Age:

- Auricular surface is coarsely granular with faint striations (20-75, mean = 47.8; Osborne et al., 2004)
- Osteophytic lipping on vertebral bodies, especially in the lumbar region
- Arthritic lipping of the femoral and tibial condyles as well as within the semilunar notch of the ulna

Be17.14
Landing Mound (15Be17) Burial 14
Published Sex: Male
Published Age-at-Death: 30
Revised Sex: **Male**
Revised Age-at-Death: **40-50**
Relevant observations:

Sex:

- Subpubic angle is narrow
- Greater sciatic notch: 2.5
- Supraorbital ridges: 3.5
- Mastoid processes: 4.5
- Septal aperture in right humerus
- Mandibular canines (BL = 7.96mm, MD = 5.7 mm; 98.6% probability of being male based on linear discriminant analysis)

Age:

- Pubic symphyseal face is flattened, rim is complete (27-61, mean = 42.54; Hartnett, 2010a)
- Sternal ribs have U-shaped pits with thin walls, rims becoming irregular (36-48, mean = 42.43; Hartnett, 2010b)
- Auricular surface exhibits islands of densification, remnants of transverse striae, and some apical activity (20-75, mean = 47.8; Osborne et al., 2004)
- Severe osteophytic lipping of vertebrae, especially in cervical and lumbar regions (accompanied by compression of the cervical vertebral bodies)
- Osteophytes in the semilunar notches of both ulnae
- Medial clavicle is fused (25+; Baker et al., 2005)

Be17.15
Landing Mound (15Be17) Burial 15
Published Sex: Female
Published Age-at-Death: 21-22
Revised Sex: **Probable Female**
Revised Age-at-Death: **18-21**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5
- Mental eminence: 1.5
- Gonial angle is oblique
- Bilateral septal apertures
- Mandibular canines (BL = 7.55 mm, MD = 5.22 mm; 72.6% probability of being female based on linear discriminant analysis)

Age:

- Auricular surface exhibits transverse organization, although texture is difficult to discern (≤ 46; Osborne et al., 2004)
- Acetabulum does not exhibit groove formation on the lunate surface nor osteophyte activity inferior to the anterior inferior iliac spine (17-39; Calce, 2012)
- Iliac crest is in the process of fusing, attached in segments
- Medial clavicle is unfused (< 21; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Be20.1
Crigler Mound (15Be20) Burial 1
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be20.2
Crigler Mound (15Be20) Burial 2
Published Sex: Indeterminate
Published Age-at-Death: Probable Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be20.3
Crigler Mound (15Be20) Burial 3
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 5

Age:

- Observable first molars exhibit grades 3 and 4 wear
- Observable second molars exhibit grade 3 wear

        - Observable third molars exhibit grade 2 wear

Be20.4
Crigler Mound (15Be20) Burial 4
Published Sex: Indeterminate
Published Age-at-Death: Probable Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by some very fragmentary cremated remains.

Be20.5
Crigler Mound (15Be20) Burial 5
Published Sex: Male
Published Age-at-Death: 28-30
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only some cranial fragments, some teeth, and some burned long bone fragments.

Be20.6
Crigler Mound (15Be20) Burial 6
Published Sex: Probable Male
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **6-8**
Relevant observations:

Age:

- Acetabulum is unfused (≤ 14; Scheuer & Black, 2000)
- Apices of roots of observable first molars are open (< 8.5; Smith, 1991)
- Root of mandibular left lateral incisor is approximately 2/3 complete (5.5-7; Smith, 1991)
- Root formation for mandibular left third premolar is approximately 1/4 complete (6-8.5; Smith, 1991)
- Root formation for mandibular left fourth premolar has just initiated (6.5-7.5; Smith, 1991)

Be20.7
Crigler Mound (15Be20) Burial 7
Published Sex: Female
Published Age-at-Death: 14-16
Revised Sex: **Male**
Revised Age-at-Death: 12-15
Relevant observations:

Sex:

- Mandibular canines (BL = 7.38 mm, MD = 5.56 mm; 85.8% probability of being male based on linear discriminant analysis)

Age:

- No vertebral ring epiphyses are present (≤ 16; Albert & Maples, 1995)
- Dens is complete (≥ 12; Scheuer & Black, 2000)
- Observable third molar crowns are complete, roots are approximately 1/4 complete (12.4-14.8; Smith, 1991)
- Observable second molars exhibit grade 0.5 wear

Be20.8
Crigler Mound (15Be20) Burial 8
Published Sex: Probable Male
Published Age-at-Death: 7-8
Revised Sex: **Indeterminate**
Revised Age-at-Death: **6-13**
Relevant observations:

Age:

- Observable first molars exhibit grade 1 wear (≥ 6; Smith, 1991)
- Observable second molars exhibit grade 0 wear (≤ 13; Smith, 1991)

Additional notes: This individual is represented only by some tooth crowns embedded in clay.

Be20.9
Crigler Mound (15Be20) Burial 9
Published Sex: Probable Male
Published Age-at-Death: Probable Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a few cranial fragments.

Be20.10
Crigler Mound (15Be20) Burial 10
Published Sex: Male
Published Age-at-Death: 20-22
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**
Relevant observations:

Age:

- Observable third molars exhibit grade 0.5 wear

Be20.11
Crigler Mound (15Be20) Burial 11
Published Sex: Male
Published Age-at-Death: 28-40
Revised Sex: **Male**
Revised Age-at-Death: **40-55**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Sacrum is very curved
- Greater sciatic notch: 4
- Glabellar region: 5
- Supraorbital margins: 4
- Mastoid processes: 4
- Mental eminence: 4
- Square gonial angles

Age:

- Pubic symphyseal face is flat to slightly depressed, exhibiting slight dorsal lipping and some osteophytic activity on the margin of the obturator foramen (37-72, mean = 53.87; Hartnett, 2010a)
- Auricular surface is mostly coarse-grained with faint striae and some apical activity (≤ 69, mean = 42; Osborne et al., 2004)
- Groove formation on lunate surface of acetabulum (40-64; Calce, 2012)
- Vertebral ring epiphyses are fused, but no osteophytic lipping is evident

Be20.12
Crigler Mound (15Be20) Burial 12
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented by highly fragmented cremated remains. Snow's notes suggest that the vertebrae exhibit osteophytic lipping.

Be20.13
Crigler Mound (15Be20) Burial 13
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented by highly fragmented cremated remains. Snow's notes suggest that there is an adult and an infant included in this deposit.

Be20.14
Crigler Mound (15Be20) Burial 14
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented by highly fragmented cremated remains. Snow's notes suggest that there are at least two adults included in this deposit.

Be20.15
Crigler Mound (15Be20) Burial 15
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented by highly fragmented cremated remains and accompanied by some charred faunal bones as well as shell and some lithic debris.

Be20.16
Crigler Mound (15Be20) Burial 16
Published Sex: Male
Published Age-at-Death: 20-25
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Mandibular canines (BL = 8.17 mm, MD = 6.04 mm; 99.8% probability of being a male based on linear discriminant analysis)

Age:

- Observable first molars exhibit grade 2 wear
- Observable second molars exhibit grade 1 wear
- Observable third molars exhibit grade 0.5 wear

Be32.1
Hartman Mound (15Be32) Burial 1
Published Sex: Male
Published Age-at-Death: 28
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments.

Be32.2
Hartman Mound (15Be32) Burial 2
Published Sex: Male
Published Age-at-Death: 28
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by cranial fragments and an eroded vertebra.

Be32.3
Hartman Mound (15Be32) Burial 3
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**

Relevant observations:

Sex:
- Talus (max length = 51.7 mm, trochlea length = 34.4 mm, trochlea width = 31.3 mm; 92.5% probability of being male based on linear discriminant analysis)

Age:
- Maxillary left central incisor exhibits grade 2 wear (only tooth present)

Be32.4
Hartman Mound (15Be32) Burial 4
Published Sex: Male
Published Age-at-Death: 22
Revised Sex: **Probable Female**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:
- Glabellar region: 1.5
- Supraorbital margins: 2
- Mastoid processes: 3

Age:
- Vertebral ring epiphyses are fused (18+; Albert & Maples, 1995)
- Maxillary first molar exhibit grade 2 wear
- Mandibular left third molar exhibits grade 0.5 wear

Be32.5
Hartman Mound (15Be32) Burial 5
Published Sex: Male
Published Age-at-Death: 22
Revised Sex: **Female**
Revised Age-at-Death: **18-20**
Relevant observations:

Sex:
- Glabellar region: 2
- Supraorbital margins: 2
- Mastoid processes: 1
- Mandibular corpus is short

Age:
- Thoracic vertebral ring epiphyses are fusing, but still exhibit gaps (14-20; Albert & Maples, 1995)

- Rib head epiphyses are fused (> 17; Scheuer & Black, 2000)
- Medial clavicle epiphysis is fusing (> 16; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Be32.6
Hartman Mound (15Be32) Burial 6
Published Sex: Male
Published Age-at-Death: 23
Revised Sex: **Male**
Revised Age-at-Death: **18-21**
Relevant observations:

Sex:

- Subpubic angle is narrow
- Greater sciatic notch: 4.5
- Mastoid processes: 5

Age:

- Pubic symphyseal face exhibits strong ridges and furrows (18-22; Hartnett, 2010a)
- Sternal pit is shallow and exhibits billowing (18-22; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fusing; thoracic are still largely open while lumbar are recently fused with an evident scar (16-21; Albert & Maples, 1995)
- Rib head epiphyses are fusing and recently fused with a visible scar (> 17; Scheuer & Black, 2000)
- Medial clavicle has not begun to fuse (< 21; Scheuer & Black, 2000)
- Distal radius has recently fused, with scar still visible (> 16; Scheuer & Black, 2000)
- Ischial tuberosity is fused (> 16; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Tibial plateau has recently fused, with scar still visible (> 15; Scheuer & Black, 2000)
- Calcaneal tuberosity is fused (> 18; Scheuer & Black, 2000)
- Mandibular right third molar’s root apex is open (≈ 19; Smith, 1991)

Be32.7
Hartman Mound (15Be32) Burial 7
Published Sex: Male
Published Age-at-Death: 22
Revised Sex: **Male**
Revised Age-at-Death: **18-27**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Glabellar region: 4
- Mastoid processes: 4
- Mental eminence: 4
- Gonial angles are square

Age:

- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)

Be32.8
Hartman Mound (15Be32) Burial 8
Published Sex: Female
Published Age-at-Death: 20
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented by highly fragmented cremated remains, primarily cranial.

Be32.9
Hartman Mound (15Be32) Burial 9
Published Sex: Female
Published Age-at-Death: 20
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Mental eminence: 4
- Gonial angle is very square
- Mandibular canines (BL = 7.5 mm, MD = 5.08 mm; 56.2% probability of being male based on linear discriminant analysis)

Age:

- Observable first molars exhibit grade 3 wear

    - Observable second molars exhibit grade 2 wear
    - Mandibular right third molar exhibits grade 1 wear

Be32.10
Hartman Mound (15Be32) Burial 10
Published Sex: Probable Male
Published Age-at-Death: 14-16
Revised Sex: **Probable Female**
Revised Age-at-Death: **11-13**
Relevant observations:

Sex:

- Mental eminence: 3
- Mandibular canines (BL = 7.11 mm, MD = 5.28 mm; 55% probability of being female based on linear discriminant analysis)

Age:

- Epiphysis for proximal radius is unfused (< 13; Scheuer & Black, 2000)
- Mandibular right first molar exhibits grade 1 wear
- Associated second molar was in occlusion, based on interproximal wear facet (> 11; Smith, 1991)

Additional notes: The remains labeled as Burial 11 are inconsistent with the description of this burial and consistent in terms of age-at-death with those labeled as Burial 10.

Be32.11
Hartman Mound (15Be32) Burial 11
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: These remains were labeled as Burial 12, but are most consistent with the description of Burial 11. This individual is represented only by fragments of the lower extremities.

Be32.12
Hartman Mound (15Be32) Burial 12
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: These remains were labeled as Burial 13, but are most consistent with the description of Burial 12. This individual is represented only by a left tibial diaphysis.

Be32.13
Hartman Mound (15Be32) Burial 13
Published Sex: Indeterminate
Published Age-at-Death: Infant
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Infant**

Additional notes: These remains consist of fragments of the cranial vault of an infant and were only labeled with their provenience (Square 35R2). They are consistent with the published description of Burial 13, and no remains given this number were encountered during data collection.

Be32.14
Hartman Mound (15Be32) Burial 14
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Juvenile**

Additional notes: These remains consist of an immature right temporal bone and were only labeled with their provenience (Square 40L1). They are consistent with the published description of Burial 14.

Be32.15
Hartman Mound (15Be32) Burial 15
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Female**
Revised Age-at-Death: **Adult**
Relevant observations:
Sex:
Talus (max length = 49.1 mm, trochlea length = 29.2 mm, trochlea width = 27.7 mm; 95.2% probability of being female based on linear discriminate analysis)

Additional notes: These remains consist only of fragments of the left lower extremity, excluding the femur. They were labeled as Burial 14, but are inconsistent with the published description of this burial. They have been given the new number Be32.15 for the purposes of this research.

Be32.16
Hartman Mound (15Be32) Burial 16
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: These remains consist only of a portion of the occipital bone. They were labeled as Burial 15, but the published report does not mention this burial number. They have been given the new number Be32.16 for the purposes of this research.

Bh15.1
Morgan Stone Mound (15Bh15) Burial 1
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Probable Female**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Talus (max length = 48.42 mm, trochlea length = 29.1 mm; this talus does not have the full suite of measurements to obtain a probability from the linear discriminant analysis, but the measurements that do exist fall comfortably within the range of those individuals who have been estimated to be female)

Age:

- All observable epiphyses have fused and exhibit no scars
- No observable osteophytic lipping

Bh15.2
Morgan Stone Mound (15Bh15) Burial 2
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Talus (max length = 54.57 mm, trochlea length = 34.9mm, trochlea width = 30.08 mm; 98.4% probability of being male based on linear discriminant analysis)

Age:

- All observable epiphyses have fused without evident scarring
- No observable osteophytic lipping

Bh15.3
Morgan Stone Mound (15Bh15) Burial 3
Published Sex: Probable Female
Published Age-at-Death: 24
Revised Sex: **Probable Female**
Revised Age-at-Death: **17-20**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5
- Glabellar region: 1
- Supraorbital margins: 3
- Mastoid processes: 3
- Mental eminence: 1
- Oblique gonial angle

Age:

- Vertebral ring epiphyseal attachment is progressing, with some epiphyses having just initiated fusion while others are nearing completion (17-20; Albert & Maples, 1995)
- No anatomical interruption between the lunate surface of the acetabulum and the acetabular rim (17-39; Clace, 2012)

Bh15.4
Morgan Stone Mound (15Bh15) Burial 4
Published Sex: Female
Published Age-at-Death: 22
Revised Sex: **Female**
Revised Age-at-Death: **17-20**
Relevant observations:

Sex:

- Greater sciatic notch: 1
- Glabellar region: 1.5

Age:

- Auricular surfaces are fine-grained and exhibit billowing; apex is smooth (≤ 27, mean = 21.1; Osborne et al., 2004)

- No spicules evident on posterior aspect of lunate surface of acetabulum, bone is smooth and dense between the acetabular rim and the anterior inferior iliac spine (17-39; Calce, 2012)
- Fusion scar evident on the head of the left first rib (17-25; Scheuer & Black, 2000)
- Vertebral ring epiphyses have either completed union or exhibit recent union (18-26; Albert & Maples, 1995)
- Mandibular third molar roots are incomplete (17-19.5; Smith, 1991)

Bh15.5
Morgan Stone Mound (15Bh15) Burial 5
Published Sex: Female
Published Age-at-Death: 20-22
Revised Sex: **Female**
Revised Age-at-Death: **18-22**
Relevant observations:

Sex:

- Ventral arc is evident
- Greater sciatic notch: 1

Age:

- Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett, 2010a)
- No anatomical separation between the lunate surface of the acetabulum and the acetabular rim (17-39; Calce, 2012)
- Vertebral ring epiphyses are in the process of union, with some having just initiated fusion while others are nearing completion (17-20; Albert & Maples, 1995)
- Iliac crest has nearly completed union, with scarring evident as well as small segments of separation (20-23; Scheuer & Black, 2000)

Bh15.6
Morgan Stone Mound (15Bh15) Burial 6
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **< 11**
Relevant observations:

Age:

- Although cremated, the morphology and size of the tooth roots included in this deposit indicate that they represent deciduous teeth

Bh15.7
Morgan Stone Mound (15Bh15) Burial 7
Published Sex: Probable Female
Published Age-at-Death: 26
Revised Sex: **Probable Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Mastoid processes: 3
- Mental eminence: 4

Age:

- Osteophytic lipping evident on the fragmentary cervical vertebrae
- Arthritic lipping on the heads of the first metatarsals
- Arthritic lipping on the left femoral head

Fa11.1
Drake Mound (15Fa11) Burial 1
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.2
Drake Mound (15Fa11) Burial 2
Published Sex: Probable Female
Published Age-at-Death: Young adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.3
Drake Mound (15Fa11) Burial 3
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.4
Drake Mound (15Fa11) Burial 4
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.5
Drake Mound (15Fa11) Burial 5
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.6
Drake Mound (15Fa11) Burial 6
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.7
Drake Mound (15Fa11) Burial 7
Published Sex: Probable Female
Published Age-at-Death: 18-22
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa11.8
Drake Mound (15Fa11) Burial 8
Published Sex: Indeterminate
Published Age-at-Death: 2-6 months
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa152.1
Fisher Mound (15Fa152) Burial 1
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Fa152.2
Fisher Mound (15Fa152) Burial 2
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: Represented only by a portion of the right scapula and a maxillary premolar exhibiting grade 4 wear. Accompanied by a series of (mostly maxillary) teeth representing at least two individuals that have been drilled and/or incised for wrapping.

Fa152.2a
Fisher Mound (15Fa152) Burial 2B1
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual is represented only by portions of both parietals, the occipital, and the frontal that have been cut and ground to fashion a bowl from the cranial vault.

Fa152.2b
Fisher Mound (15Fa152) Burial 2B4
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual is represented by most of the right parietal, a small portion of the left parietal (along the sagittal suture), a part of the frontal, and a part of the occipital that have all been cut and ground to fashion a bowl from the cranial vault.

Fa152.2c
Fisher Mound (15Fa152) Burial 2B5
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual is represented by a portion of a bowl fashioned from the cranial vault that consists of the left parietal, a small portion of the left temporal squama, and the left portion of the frontal.

Fa152.2d
Fisher Mound (15Fa152) Burial 2B6
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual is represented only by a right humeral head and diaphysis that, although they do not articulate, likely originate from the same bone.

Fa152.2e
Fisher Mound (15Fa152) Burial 2B7
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Mental eminence: 3
- Gonial angle is square

  - Mandibular canines (BL = 7.49 mm, MD = 5.4 mm; 81.8% probability of being male based on linear discriminant analysis)

Age:
  - Observable first molars exhibit grade 2 wear
  - Observable second molars exhibit grade 2 wear
  - Observable third molars exhibit grade 1 wear

Additional notes: This individual is represented only by a mandible.

Fa152.2f
Fisher Mound (15Fa152) Burial 2B8
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:
  - Mental eminence: 2.5
  - Gonial angle is square
  - Mandibular corpus is tall
  - Mandibular canines (BL = 7.98 mm, MD = 5.5 mm; 97% probability of being male based on linear discriminant analysis)

Age:
  - Observable first molars exhibit grade 2 wear
  - Observable second molar exhibit grade 1 wear
  - Observable third molars exhibit grade 1 wear

Additional notes: This individual is represented only by a mandible.

Fa152.2g
Fisher Mound (15Fa152) Burial 2B9
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual is represented only by a right mandibular condyle, a fragment of what is likely the alveolar portion of the mandible, and a small cranial fragment with a ground edge.

Fa152.2h
Fisher Mound (15Fa152) Burial 2B10
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Mental eminence: 2
- Gonial angle is square
- Mandibular corpus is tall
- Mandibular canines (BL = 8.56 mm, MD = 6.13 mm; 99.9% probability of being male based on linear discriminant analysis)

Age:

- Observable first molars exhibit grade 1 wear
- Observable second molars exhibit grades 0.5 and 1 wear
- Observable third molars exhibit grade 0.5 wear

Additional notes: This individual is represented only by a mandible.

Fa152.3
Fisher Mound (15Fa152) Burial 3
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa152.3a
Fisher Mound (15Fa152) Burial 3B17
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection – just an empty plastic bag and a note indicating that its contents have been removed for mtDNA analysis.

Fa152.3b
Fisher Mound (15Fa152) Burial 3B18
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by a few miscellaneous bone fragments.

Fa152.4
Fisher Mound (15Fa152) Burial 4
Published Sex: Unrecorded
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa152.5
Fisher Mound (15Fa152) Burial 5
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa152.6
Fisher Mound (15Fa152) Burial 6
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Fa152.7
Fisher Mound (15Fa152) Burial 7
Published Sex: Indeterminate
Published Age-at-Death: Infant
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Infant**

Additional notes: This individual is represented only by copper-stained cranial vault fragments.

Fa152.8
Fisher Mound (15Fa152) Burial 8
Published Sex: Indeterminate
Published Age-at-Death: Infant
Revised Sex: **Indeterminate**
Revised Age-at-Death: **2-5 months**
Relevant observations:
Age:
- Mandibular deciduous first molar crowns are nearing completion; mandibular deciduous second molar crowns are almost half complete (< 5 months; Smith, 1991)
- Mandibular deciduous central incisor crowns are complete, with roots having just initiated (> 2 months; Smith, 1991)

Fa152.9
Fisher Mound (15Fa152) Burial 9
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **14.5+**
Relevant observations:
Age:
Second metacarpal is complete (Scheuer & Black, 2000)

Additional notes: This individual is represented only by a left second metacarpal.

Jo2.1
C&O Mounds (15Jo2) Burial 1
Published Sex: Probable Male
Published Age-at-Death: 6-7
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo2.2
C&O Mounds (15Jo2) Burial 2
Published Sex: Probable Male
Published Age-at-Death: 1-2
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo2.3
C&O Mounds (15Jo2) Burial 3
Published Sex: Probable Male
Published Age-at-Death: 1-2
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo2.4
C&O Mounds (15Jo2) Burial 4
Published Sex: Female
Published Age-at-Death: 24
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo2.5
C&O Mounds (15Jo2) Burial 5
Published Sex: Male
Published Age-at-Death: 2-3
Revised Sex: **N/A**

Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo9.1
C&O Mounds (15Jo9) Burial 1
Published Sex: Probable Male
Published Age-at-Death: 12-18
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Juvenile**
Relevant observations:

Age:

- Maxillary second molars exhibit grade 1 wear
- Mandibular second molars exhibit grade 0.5 wear
- All observable third molars exhibit grade 0 wear

Additional notes: Represented only by a series of tooth crowns embedded in plaster.

Jo9.2
C&O Mounds (15Jo9) Burial 2
Published Sex: Probable Female
Published Age-at-Death: Probable Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.3
C&O Mounds (15Jo9) Burial 3
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Probable Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Talus (max length = 50.1 mm, trochlea length = 33.9 mm, trochlea width = 29.9 mm; 72.3% probability of being male based on linear discriminant analysis)

Additional notes: Represented only by partially cremated remains.

Jo9.4
C&O Mounds (15Jo9) Burial 4
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.5
C&O Mounds (15Jo9) Burial 5
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.6
C&O Mounds (15Jo9) Burial 6
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.7
C&O Mounds (15Jo9) Burial 7
Published Sex: Probable Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.8
C&O Mounds (15Jo9) Burial 8
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**

Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.9
C&O Mounds (15Jo9) Burial 9
Published Sex: Probable Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.10
C&O Mounds (15Jo9) Burial 10
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo9.11
C&O Mounds (15Jo9) Burial 11
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.12
C&O Mounds (15Jo9) Burial 12
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.13
C&O Mounds (15Jo9) Burial 13
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo9.14
C&O Mounds (15Jo9) Burial 14
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.15
C&O Mounds (15Jo9) Burial 15
Published Sex: Probable Female and Probable Male
Published Age-at-Death: Young Adult and Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.16
C&O Mounds (15Jo9) Burial 16
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.17
C&O Mounds (15Jo9) Burial 17
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**

Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.18
C&O Mounds (15Jo9) Burial 18
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.19
C&O Mounds (15Jo9) Burial 19
Published Sex: Unrecorded
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Jo9.20
C&O Mounds (15Jo9) Burial 20
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.21
C&O Mounds (15Jo9) Burial 21
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.22
C&O Mounds (15Jo9) Burial 22
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.23
C&O Mounds (15Jo9) Burial 23
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.24
C&O Mounds (15Jo9) Burial 24
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Jo9.25
C&O Mounds (15Jo9) Burial 25
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: Represented only by highly fragmentary cremated remains.

Mm3.1
Ricketts Site (15Mm3) Burial 14 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Male**

Revised Age-at-Death: **20-21**
Relevant observations:

Sex:

- Subpubic angle is narrow
- Greater sciatic notch: 5
- Glabellar region: 4
- Mastoid processes: 3
- Mental eminence: 3
- Gonial angle is square
- Bilateral septal apertures

Age:

- Pubic symphyseal face exhibits strong ridges and furrows (18-22; Hartnett, 2010a)
- Auricular surfaces are fine-grained and exhibit billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are in the process of union (16-26; Albert & Maples, 1995)
- Medial clavicle is unfused (< 21; Scheuer & Black, 2000)
- Line of fusion visible at distal radius (> 16; Scheuer & Black, 2000)
- Ischial tuberosity is recently fused, with scar still visible (> 16; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Line of fusion visible at proximal tibia (> 15; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear (> 18; Smith, 1991)

Mm3.2
Ricketts Site (15Mm3) Burial 3, second individual (Funkhouser & Webb, 1935)
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Probable Male**
Revised Age-at-Death: **17-20**
Relevant observations:

Sex:

- Greater sciatic notch: 2.5
- Glabellar region: 1
- Supraorbital margins: 1.5
- Mastoid processes: 3
- Bilateral septal apertures
- Mandibular canines (BL = 7.72 mm, MD = 5.93 mm; 98.8% probability of being male based on linear discriminant analysis)

Age:

- Vertebral ring epiphyses have recently commenced fusion (16-21; Albert & Maples, 1995)
- Tip of spinous process of lumbar vertebra has evident fusion scar (early 20s; Scheuer & Black, 2000)
- S2-S3 is unfused (20s; Baker et al., 2005)
- Rib head epiphyses are unfused (< 25; Scheuer & Black, 2000)
- Epiphysis for inferior angle of scapula is unfused (< 23; Scheuer & Black, 2000)
- Proximal humeral epiphysis has recently fused, with scar still evident (> 16; Scheuer & Black, 2000)
- Iliac crest is unfused (< 23; Scheuer & Black, 2000)
- Femoral head epiphysis has recently fused, with scar still evident (> 14; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear (> 18; Smith, 1991)

Mm3.3a
Ricketts Site (15Mm3) Burial 2 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: The remains given the corresponding number (Burial 3) are not consistent with the published description and are instead likely associated with Mm3.33 based on the woven bone formation on the anterior aspect of this vertebral body.

Mm3.3b
Ricketts Site (15Mm3) Burial 8 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: The remains given the corresponding number (Burial 3) are not consistent with the published description and are instead likely associated with Mm3.33 based on the woven bone formation on the anterior aspect of this vertebral body.

Mm3.4
Ricketts Site (15Mm3) Burial 3 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **< 20**
Relevant observations:

Age:

- Distal radial epiphysis is unfused (< 20; Scheuer & Black, 2000)

Additional notes: This individual is represented only by a portion of the distal left radius, but this is inconsistent with its published description as a crushed skull.

Mm3.5
Ricketts Site (15Mm3) Burial 3, first individual (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **> 20**
Relevant observations:

Sex:

- Supraorbital margins: 1.5
- Mastoid processes: 3
- Mental eminence: 3

Age:

- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Cervical vertebrae exhibit osteophytic lipping
- Much of the observable dentition exhibits grade 4 wear; extensive antemortem tooth loss

Additional notes: This individual is not firmly linked to either published site report. However, based on the apparent age and the evident copper staining on the posterior aspects of the C1 and C2 vertebrae, it is most consistent with the published description of the first individual from Burial 3 as described by Funkhouser and Webb (1935) and is treated as such for the analyses in this research.

Mm3.6
Ricketts Site (15Mm3) Burial 5 (Webb & Funkhouser, 1940)
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **14-16**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Mandibular canines (BL = 6.9 mm, MD = 4.86 mm; 92.9% probability of being female based on linear discriminant analysis)

Age:

- No vertebral ring epiphyses are present (< 17; Albert & Maples, 1995)
- Rib head epiphyses are unfused (< 25; Scheuer & Black, 2000)
- Humeral head epiphysis is unfused (< 17; Scheuer & Black, 2000)
- Medial epicondyle of humerus is unfused (< 15; Scheuer & Black, 2000)
- Radial head epiphysis is fused (> 11.5; Scheuer & Black, 2000)
- Distal epiphysis of radius is unfused (< 17; Scheuer & Black, 2000)
- Heads of metacarpals are unfused (< 15; Scheuer & Black, 2000)
- Os coxa is united at acetabulum (> 11; Scheuer & Black, 2000)
- Ischial tuberosity is unfused (< 18; Scheuer & Black, 2000)
- Iliac crest is unfused (< 20; Scheuer & Black, 2000)
- Right femoral head is fusing; open on left (12-16; Scheuer & Black, 2000)
- Right greater trochanter is fusing; open on left (14-16; Scheuer & Black, 2000)
- Epiphyses for proximal and distal tibia are unfused (< 16; Scheuer & Black, 2000)
- Observable second molars exhibit grade 0.5 wear
- Observable third molars have complete crowns with roots approximately halfway complete (15-16; Smith, 1991)

Additional notes: There are two smaller bags from a different box that are labeled as belonging to this burial. One contains cranial fragments from an infant and the other contains two thoracic vertebrae with fused ring epiphyses.

Mm3.7
Ricketts Site (15Mm3) Burial 6 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **2.5-3**

Relevant observations:

Age:

- Deciduous first and second molars are in occlusion
- Maxillary first molar crowns are complete with roots having just initiated (2.4-3.2; Smith, 1991)
- Maxillary central incisor crowns are incomplete
- Mandibular canine crowns are incomplete (< 4; Smith, 1991)

Mm3.8

Ricketts Site (15Mm3) Burial 7 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Infant
Revised Sex: **Male**
Revised Age-at-Death: **17-39**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Talus (max length = 53.8 mm, trochlea length = 36 mm, trochlea width = 33 mm; 99.4% probability of being male based on linear discriminant analysis)

Age:

- No groove formation on lunate surface of acetabulum, only slight activity inferior to the anterior inferior iliac spine (17-39; Calce, 2012)
- Observable first molars exhibit grade 4 wear
- Observable second molars exhibit grade 3 wear
- Observable third molars exhibit grade 2 wear

Additional notes: These remains are supposed to be those from Burial 7 as described by Webb and Funkhouser (1940) according to Snow's unpublished notes. They are, however, inconsistent with the published description.

Mm3.9

Ricketts Site (15Mm3) Burial 8 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with his number were encountered during data collection.

Mm3.10
Ricketts Site (15Mm3) Burial 9 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **1-2.5**
Relevant observations:

Age:

- Neural arches are not united (< 2; Scheuer & Black, 2000)
- No visible epiphyseal union
- Ulnar diaphysis measures 117.3 mm in length (2.5-3; Scheuer & Black, 2000)
- Deciduous molars are in occlusion and slightly worn (1-2.5; Smith, 1991)
- Observable first molars have nearly complete crowns (< 2.5; Smith, 1991)
- Maxillary central incisor crowns are incomplete

Mm3.11
Ricketts Site (15Mm3) Burial 10 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **40-64**
Relevant observations:

Sex:

- Greater sciatic notch: 4
- Glabellar region: 5
- Supraorbital margins: 4
- Mastoid processes: 4
- Mental eminence: 5

Age:

- Auricular surface is coarse-grained, exhibiting islands of densification and some macroporosity with moderate retroauricular and apical activity (20-75, mean = 47.8; Osborne et al., 2004)
- Evident groove formation on the lunate surface of the acetabulum (40-64; Calce, 2012)
- Observable first molars exhibit grade 2 wear
- Observable second molars exhibit grade 1 wear
- Observable third molars exhibit grade 0.5 wear (although the right mandibular molar is impacted and the left appears to be congenitally absent)

Mm3.12
Ricketts Site (15Mm3) Burial 11 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **54-72**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Greater sciatic notch: 5
- Mental eminence: 4

Age:

- Pubic symphyseal face is depressed, with complete rim and some activity on the margin of the obturator foramen (37-72, mean = 53.87; Hartnett, 2010a)
- Entire vertebral column exhibits extensive osteophytic lipping, with collapse evident in the lumbar region and osteophytic bridging in both the cervical and lumbar regions
- Mandible is completely edentulous

Mm3.13
Ricketts Site (15Mm3) Burial 12 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **18-23**
Relevant observations:

Sex:

- Greater sciatic notch: 5
- Glabellar region: 2
- Supraorbital margins: 2
- Mandibular canines (BL = 7.83 mm, MD = 5.65 mm; 97.4% probability of being male based on linear discriminant analysis)

Age:

- Sternal rib end exhibits billowing and minimal indentation (18-22; Hartnett, 2010b)
- Auricular surface is fine grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)

- Vertebral ring epiphyses are in the process of union (18-26; Albert & Maples, 1995)
- Iliac crest is unfused (< 23; Scheuer & Black, 2000)

Additional notes: Accompanied by some cremated bone fragments and a few bones from an infant.

Mm3.14
Ricketts Site (15Mm3) Burial 13 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **25-69**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Glabellar region: 4
- Supraorbital margins: 3
- Mastoid processes: 4.5
- Mental eminence: 3

Age:

- Auricular surface exhibits transverse organization, some retroauricular and apical activity, and coarse granularity (≤ 69, mean = 42; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Slight osteophytic lipping on the vertebral bodies
- Observable third molars exhibit grade 2 wear

Additional notes: More than one individual is included under this number as three acetabula are present.

Mm3.15
Ricketts Site (15Mm3) Burial 14 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 3
- Supraorbital margins: 3

- Mastoid processes: 3
- Mental eminence: 4
- Gonial angle is square

Age:

- Rib heads exhibit osteophytic lipping
- Observable third molars exhibit grade 4 wear

Mm3.15a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **16-29**
Relevant observations:

Age:

- Epiphysis for medial clavicle is in the process of fusion (16-29; Scheuer & Black, 2000)

Additional notes: These remains are labeled as belonging to Burial 15 (i.e., Burial 14 as described by Webb and Funkhouser [1940]), but the elements reduplicate those of that individual and, moreover, appear to derive from a younger individual.

Mm3.16
Ricketts Site (15Mm3) Burial 15 (Webb & Funkhouser, 1940)
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Probable Male**
Revised Age-at-Death: **20-27**
Relevant observations:

Sex:

- Greater sciatic notch: 2
- Glabellar region: 2
- Supraorbital margins: 1.5
- Gonial angle is oblique
- Septal aperture on right humerus
- Talus (max length = 51.8 mm, trochlea length = 31.5 mm, trochlea width = 30.7 mm; 66.2% probability of being male based on linear discriminant analysis)

Age:

- Auricular surface is fine-grained and exhibits billowing with no apical or retroauricular activity (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused, but scar is still evident on thoracic vertebrae (> 18; Albert & Maples, 1995)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Mm3.17
Ricketts Site (15Mm3) Burial 16 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **28-56**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4
- Mastoid processes: 3
- Mental eminence: 4.5
- Gonial angle is square
- Mandibular canines (BL = 7.84 mm, MD = 5.26 mm; 88.8% probability of being male based on linear discriminant analysis

Age:

- Auricular surface is coarse-grained and has lost transverse organization (≤ 69, mean = 42; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18, Albert & Maples, 1995)
- Lumbar vertebrae exhibit osteophytic lipping
- Observable first molars exhibit grade 3 wear
- Observable maxillary second molars exhibit grade 2 wear; mandibular second molars exhibit grade 3 wear
- Left maxillary third molar exhibits grade 0.5 wear, left mandibular third molar exhibits grade 0.5 wear while right mandibular third molar exhibits grade 2 wear (note that the left third molars were erupted, but not in occlusion)

Mm3.18
Ricketts Site (15Mm3) Burial 17 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **20-23**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Ischiopubic ramus is rounded
- Greater sciatic notch: 5

Age:

- Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett, 2010a)
- Sternal pit exhibits billowing and slight indentation (18-22; Hartnett, 2010b)
- Vertebral ring epiphyses are fused, but some scarring is still visible (> 18; Albert & Maples, 1995)
- Medial clavicle is unfused (< 25; Baker et al., 2005)
- Ischial tuberosity is fusing (20-23; Scheuer & Black, 2000)
- Iliac crest is fusing (20-23; Scheuer & Black, 2000)
- Lumbar vertebrae exhibit slight osteophytic lipping

Mm3.19
Ricketts Site (15Mm3) Burial 18 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **46-62**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident

Age:

- Pubic symphyseal face is depressed with a complete rim and minor activity on the margin of the obturator foramen and slight dorsal lipping (37-72, mean = 53.87; Hartnett, 2010a)

Additional notes: According to Snow's unpublished notes, these remains should be from Burial 18 as described by Webb and Funkhouser (1940). They seem, however, to be inconsistent with the description of this burial.

Mm3.20
Ricketts Site (15Mm3) Burial 19 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **21-27**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Greater sciatic notch: 4.5

Age:

- Pubic symphyseal face exhibits ridges and furrows with some rim formation (18-22; Hartnett, 2010a)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Medial clavicle is fused (> 21; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Slight arthritic lipping of knee joints

Mm3.20a
Ricketts Site (15Mm3), unidentified burial
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Probable Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 3
- Mental eminence: 4
- Gonial angle is square

Age:

- Dentition is very worn, with most of the remaining teeth exhibiting grade 4 wear

Additional notes: These remains were given the number 6-20-21 and may represent bones from three different individuals although they could not be confidently assigned to Burials 6, 20, or 21. Cranial remains represent two different individuals, but only one set of cranial remains was complete enough to permit any data collection. Those remains have been given number Mm3.20a for the analyses undertaken in this research.

Mm3.21
Ricketts Site (15Mm3) Burial 20 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **46-62**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Glabellar region: 5
- Supraorbital margins: 4
- Mastoid processes: 4.5
- Mental eminence: 4.5

Age:

- Pubic symphyseal face is depressed, with a complete rim, slight dorsal lipping, and minimal osteophyte formation on the margin of the obturator foramen (37-72, mean = 53.87; Hartnett, 2010a)
- Auricular surface is coarse-grained and has lost transverse organization (20-75, mean = 47.8; Osborne et al., 2004)

Mm3.22
Ricketts Site (15Mm3) Burial 21 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **34-62**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5
- Glabellar region: 4
- Supraorbital margins: 3
- Mental eminence: 3
- Gonial angle is square

- Mandibular canines (BL = 7.78 mm, MD = 5.46 mm; 93.6% probability of being male based on linear discriminant analysis)

Age:

- Auricular surface, although degraded, appears to be coarsely granular with remnants of transverse organization and slight retroauricular activity (20-75; mean = 47.8; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Moderate osteophytic lipping evident on lumbar vertebrae
- Observable third molars exhibit grade 2 wear

Mm3.23

Ricketts Site (15Mm3) Burial 22 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **20-27**
Relevant observations:

Sex:

- Greater sciatic notch: 2
- Glabellar region: 2
- Supraorbital margins: 2
- Mastoid processes: 3
- Mental eminence: 2
- Gonial angle is oblique
- Mandibular canines (BL = 7.09 mm, MD = 4.88 mm; 86.7% probability of being female based on linear discriminant analysis)

Age:

- Sternal pit is flat with no evident billowing and slight indentation (18-27; Hartnett, 2010b)
- Auricular surface is mostly fine-grained, although there is some retroauricular activity (≤ 46, mean = 29.5; Osborne et al., 2004)
- Slight lipping on lumbar and some thoracic vertebrae
- Arthritis of right temporomandibular joint

Additional notes: Mixed in with the bag of long bones given this number were the proximal left femur and the right ilium of an infant.

Mm3.24
Ricketts Site (15Mm3) Burial 23 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Child
Revised Sex: **Indeterminate**
Revised Age-at-Death: **1-2**
Relevant observations:

Age:

- Deciduous mandibular molars are in occlusion, but minimally worn
- Crown formation of mandibular right first molar has commenced but is less than 3/4 complete (1-2; Smith, 1991)

Additional notes: These cranial remains are likely associated with a small bag of postcranial remains from an individual aged 1.5 to 2 years and labeled (erroneously) as deriving from Burial 26.

Mm3.25
Ricketts Site (15Mm3) Burial 24 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **17-20**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Greater sciatic notch: 4
- Glabellar region: 2.5
- Supraorbital margins: 2
- Mastoid processes: 4
- Mental eminence: 3
- Gonial angle is square

Age:

- Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett, 2010a)
- Sternal rib ends are flat and exhibit billowing (18-22; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Lumbar ring epiphyses are in the process of fusing (16-21; Albert & Maples, 1995)
- Medial clavicle is unfused (< 21; Scheuer & Black, 2000)

- Humeral head epiphysis has recently completed union, with scar still evident (> 16; Scheuer & Black, 2000)
- Distal radius has not completed fusion (16-20; Scheuer & Black, 2000)
- Ischial tuberosity has recently completed fusion, with scar still evident (> 16; Scheuer & Black, 2000)
- Iliac crest has commenced union (17-20; Scheuer & Black, 2000)
- Epiphysis for distal femur has recently completed fusion, with scar still evident (> 16; Scheuer & Black, 2000)
- Epiphyses for the proximal and distal fibula have recently completed fusion, with scar still evident (> 15; Scheuer & Black, 2000)

Mm3.26
Ricketts Site (15Mm3) Burial 25 (Webb & Funkhouser, 1940)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: These remains are represented only by cremated fragments of cranium ad long bones. Snow’s unpublished notes suggest that there may be more than one individual present.

Mm3.26a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26A.

Mm3.26b
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26B.

Mm3.26c
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26C.

Mm3.26d
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26D.

Mm3.26e
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26E.

Mm3.26f
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26F.

Mm3.26g
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26G.

Mm3.26h
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26H.

Mm3.26i
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by cranial vault fragments and labeled as Burial 26i.

Mm3.27
Ricketts Site (15Mm3), Burial 16 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **29-42**
Relevant observations:

Sex:

- Greater sciatic notch: 3
- Talus (max length = 49.6 mm, trochlea length = 30.4 mm, trochlea width = 28.5 mm; 85.6% probability of being female based on linear discriminant analysis)

Age:

- Sternal rib ends are flared, with a shallow pit and a rim that is becoming irregular (27-38, mean = 32.95; Hartnett, 2010b)
- Auricular surface is becoming coarse-grained, with slight apical activity (≤ 69, mean = 42; Osborne et al., 2004)
- Medial clavicle is fused, but fusion scar is still visible (> 29; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)

Additional notes: Snow's unpublished notes associate these postcranial remains with the cranial remains numbered as Mm3.31 and, while this is plausible, the observed dental wear seems incompatible with the estimated age from the postcranial remains. As such, they are maintained as separate individuals for the purposes of this research.

Mm3.28a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Female**
Revised Age-at-Death: **26-36**
Relevant observations:

Sex:

- Ventral arc is evident
- Greater sciatic notch: 3
- Glabellar region: 2
- Supraorbital margins: 2
- Mastoid processes: 3
- Mental eminence: 1
- Gonial angle is oblique

Age:

- Pubic symphyseal face exhibits traces of ridges and furrows, but with almost complete rim formation (24-44, mean = 31.44; Hartnett, 2010a)
- Auricular surface is fine-grained with transverse striae (≤ 46, mean = 29.5; Osborne et al., 2004)
- No groove formation on the lunate surface of the acetabulum (17-39; Calce, 2012)
- Observable first molars exhibit grade 2 and grade 3 wear
- Observable second molars exhibit grade 2 wear

Additional notes: Two individuals are represented by the remains labeled as Burial 28. Based on morphology and tooth wear, the cranial remains have been associated with the younger, female individual, who has been given the number Mm3.28a for the analyses undertaken in this research.

Mm3.28b
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **40-62**
Relevant observations:

Sex:

- Greater sciatic notch: 3

Age:

- Auricular surface is coarse-grained, with no remnants of transverse organization (20-75, mean = 47.8; Osborne et al., 2004)
- Evident groove on the lunate surface of the acetabulum (40-64; Calce, 2012)
- Moderate osteophytic lipping of the lumbar vertebrae

Additional notes: Two individuals are represented by the remains labeled as Burial 28. These postcranial remains, representing an older individual of indeterminate sex, have been given the number Mm3.28b for the analyses undertaken in this research.

Mm3.29
Ricketts Site (15Mm3), Burial 4? (Funkhouser & Webb, 1935)
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **17-39**
Relevant observations:

Age:

- No groove formation is evident on the lunate surface of the acetabulum (17-39; Calce, 2012)

Additional notes: Snow’s unpublished notes suggest that these postcranial remains are associated with the cranial remains given the number Mm3.34. Although this is possible, given that the skeletal inventories do not overlap, the extreme dental wear exhibited by the cranial remains is inconsistent with the age estimate derived from the acetabulum and the two sets of remains have been given separate numbers for the purposes of this research.

Mm3.30
Ricketts Site (15Mm3), Burial 16 (Funkhouser & Webb, 1935)
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **15-16**
Relevant observations:

Age:

- No vertebral ring epiphyses are present (< 21; Albert & Maples, 1995)
- Acromial end of clavicle is unfused (< 20; Scheuer & Black, 2000)
- Coracoid process of scapula is unfused (< 17; Scheuer & Black, 2000)
- Humeral heads and distal humeri are unfused (< 17; Scheuer & Black, 2000)
- Distal epiphysis of radius is unfused (< 20; Scheuer & Black, 2000)
- Olecranon process and epiphysis for distal ulna are unfused (< 16; Scheuer & Black, 2000)
- Heads of metacarpals are unfused; bases are in the process of fusion (< 16.5; Scheuer & Black, 2000)
- Epiphyses for proximal manual phalanges are unfused (< 16.5; Scheuer & Black, 2000)
- Acetabulum is not united (< 17; Scheuer & Black, 2000)
- Femoral heads and greater trochanters are in the process of fusion (14-18; Scheuer & Black, 2000)
- Lesser trochanter is unfused (< 17; Scheuer & Black, 2000)
- Epiphysis for distal femur is unfused (< 20; Scheuer & Black, 2000)
- Epiphyses for proximal and distal tibia are unfused (< 18; Scheuer & Black, 2000)
- Calcaneal tuberosity is unfused (< 20; Scheuer & Black, 2000)
- Base of first metatarsal is unfused (< 18; Scheuer & Black, 2000)
- Observable third molars exhibit complete crowns with root formation approximately halfway complete (> 15; Smith, 1991)

Mm3.31
Ricketts Site (15Mm3), Burial 16 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **Female**
Revised Age-at-Death: **Indeterminate**
Relevant observations:

Sex:

- Glabellar region: 1.5

  - Supraorbital margins: 1.5
  - Mastoid processes: 2
  - Mental eminence: 2
  - Gonial angle is oblique
  - Mandibular canines (BL = 6.64 mm, MD = 4.69 mm; 98.4% probability of being female based on linear discriminant analysis)

Age:

  - Observable third molars exhibit grade 0.5 wear

Additional notes: This individual exhibits very little cranial modification and a narrower palate than other individuals. Snow's unpublished notes associate this cranium with the postcranial remains of Mm3.27 and, while this is plausible, the observed dental wear seems incompatible with the estimated age from the postcranial remains. As such, they are maintained as separate individuals for the purposes of this research.

Mm3.32
Ricketts Site (15Mm3), Burial 1 (Webb & Funkhouser, 1940)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is only represented by fragmentary cremated remains.

Mm3.33
Ricketts Site (15Mm3), Burial 10 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **14-16**
Relevant observations:

Sex:

  - Talus (max length = 53 mm, trochlea length = 31.3 mm, trochlea width = 31.1 mm; 79% probability of being male based on linear discriminant analysis)

Age:

  - No vertebral ring epiphyses are present (< 21; Scheuer & Black, 2000)
  - Acromion and coracoid processes of the scapula are unfused (< 20; Scheuer & Black, 2000)
  - Epiphyses for humeral head and medial epicondyle are unfused (< 16; Scheuer & Black, 2000)

    - Distal epiphysis for humerus has fused (> 12; Scheuer & Black, 2000)
    - Proximal and distal radial epiphyses are unfused (< 17; Scheuer & Black, 2000)
    - Metacarpal heads are unfused (< 16.5; Scheuer & Black, 2000)
    - Acetabulum is not united (< 17; Scheuer & Black, 2000)
    - Epiphyses for femoral heads, condyles, and greater and lesser trochanters are unfused (< 17; Scheuer & Black, 2000)
    - Proximal and distal tibial epiphyses are unfused (< 18; Scheuer & Black, 2000)
    - Calcaneal tuberosities are unfused (< 20; Scheuer & Black, 2000)
    - Base of first metatarsal is unfused (< 18; Scheuer & Black, 2000)
    - Styloid process on base of fifth metatarsal has recently completed union (> 14; Scheuer & Black, 2000)

Additional notes: These remains are accompanied by skeletal elements representing at least three other individuals: a right femur of a younger individual, the right ulna and portions of a left os coxa from a young adult probable male (given the number Mm3.33a) and cranial remains representing an older male (given the number Mm3.33b).

Mm3.33a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Male**
Revised Age-at-Death: **Indeterminate**
Relevant observations:

Sex:

- Greater sciatic notch: 4

Age:

- Auricular surface is fine-grained and exhibits transverse organization (≤ 46, mean = 29.5; Osborne et al., 2004)

Additional notes: These remains were included with those labeled as Burial 33, but represent a separate individual.

Mm3.33b
Ricketts Site (15Mm3), unknown burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Male**

Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 5
- Mastoid processes: 4

Age:

- Observable dentition all exhibits grade 4 wear

Additional notes: These remains were included with those labeled as Burial 33, but represent a separate individual.

Mm3.34
Ricketts Site (15Mm3), Burial 4? (Funkhouser & Webb, 1935)
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 3
- Mastoid processes: 4
- Mental eminence: 4
- Mandibular canines (BL = 8.0 mm, MD = 5.6 mm; 98.1% probability of being male based on linear discriminant analysis

Age:

- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Mandibular first and second molars exhibit grade 3 wear
- Right mandibular third molar exhibits grade 2 wear

Additional notes: Snow’s unpublished notes suggest that these remains are associated with the postcranial remains given the number Mm3.29. Although this is possible, given that the skeletal inventories do not overlap, the extreme dental wear exhibited by these cranial remains is inconsistent with the age estimate derived from the acetabulum and the two sets of remains have been given separate numbers for the purposes of this research. These remains are also accompanied by those of a younger female who has been given the number Mm3.34a.

Mm3.34a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Female**
Revised Age-at-Death: **12-15**
Relevant observations:

Sex:

- Talus (max length = 48.9 mm, trochlea length = 28.9 mm, trochlea width = 30.9 mm; 92.2% probability of being female based on linear discriminant analysis

Age:

- Thoracic vertebral ring epiphysis is unfused (< 17; Albert & Maples, 1995)
- Two ribs with unfused heads (< 25; Scheuer & Black, 2000)
- Left scapula with unfused coracoid process (< 17; Scheuer & Black, 2000)
- Head of right fifth metacarpal is unfused (< 15; Scheuer & Black, 2000)
- Portion of an unfused iliac crest (> 12; Scheuer & Black, 2000)

Additional notes: These remains were included with those given the label Burial 34 (now Mm3.34) and have been given the designation Mm3.34a based on their difference in age and sex. These remains may be associated with those designated as Mm3.35 based on age, but this cannot be determined with any certainty.

Mm3.35
Ricketts Site (15Mm3), Burial 15 (Funkhouser & Webb, 1935)
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **13-16**
Relevant observations:

Age:

- No vertebral ring epiphyses are present (< 21; Albert & Maples, 1995)
- Proximal and distal humeral epiphyses are unfused (< 17; Scheuer & Black, 2000)
- Radial head is unfused (< 17; Scheuer & Black, 2000)
- Proximal epiphysis of ulna is unfused (< 16; Scheuer & Black, 2000)
- Acetabulum is not united (< 17; Scheuer & Black, 2000)
- Epiphyses for femoral head, condyles, and greater and lesser trochanters are unfused (< 17; Scheuer & Black, 2000)

- Epiphyses for proximal and distal tibia are unfused (< 18; Scheuer & Black, 2000)
- Observable first molars exhibit grade 1 wear
- Observable second molars exhibit grade 0.5 wear
- Third molar crowns are complete (> 12.5; Smith, 1991)

Mm3.36
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Male**
Revised Age-at-Death: **Indeterminate**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4
- Mastoid processes: 4

Age:

- Observable second molars exhibit grade 1 wear

Additional notes: This individual is represented only by a fragmentary cranium.

Mm3.37
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **< 17**
Relevant observations:

Age:

- Coracoid process is unfused (< 17; Scheuer & Black, 2000)

Additional notes: This individual is represented only by a fragment of the right scapula. Snow's unpublished notes suggest that there should be an associated skull, but this was not encountered.

Mm3.38a

Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Male**
Revised Age-at-Death: **17-39**
Relevant observations:

Sex:

- Greater sciatic notch: 4.5

Age:

- Auricular surface is fine-grained with transverse organization (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on the lunate surface of the acetabulum (17-39; Calce, 2012)

Additional notes: There are at least three individuals represented by the remains labeled 6-38. Snow's unpublished notes suggest that one of these individuals is the male from Burial 3 as described by Funkhouser and Webb (1935), but the remains designated in this research as Mm3.5 are more consistent with the published description of this burial and are thus treated as such. The remains of this probable male have therefore been given the new designation Mm3.38a. The other two individuals labeled as 6-38 have been given the numbers Mm3.38b and Mm3.38c.

Mm3.38b

Ricketts Site (15Mm3), Burial 9 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **40-58**
Relevant observations:

Sex:

- Subpubic angle is wide
- Ventral arc is evident

Age:

- Pubic symphyseal face is flattened, with a complete rim and slight dorsal lipping (33-58, mean = 43.26; Hartnett, 2010a)
- Evident groove formation on the lunate surface of the acetabulum (40-64; Calce, 2012)

Additional notes: These remains represent the second of at least three individuals labeled as 6-38. Snow's unpublished notes suggest that this individual is the same as the one described as Burial 9 by Funkhouser and Webb (1935), and there is no evidence that discounts this suggestion. The two other individuals labeled as 6-38 have been given the numbers Mm3.38a and Mm3.38c.

Mm3.38c
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **< 16.5**
Relevant observations:

Age:

- Sternal pit is flat and exhibits billowing (18-22; Hartnett, 2010b)
- Epiphyses for rib heads are unfused (< 25; Scheuer & Black, 2000)
- Heads of metacarpals are unfused (< 16.5; Scheuer & Black, 2000)

Additional notes: These remains represent the third of at least three individuals labeled as 6-38. The other two individuals labeled as 6-38 have been given the numbers Mm3.38a and Mm3.38b.

Mm3.39
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Female**
Revised Age-at-Death: **16-17**
Relevant observations:

Sex:

- Glabellar region: 1.5
- Supraorbital margins: 2
- Gonial angle is oblique

Age:

- Mandibular first molars exhibit grade 1 wear
- Mandibular second molars exhibit grade 0.5 wear
- Mandibular third molars have complete crowns, with root formation approximately half complete (15-16; Smith, 1991)

Mm3.40a
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Female**
Revised Age-at-Death: **17-20**
Relevant observations:

Sex:

- Greater sciatic notch: 2

Age:

- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are in the process of fusion (14-20; Albert & Maples, 1995)
- Epiphyses for rib heads are unfused (< 25; Scheuer & Black, 2000)
- Medial clavicle is unfused (< 25; Baker et al., 2005)
- Proximal radial epiphysis has completed union, with visible scar (> 13; Scheuer & Black, 2000)
- Ischial tuberosity has recently fused, with visible scar (> 16; Scheuer & Black, 2000)
- Iliac crest is fusing (17-23; Scheuer & Black, 2000)
- Apex of observable third molar roots is open (< 19.5; Smith, 1991)

Additional notes: These remains represent the first of three individuals that were labeled as “Double Burial.” While this designation suggests that the remains should be associated with Burial 16 as described by Funkhouser and Webb (1935), Snow’s unpublished notes indicate that Mm3.30 and Mm3.31 are more consistent with this burial. The remaining two individuals under this label have been given the numbers Mm3.40b and Mm3.40c.

Mm3.40b
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Male**
Revised Age-at-Death: **20+**
Relevant observations:

Sex:

- Mandibular canines (BL = 7.75 mm, MD = 5.58 mm; 95.5% probability of being male based on linear discriminant analysis)

Age:

- Ischial tuberosity is fused, with no visible scar (Scheuer & Black, 2000)

Additional notes: These remains represent the second of three individuals that were labeled as “Double Burial.” While this designation suggests that the remains should be associated with Burial 16 as described by Funkhouser and Webb (1935), Snow’s unpublished notes indicate that Mm3.30 and Mm3.31 are more consistent with this burial. The remaining two individuals under this label have been given the numbers Mm3.40a and Mm3.40c.

Mm3.40c
Ricketts Site (15Mm3), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **8-10**
Relevant observations:

Age:

- Mandibular first molars are in occlusion, with a complete root (> 8; Smith, 1991)
- Mandibular fourth premolars are approximately halfway through root formation (8-10; Smith, 1991)

Additional notes: These remains represent the third of three individuals that were labeled as “Double Burial.” While this designation suggests that the remains should be associated with Burial 16 as described by Funkhouser and Webb (1935), Snow’s unpublished notes indicate that Mm3.30 and Mm3.31 are more consistent with this burial. The remaining two individuals under this label have been given the numbers Mm3.40a and Mm3.40b.

Mm3.41
Ricketts Site (15Mm3), Burial 1 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.42
Ricketts Site (15Mm3), Burial 2 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **N/A**

Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.43
Ricketts Site (15Mm3), Burial 5 (Funkhouser & Webb, 1935)
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.44
Ricketts Site (15Mm3), Burial 6 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.45
Ricketts Site (15Mm3), Burial 7 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Infant
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.46
Ricketts Site (15Mm3), Burial 11 (Funkhouser & Webb, 1935)
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.47
Ricketts Site (15Mm3), Burial 12 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.48
Ricketts Site (15Mm3), Burial 13 (Funkhouser & Webb, 1935)
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm3.49
Ricketts Site (15Mm3), Burial 4 (Webb & Funkhouser, 1940)
Published Sex: Probable Female
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains positively associated with this burial were encountered during data collection.

Mm6.1
Wright Mound (15Mm6), Burial 1
Published Sex: Female
Published Age-at-Death: Juvenile
Revised Sex: **Female**
Revised Age-at-Death: **15-17**

Relevant observations:

Sex:

- Glabellar region: 1
- Supraorbital margins: 1
- Mastoid processes: 3
- Mental eminence: 1
- Gonial angle is oblique
- Mandibular canines (BL = 6.56 mm, MD = 4.98 mm; 96% probability of being female based on linear discriminant analysis)

Age:

- Observable third molars have complete crowns with root formation approximately half complete (15-17; Smith, 1991)

Mm6.2
Wright Mound (15Mm6), Burial 2
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Mm6.3
Wright Mound (15Mm6), Burial 3
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **17-25**
Relevant observations:

Sex:

- Greater sciatic notch: 3
- Glabellar region: 3
- Supraorbital margins: 4.5
- Mastoid processes: 4
- Mental eminence: 4
- Evident preauricular sulcus
- Mandibular corpus is tall
- Mandibular canines (BL = 8.05 mm, MD = 4.88 mm; 77% probability of being male based on linear discriminant analysis)

Age:
- Auricular surface exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on lunate surface of the acetabulum (17-39; Calce, 2012)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Epiphyses for rib heads are unfused (< 25; Scheuer & Black, 2000)

Mm6.4
Wright Mound (15Mm6), Burial 4
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by a very fragmentary cranium, a distal femur, and a left second metacarpal.

Mm6.5
Wright Mound (15Mm6), Burial 5
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **18-27**
Relevant observations:

Sex:
- Greater sciatic notch: 3
- Glabellar region: 2
- Supraorbital margins: 2
- Mastoid processes: 2
- Mental eminence: 2
- Gonial angle is oblique
- Bilateral septal apertures
- Mandibular canines (BL = 7.33 mm, MD = 5.07 mm; 58.4% probability of being female based on linear discriminant analysis)

Age:
- Auricular surface is mostly fine-grained with some transverse organization (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on lunate surface of the acetabulum (17-39; Calce, 2012)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)

- Rib head epiphyses are fused (> 17; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Mm6.6
Wright Mound (15Mm6), Burial 6
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **27-38**
Relevant observations:

Sex:

- Very wide pelvic inlet
- Mastoid processes: 3
- Gonial angle is oblique
- Talus (max length = 47.75 mm, trochlea length = 32.68, trochlea width = 29.67; 76% probability of being female based on linear discriminant analysis)

Age:

- Sternal pit is shallow and U-shaped with flaring rim edges that are regular and rounded (27-38, mean = 32.95; Hartnett, 2010b)
- Auricular surface exhibits transverse organization, with minimal apical or retroauricular activity (≤ 46, mean = 29.5; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Iliac crest is fused, but scar is still evident (> 20; Scheuer & Black, 2000)

Mm6.7
Wright Mound (15Mm6), Burial 7
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4.5
- Mastoid processes: 3
- Mental eminence: 4
- Gonial angle is square

Age:

  - Much of the dentition has been lost antemortem, with remaining dentition exhibiting grade 3.5 wear

Mm6.8
Wright Mound (15Mm6), Burial 8
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:
  - Glabellar region: 4
  - Supraorbital margins: 4
  - Mandibular canines (BL = 8.26 mm, MD = 5.02 mm; 92.1% probability of being male based on linear discriminant analysis)

Age:
  - Observable third molars exhibit grade 0.5 wear

Mm6.9
Wright Mound (15Mm6), Burial 9
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:
  - Talus (max length = 54.08 mm, trochlea length = 35.26 mm, trochlea width = 33.7 mm; 99.3% probability of being male based on linear discriminant analysis)

Age:
  - Cervical vertebrae exhibit osteophytic lipping

Mm6.10
Wright Mound (15Mm6), Burial 10
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Male**
Revised Age-at-Death: **Adult**

Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 4
- Mastoid processes: 3
- Mental eminence: 4
- Mandibular canines (BL = 7.6 mm, MD = 5.78 mm; 96.7% probability of being male based on linear discriminant analysis)

Age:

- Maxillae are almost completely edentulous
- Observable mandibular dentition, including right mandibular third molar, exhibits grade 3+ wear

Mm6.11

Wright Mound (15Mm6), Burial 11
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **40-55**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Ischiopubic ramus is thick and rounded
- Greater sciatic notch: 4
- Mental eminence: 5
- Gonial angle is square

Age:

- Pubic symphyseal face is flattened, with a complete rim aside from a small ventral hiatus (27-61, mean = 42.54; Hartnett, 2010a)
- Sternal rib pit is moderately deep and U-shaped, but rim is still rounded (36-48, mean = 42.43; Hartnett, 2010b)
- Auricular surface shows coarse granulation and a loss of transverse organization with some retroauricular activity (20-75, mean = 47.8; Osborne et al., 2004)
- Distinct groove along lunate surface of acetabulum (40-64; Calce, 2012)
- Osteophytic lipping evident on lumbar vertebrae
- Arthritic lipping of femoral condyles

Mm6.12
Wright Mound (15Mm6), Burial 12
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by a fragmentary frontal bone.

Mm6.13
Wright Mound (15Mm6), Burial 13
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **20-25**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5
- Glabellar region: 3
- Supraorbital margins: 2
- Mastoid processes: 3
- Mental eminence: 2
- Gonial angle is oblique
- Bilateral septal apertures
- Mandibular canines (BL = 6.92 mm, MD = 4.96 mm; 89.1% probability of being female based on linear discriminant analysis)

Age:

- Sternal rib pit is shallow and V-shaped in cross section, with remnants of billowing evident (20-25; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- No groove formation on lunate surface of acetabulum (17-39; Calce, 2012)
- Vertebral ring epiphyses are fused, with scar still visible (> 18; Albert & Maples, 1995)
- Medial epiphysis of clavicle is in the process of fusing (16-29; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)
- Observable third molars exhibit grade 0.5 wear

Mm6.14
Wright Mound (15Mm6), Burial 14
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Male**
Revised Age-at-Death: **40-64**
Relevant observations:

Sex:

- Greater sciatic notch: 5
- Glabellar region: 5
- Supraorbital margins: 5
- Mastoid processes: 5
- Mental eminence: 5
- Gonial angle is square

Age:

- Auricular surface is coarse-grained, but retains transverse organization with some retroauricular activity (≤ 69, mean = 42; Osborne et al., 2004)
- Evident groove formation on lunate surface of acetabulum (40-64; Calce, 2012)
- Lumbar vertebrae exhibit extensive osteophytic lipping
- Slight arthritic lipping of glenoid fossae, femoral and tibial condyles

Mm6.15
Wright Mound (15Mm6), Burial 15
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **21-30**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Ischiopubic ramus is rounded
- Greater sciatic notch: 4
- Glabellar region: 4.5
- Supraorbital margins: 4.5
- Mastoid processes: 5
- Mental eminence: 4
- Mandibular corpus is tall
- Gonial angle is square

Age:

- Pubic symphyseal face is slightly convex, with rim formation incomplete along ventral border (21-44, mean = 29.53; Hartnett, 2010a)
- Auricular surface is fine-grained, with no evident retroauricular or apical activity (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 2000)
- Rib head epiphyses are fused (> 17; Scheuer & Black, 2000)
- Ischial tuberosity is fused (> 18; Scheuer & Black, 2000)
- Iliac crest is fused (> 20; Scheuer & Black, 2000)

Mm6.16
Wright Mound (15Mm6), Burial 16
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Male**
Revised Age-at-Death: **45-55**
Relevant observations:

Sex:

- Subpubic angle is narrow
- No ventral arc is evident
- Ischiopubic ramus is rounded
- Greater sciatic notch: 4.5
- Glabellar region: 4
- Supraorbital margins: 4
- Mastoid processes: 4
- Mental eminence: 3
- Gonial angle is square

Age:

- Bony spicules are evident on the margin of the obturator foramen (37-72, mean = 53.87; Hartnett, 2010a)
- Sternal rib ends are flared, with a U-shaped pit, irregular rim, and the beginning of projections on the superior and inferior margins (45-59, mean = 52.05; Hartnett, 2010b)
- Auricular surface exhibits patches of coarse granularity and the remnants of transverse organization (20-75, mean = 47.8; Osborne et al., 2004)
- Slight osteophytic lipping of lumbar vertebrae

Mm6.17
Wright Mound (15Mm6), Burial 17
Published Sex: Female
Published Age-at-Death: Adult
Revised Sex: **Female**
Revised Age-at-Death: **18-22**
Relevant observations:

Sex:

- Greater sciatic notch: 1.5
- Glabellar region: 1
- Supraorbital margins: 1.5
- Mastoid processes: 2
- Mandibular canines (BL = 7.22 mm, MD = 5.22 mm; 52.2% probability of being female based on linear discriminant analysis)

Age:

- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Minimal groove development on lunate surface of acetabulum (17-39; Calce, 2012)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Ischial tuberosities are fused (> 18; Scheuer & Black, 2000)
- Apex of root of maxillary right third molar is open (≈ 19.5; Smith, 1991)
- Observable third molar exhibit grade 0.5 wear

Additional notes: This individual was accompanied by the remains of a fetus aged between 28 and 36 weeks (based on humeral diaphysis length [Scheuer & Black, 2000]). As these fetal remains were located beneath the pelvis and between the femora of Mm6.17 (Webb, 1940), this suggests that she died either while pregnant or during childbirth.

Mm6.18
Wright Mound (15Mm6), Burial 18
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **15-17**
Relevant observations:

Sex:

- Greater sciatic notch: 2

Age:

- Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett; 2010a)
- No vertebral ring epiphyses are present (< 21; Albert & Maples, 1995)
- Rib head epiphyses are fused (> 17; Scheuer & Black, 2000)
- Acromion process is unfused (< 20; Scheuer & Black, 2000)
- Epiphyses for humeral heads and medial epicondyles are unfused (< 16; Scheuer & Black, 2000)
- Proximal epiphyses for radius are fusing, distal epiphyses are unfused (12-17; Scheuer & Black, 2000)
- Proximal epiphysis of ulna is fusing (12-16; Scheuer & Black, 2000)
- Metacarpal heads are unfused (< 16.5; Scheuer & Black, 2000)
- Acetabulum is fused (< 17; Scheuer & Black, 2000)
- Ischial tuberosity has begun to fuse (< 18; Scheuer & Black, 2000)
- Iliac crest has begun to fuse (17-20; Scheuer & Black, 2000)
- Epiphyses for femoral heads, greater and lesser trochanters are unfused (< 17; Scheuer & Black, 2000)

Mm6.19
Wright Mound (15Mm6), Burial 19
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **25+**

Additional notes: This individual is represented only by the cranial portion of the sacrum (S1-S2, fused). This is inconsistent with the published description of Burial 19 (Webb, 1940).

Mm6.20
Wright Mound (15Mm6), Burial 20
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **10-11.5**
Relevant observations:

Age:

- Coracoid process is unfused (< 17; Scheuer & Black, 2000)
- Epiphyses for proximal and distal radius are unfused (< 17; Scheuer & Black, 2000)

- Epiphyses for proximal and distal ulna are unfused (< 16; Scheuer & Black, 2000)
- Acetabulum is unfused (< 17; Scheuer & Black, 2000)
- Ischiopubic ramus is unfused (< 8; Scheuer & Black, 2000)
- Maxillary second molar crowns are complete, roots approximately 3/4 complete (10-11.5; Smith, 1991)
- Maxillary deciduous second molars are still present, but heavily worn

Additional notes: The fibular diaphysis of this individual suggests a chronic non-specific infection, which may account for the discrepancy between the dental age and the age derived from the pattern of epiphyseal fusion. For the purposes of this research, the dental age was assumed to be more accurate.

Mm6.21
Wright Mound (15Mm6), Burial 21
Published Sex: Male
Published Age-at-Death: Juvenile
Revised Sex: **Male**
Revised Age-at-Death: **21-26**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Ischiopubic ramus is rounded
- Greater sciatic notch: 4
- Glabellar region: 5
- Supraorbital margins: 5
- Mastoid processes: 5
- Mental eminence: 3
- Mandibular corpus is tall
- Gonial angle is square

Age:

- Dorsal demi-face of the pubic symphyseal face is beginning to fill in while ventral demi-face still exhibits marked ridges and furrows; the dorsal rim is complete while the ventral rim has yet to develop (20-26; Hartnett, 2010a)
- Sternal pit of rib is V-shaped and still exhibits slight billowing (21-28; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)

    - Medial epiphysis of clavicle has fused (> 21; Scheuer & Black, 2000)
    - Observable third molars exhibit grade 0.5 wear

Mm6.22
Wright Mound (15Mm6), unidentified burial
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Probable Female**
Revised Age-at-Death: **Adult**

Sex:

- Mandibular canines (BL = 6.88 mm, MD = 5.25 mm; 74.3% probability of being female based on linear discriminant analysis)

Age:

- Observable dentition exhibits grade 3 wear or higher

Additional notes: These remains were initially labeled as belonging to 7-18 (Burial 18), but they are inconsistent with the published description of these remains and represent an older individual than Mm6.18. As such, they have been given the number Mm6.22 for this research.

Mm7.1
Wright Mound (15Mm7), Burial 1
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: The skeletal remains associated with this number were too fragmentary for analysis.

Mm7.2
Wright Mound (15Mm7), Burial 2
Published Sex: Unrecorded
Published Age-at-Death: Unrecorded
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: The skeletal remains associated with this number were too fragmentary for analysis.

Ms27.1
Dover Mound (15Ms27), Burial 1
Published Sex: Probable Male
Published Age-at-Death: Probable Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.2
Dover Mound (15Ms27), Burial 2
Published Sex: Probable Male
Published Age-at-Death: Probable Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.3
Dover Mound (15Ms27), Burial 3
Published Sex: Probable Male
Published Age-at-Death: 18-20
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.4
Dover Mound (15Ms27), Burial 4
Published Sex: Probable Female
Published Age-at-Death: 16-18
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.6
Dover Mound (15Ms27), Burials 5 & 6
Published Sex: Male, Male, Probable Male, Infant
Published Age-at-Death: 23, 30+, 3-5, 2-3

Revised Sex: **Male**
Revised Age-at-Death: **20+**
Relevant observations:

Sex:

- Glabellar region: 5
- Supraorbital margins: 4

Age:

- Vertebral ring epiphyses have fused (> 18; Albert & Maples, 1995)
- Observable third molars have erupted

Additional notes: This individual (or these individuals) is (are) represented by very fragmentary cremated remains. Snow records the presence of four different people, but I did not sift through the remains to determine minimum number of individuals as these cremains yielded no data usable for the analyses undertaken in this research.

Ms27.7
Dover Mound (15Ms27), Burial 7
Published Sex: Probable Male
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.8
Dover Mound (15Ms27), Burial 8
Published Sex: Male
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.9
Dover Mound (15Ms27), Burial 9
Published Sex: Male, Probable Female
Published Age-at-Death: 35-40, 20
Revised Sex: **Male**
Revised Age-at-Death: **Adult**

Relevant observations:

Sex:

- Mastoid processes: 5
- Mental eminence: 3
- Gonial angle is square
- Mandibular left canine has a buccolingual cervical diameter of 7.62mm. Although the mesiodistal cervical diameter was unmeasurable, the buccolingual cervical diameter falls comfortably within the range of known males from the mounds in the research sample.

Age:

- Observable maxillary first molars exhibit grade 3 wear
- Mandibular right first molar exhibits grade 2 wear
- Observable second molars exhibit grade 2 wear
- Mandibular right third molar exhibits grade 1 wear

Additional notes: Although the published description of this burial suggests that there were two individuals, only one, a male, is represented by these remains.

Ms27.10

Dover Mound (15Ms27), Burial 10
Published Sex: Male
Published Age-at-Death: 30
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 5
- Supraorbital margins: 4
- Mastoid processes: 5
- Mental eminence: 3

Age:

- Maxillae is almost entirely edentulous
- Majority of observable dentition exhibits grade 3 wear

Ms27.11

Dover Mound (15Ms27), Burial 11
Published Sex: Male
Published Age-at-Death: 19-20
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**

Relevant observations:

Age:

Mandibular right third molar exhibits grade 0.5 wear

Ms27.12
Dover Mound (15Ms27), Burial 12
Published Sex: Probable Female
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.13
Dover Mound (15Ms27), Burial 13
Published Sex: Male
Published Age-at-Death: 26
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 3.5
- Supraorbital margins: 4.5
- Mastoid processes: 3
- Mental eminence: 4
- Gonial angle is square
- Mandibular canines (BL = 8.08 mm, MD = 5.7 mm; 99% probability of being male based on linear discriminant analysis)

Age:

- Observable first and second molars exhibit grade 3 wear
- Observable third molars exhibit grade 2 wear

Ms27.14
Dover Mound (15Ms27), Burial 14
Published Sex: Female
Published Age-at-Death: 23-24
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.15
Dover Mound (15Ms27), Burial 15
Published Sex: Probable Male
Published Age-at-Death: Young Adult
Revised Sex: **Probable Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Talus (max length = 51.6 mm, trochlea length = 31.6 mm, trochlea width = 32.2 mm; 73.1% probability of being male based on linear discriminant analysis)

Age:

- Calcaneal tuberosity has completed union (> 18; Scheuer & Black, 2000)

Ms27.16
Dover Mound (15Ms27), Burial 16
Published Sex: Male
Published Age-at-Death: Mature Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.17
Dover Mound (15Ms27), Burial 17
Published Sex: Male
Published Age-at-Death: 23
Revised Sex: **Male**
Revised Age-at-Death: **17-22**
Relevant observations:

Sex:

- Narrow subpubic angle
- No ventral arc is evident
- Sacrum is curved in profile
- Greater sciatic notch: 4.5
- Glabellar region: 4
- Supraorbital margins: 2
- Mastoid processes: 5
- Mental eminence: 4
- Gonial angle is square

Age:

- Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett, 2010a)
- Sternal pits of ribs are shallow and exhibit slight billowing, with rims that are firm and regular (18-22; Hartnett, 2010b)
- Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
- Vertebral ring epiphyses are fused, but scar is still visible in some thoracic vertebrae (> 18; Albert & Maples, 1995)
- Rib head epiphyses have fused, but scar is still visible (> 17; Scheuer & Black, 2000)
- Epiphysis for medial clavicle is unattached (< 25; Baker et al., 2005)

Ms27.18
Dover Mound (15Ms27), Burial 18
Published Sex: Female
Published Age-at-Death: 22
Revised Sex: **Female**
Revised Age-at-Death: **18-22**
Relevant observations:
Sex:
Subpubic angle is wide
Ventral arc is evident
Greater sciatic notch: 2
Bilateral septal apertures
Age:
Pubic symphyseal face exhibits marked ridges and furrows (18-22; Hartnett, 2010a)
Auricular surface is fine-grained and exhibits billowing (≤ 27, mean = 21.1; Osborne et al., 2004)
Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
Observable third molars exhibit grade 0.5 wear

Ms27.19
Dover Mound (15Ms27), Burial 19
Published Sex: Female
Published Age-at-Death: 25-30
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.20
Dover Mound (15Ms27), Burial 20
Published Sex: Probable Male
Published Age-at-Death: Probable Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.21
Dover Mound (15Ms27), Burial 21
Published Sex: Male
Published Age-at-Death: 24-26
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**
Relevant observations:

Age:

- Mandibular left third molar exhibits grade 1 wear

Additional notes: This individual is only represented by a small collection of teeth.

Ms27.22
Dover Mound (15Ms27), Burial 22
Published Sex: Male
Published Age-at-Death: 28-30
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.23
Dover Mound (15Ms27), Burial 23
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.24
Dover Mound (15Ms27), Burial 24
Published Sex: Indeterminate
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.25
Dover Mound (15Ms27), Burial 25
Published Sex: Male
Published Age-at-Death: 35
Revised Sex: **Male**
Revised Age-at-Death: **Adult**
Relevant observations:

Sex:

- Glabellar region: 5
- Supraorbital margins: 5
- Mastoid processes: 5
- Mental eminence: 5
- Gonial angle is oblique

Age:

- All mandibular molars have been lost antemortem
- Arthritic lipping of left proximal pedal phalanx in ray one

Ms27.26
Dover Mound (15Ms27), Burial 26
Published Sex: Female
Published Age-at-Death: 22
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.27
Dover Mound (15Ms27), Burial 27
Published Sex: Probable Male
Published Age-at-Death: 7-8
Revised Sex: **Probable Female**
Revised Age-at-Death: **18+**

Relevant observations:

Sex:

- Glabellar region: 4
- Supraorbital margins: 2
- Mastoid processes: 3
- Mental eminence: 3
- Mandibular corpus is short
- Mandibular canines (BL = 7.15 mm, MD = 5.08 mm; 70.7% probability of being female based on linear discriminant analysis)

Age:

- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 1995)
- Observable third molars exhibit grade 0.5 wear

Additional notes: These remains are inconsistent with the published description of this burial as being that of a child.

Ms27.28
Dover Mound (15Ms27), Burial 28
Published Sex: Probable Female
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.29
Dover Mound (15Ms27), Burial 29
Published Sex: Male
Published Age-at-Death: 22
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.30a
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Child**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30a is represented only by a maxillary right deciduous second molar and a maxillary right first molar.

Ms27.30b
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Child**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30b is represented only by two deciduous teeth whose crowns are too fragmentary to identify.

Ms27.30c
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30c is represented by a maxillary left third molar exhibiting grade 0.5 wear.

Ms27.30d
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30d is represented by a mandibular left molar (probably a second molar, but possibly a first molar) exhibiting grade 1 wear.

Ms27.30e
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30e is represented only by a left mandibular third molar exhibiting grade 0.5 wear.

Ms27.30f
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **12-18**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30f is represented only by a right mandibular second molar exhibiting grade 0.5 wear.

Ms27.30g
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **18+**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30g is represented by a pair of mandibular third molars exhibiting grade 1 wear.

Ms27.30h
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **5-6**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30h is represented by a maxillary right deciduous second molar, both maxillary first molars (unworn, with root half complete), all mandibular incisors (with root half complete on central incisors and 1/3 complete on lateral incisors), and a mandibular right first molar (with root half complete).

Ms27.30i
Dover Mound (15Ms27), Burial 30
Published Sex: Indeterminate
Published Age-at-Death: 6-7
Revised Sex: **Indeterminate**
Revised Age-at-Death: **5-7**

Additional notes: The remains labeled as Burial 30 are inconsistent with the published description of this burial. Instead, what is present is a collection of teeth from multiple individuals. These have been assigned the numbers Ms27.30a – Ms27.30i. Ms27.30i is represented by the broken tooth crowns of the maxillary right central incisor, both maxillary lateral incisors, the maxillary right canine, all maxillary premolars, the maxillary left first molar, the mandibular left premolars, and both mandibular first molars. All crowns appear to be unworn, and the root has just initiated for the maxillary right third premolar.

Ms27.31
Dover Mound (15Ms27), Burial 31
Published Sex: Female
Published Age-at-Death: 25-30
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Indeterminate**

Additional notes: This individual is represented only by both maxillary central incisors, the maxillary right second molar, the mandibular left first and second molars, a mandibular incisor, and a broken canine.

Ms27.32
Dover Mound (15Ms27), Burial 32
Published Sex: Female
Published Age-at-Death: 22
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.33
Dover Mound (15Ms27), Burial 33
Published Sex: Indeterminate
Published Age-at-Death: Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.34a
Dover Mound (15Ms27), Burial 34a
Published Sex: Male
Published Age-at-Death: 30
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.34b
Dover Mound (15Ms27), Burial 34b
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.35
Dover Mound (15Ms27), Burial 35
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.36
Dover Mound (15Ms27), Burial 36
Published Sex: Male
Published Age-at-Death: 26-30
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual and Ms27.37 are represented only by cranial fragments, some of which are heavily smoked.

Ms27.37
Dover Mound (15Ms27), Burial 37
Published Sex: Male
Published Age-at-Death: Adult
Revised Sex: **Indeterminate**
Revised Age-at-Death: **Adult**

Additional notes: This individual and Ms27.36 are represented only by cranial fragments, some of which are heavily smoked.

Ms27.38
Dover Mound (15Ms27), Burial 38
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.39
Dover Mound (15Ms27), Burial 39
Published Sex: Female
Published Age-at-Death: Young Adult
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.40
Dover Mound (15Ms27), Burial 40
Published Sex: Male
Published Age-at-Death: 25-30
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.41
Dover Mound (15Ms27), Burial 41
Published Sex: Male
Published Age-at-Death: 22
Revised Sex: **Indeterminate**
Revised Age-at-Death: **16+**
Relevant observations:

Age:

- Femora are complete (> 16; Scheuer & Black, 2000)

Additional notes: This individual is represented only by portions of both femora.

Ms27.42
Dover Mound (15Ms27), Burial 42
Published Sex: Male
Published Age-at-Death: 25-30
Revised Sex: **Male**
Revised Age-at-Death: **18+**
Relevant observations:

Sex:

- Glabellar region: 5
- Supraorbital margins: 4
- Mastoid processes: 4
- Mental eminence: 4
- Gonial angle is square

Age:

- Maxillary third molars exhibit grade 0.5 wear
- Mandibular third molars exhibit grade 1 wear

Ms27.43a
Dover Mound (15Ms27), Burial 43
Published Sex: Probable Female
Published Age-at-Death: 13-15
Revised Sex: **Indeterminate**
Revised Age-at-Death: **9-16**
Relevant observations:

Age:

- Vertebral ring epiphyses are unfused (< 21; Albert & Maples, 1995)
- Acetabulum has not united (< 17; Scheuer & Black, 2000)
- Epiphyses for femoral heads, greater and lesser trochanters, and femoral condyles are unfused (< 17; Scheuer & Black, 2000)
- Proximal and distal tibial epiphyses are unfused (< 18; Scheuer & Black, 2000)
- Proximal fibular epiphysis is unfused (< 20; Scheuer & Black, 2000)
- Bases of second and fifth metatarsal are fused, while heads are not (9-16; Scheuer & Black, 2000)

Additional notes: A second individual is represented by some fragmentary vertebrae and a maxillary left fourth premolar and has been given the number Ms27.43b.

Ms27.43b
Dover Mound (15Ms27), Burial 43
Published Sex: N/A
Published Age-at-Death: N/A
Revised Sex: **Indeterminate**
Revised Age-at-Death: **4-6**
Relevant observations:

Age:

- Neural arches have not fused to vertebral centra (3-4; Scheuer & Black, 2000)
- Maxillary left fourth premolar crown is approximately 2/3 complete (5-6; Smith, 1991)

Additional notes: These remains were intermingled with those of Ms27.43a. It is possible that they represent two separate individuals, but the age estimates derived from the dentition and the vertebrae are close enough that it is more parsimonious to assume that they derive from the same individual.

Ms27.44
Dover Mound (15Ms27), Burial 44
Published Sex: Female
Published Age-at-Death: 19-20
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.45a
Dover Mound (15Ms27), Burial 45a
Published Sex: Indeterminate
Published Age-at-Death: Child
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.45b
Dover Mound (15Ms27), Burial 45b
Published Sex: Indeterminate
Published Age-at-Death: Child
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.46
Dover Mound (15Ms27), Burial 46
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.47
Dover Mound (15Ms27), Burial 47
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**

Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.48
Dover Mound (15Ms27), Burial 48
Published Sex: Male
Published Age-at-Death: 23-24
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.49
Dover Mound (15Ms27), Burial 49
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.50
Dover Mound (15Ms27), Burial 50
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.51
Dover Mound (15Ms27), Burial 51
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.52
Dover Mound (15Ms27), Burial 52
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.53
Dover Mound (15Ms27), Burial 53
Published Sex: Male
Published Age-at-Death: 35
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

Ms27.54
Dover Mound (15Ms27), Burial 54
Published Sex: Female
Published Age-at-Death: 27-30
Revised Sex: **Female**
Revised Age-at-Death: **25+**
Relevant observations:

Sex:

- Glabellar region: 2.5
- Supraorbital margins: 2
- Mental eminence: 2
- Gonial angle is oblique

Age:

- Vertebral ring epiphyses are fused (> 18; Albert & Maples, 19950
- Medial epiphysis of clavicle is fused (> 25; Baker et al., 2005)
- Observable first molars exhibit grade 3 wear
- Observable second molars exhibit grade 2 wear
- Mandibular right third molar exhibits grade 0.5 wear, but seems to never have been in occlusion with anything other than the distal edge of the maxillary right second molar (i.e., all other third molars appear to be congenitally absent)

Ms27.55
Dover Mound (15Ms27), Burial 55
Published Sex: Indeterminate
Published Age-at-Death: Indeterminate
Revised Sex: **N/A**
Revised Age-at-Death: **N/A**

Additional notes: No remains with this number were encountered during data collection.

APPENDIX C

CONSTRUCTION SEQUENCE FOR THE ROBBINS MOUND (15BE3)

The purpose of this appendix is to provide visual representations of the sequence of construction for the larger Robbins mound (15Be3) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

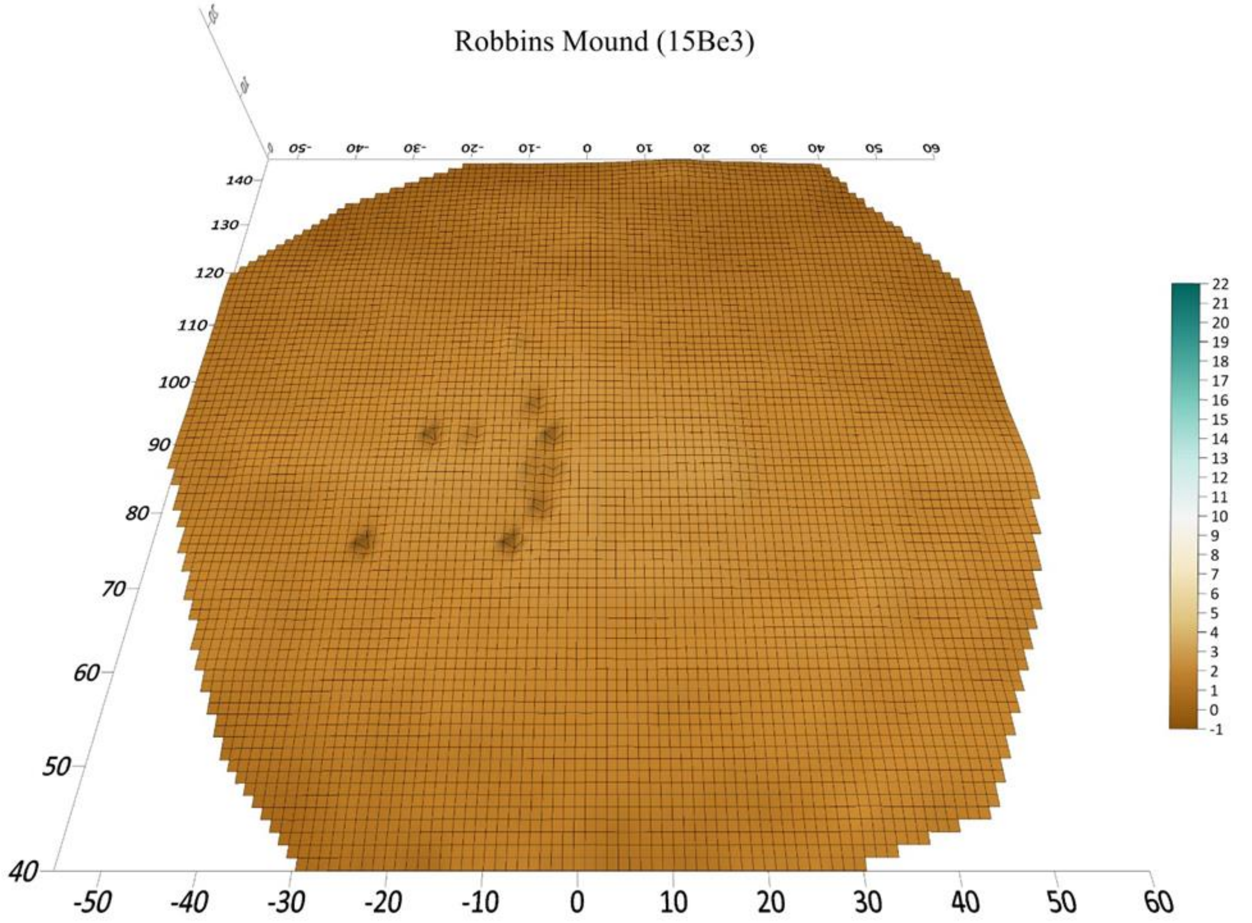


Figure C.4: Robbins Mound Sequence – 1. Surface prior to the beginning of mound construction. Note the depressions indicating the location of a submound, circular paired-post structure.

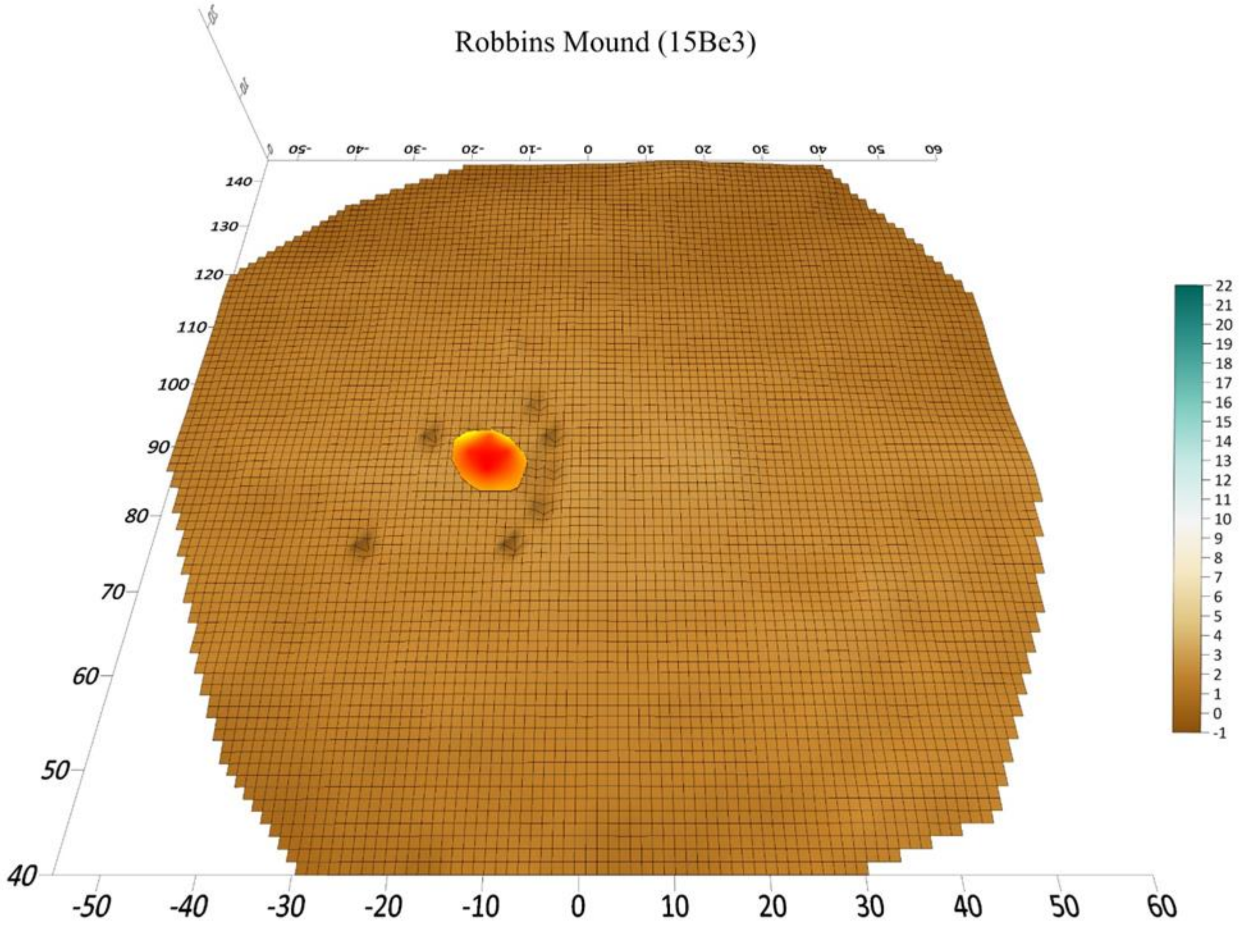


Figure C.2: Robbins Mound Sequence – 2. The red area indicates the portion of the mound floor that was covered with redeposited ash, charcoal, and the charred bone fragments of at least eleven individuals (Webb & Elliott, 1942).

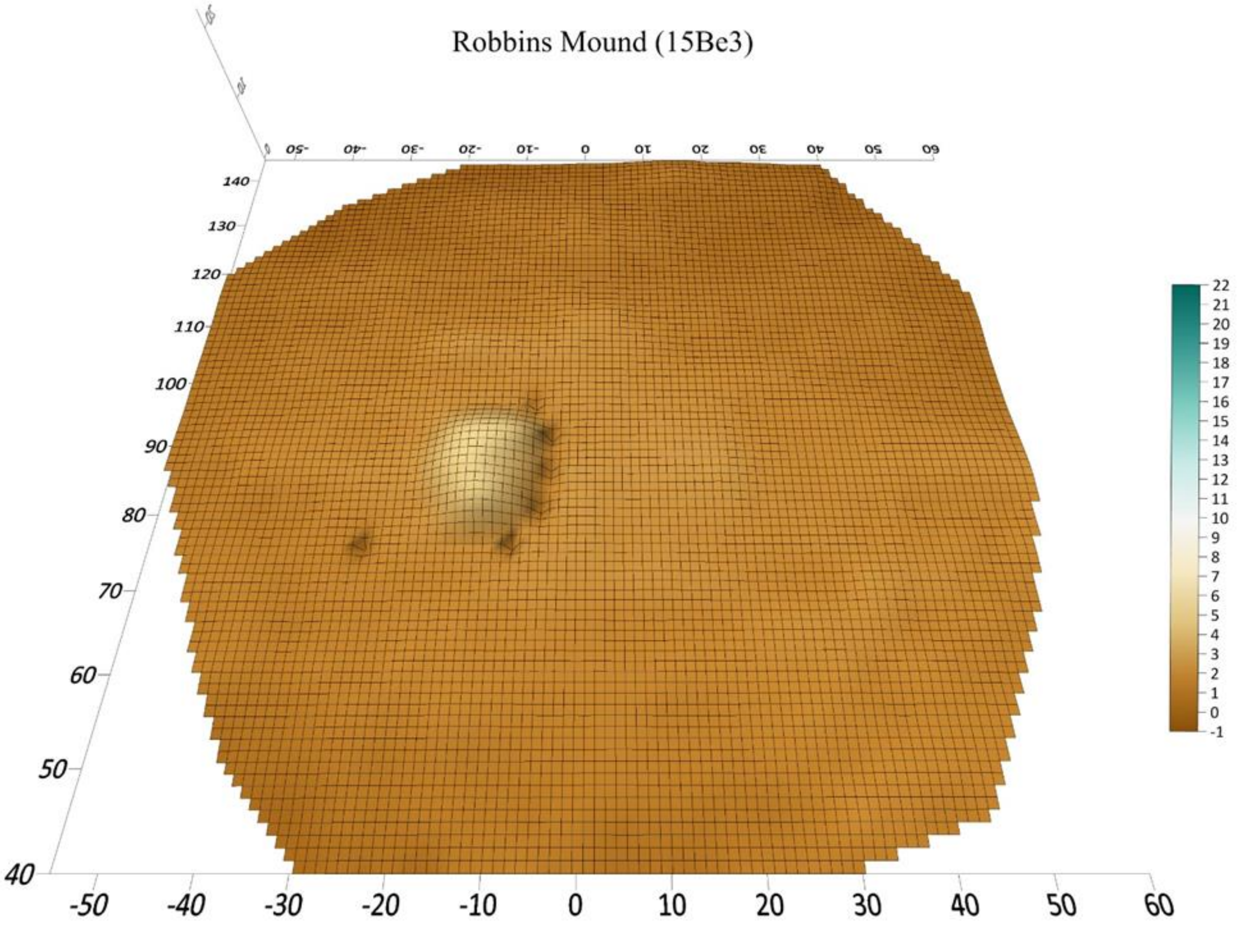


Figure C.3: Robbins Mound Sequence – 3. Following the deposition of the cremated remains, a small earth mound was constructed over them. This was done while the post structure was still standing (Webb & Elliott, 1942).

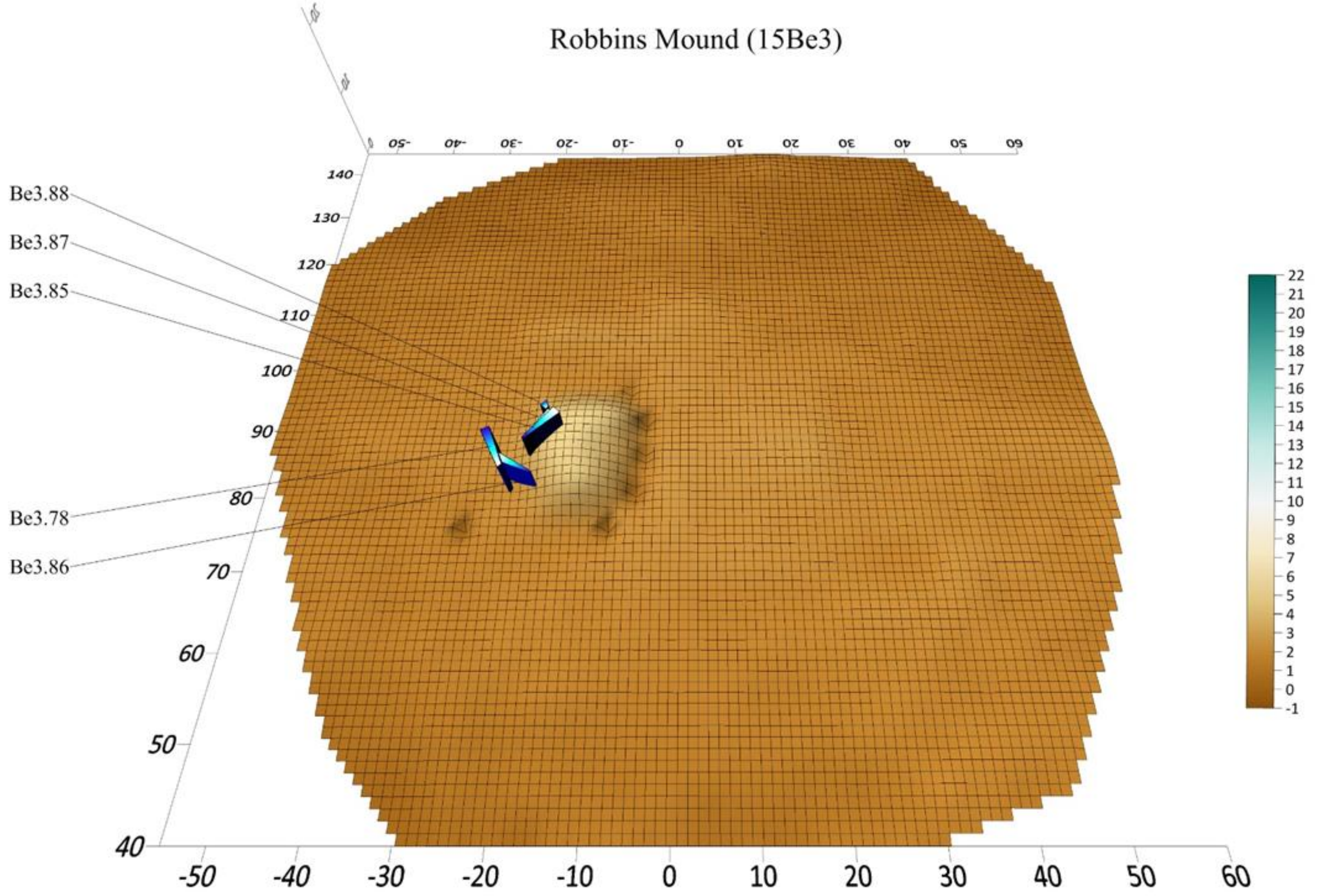
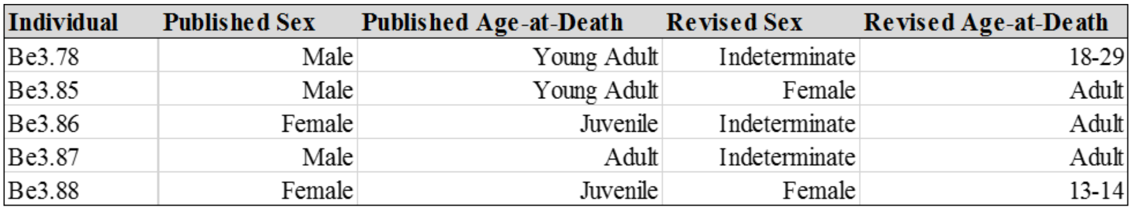


Figure C.4: Robbins Mound Sequence – 4. Placement of individuals in the first interment episode, including Be3.78, Be3.85, Be3.86, Be3.87, and Be3.88. These individuals were situated after construction of the primary mound.

Table C.1

Demographic Characteristics of Interment Episode 1

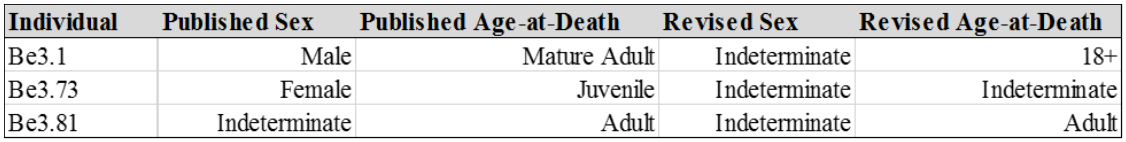


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.78	Male	Young Adult	Indeterminate	18-29
Be3.85	Male	Young Adult	Female	Adult
Be3.86	Female	Juvenile	Indeterminate	Adult
Be3.87	Male	Adult	Indeterminate	Adult
Be3.88	Female	Juvenile	Female	13-14

See Figures C.4 and C.5

Table C.2

Demographic Characteristics of Interment Episode 2

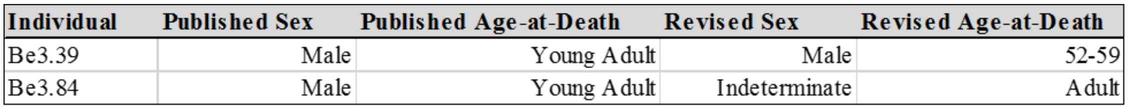


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.1	Male	Mature Adult	Indeterminate	18+
Be3.73	Female	Juvenile	Indeterminate	Indeterminate
Be3.81	Indeterminate	Adult	Indeterminate	Adult

See Figures C.6 and C.7

Table C.3

Demographic Characteristics of Interment Episode 3

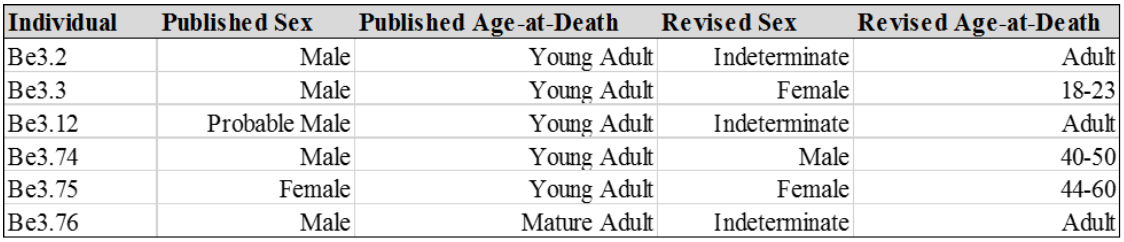


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.39	Male	Young Adult	Male	52-59
Be3.84	Male	Young Adult	Indeterminate	Adult

See Figures C.8 and C.9

Table C.4

Demographic Characteristics of Interment Episode 4



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.2	Male	Young Adult	Indeterminate	Adult
Be3.3	Male	Young Adult	Female	18-23
Be3.12	Probable Male	Young Adult	Indeterminate	Adult
Be3.74	Male	Young Adult	Male	40-50
Be3.75	Female	Young Adult	Female	44-60
Be3.76	Male	Mature Adult	Indeterminate	Adult

See Figures C.10 through C.12

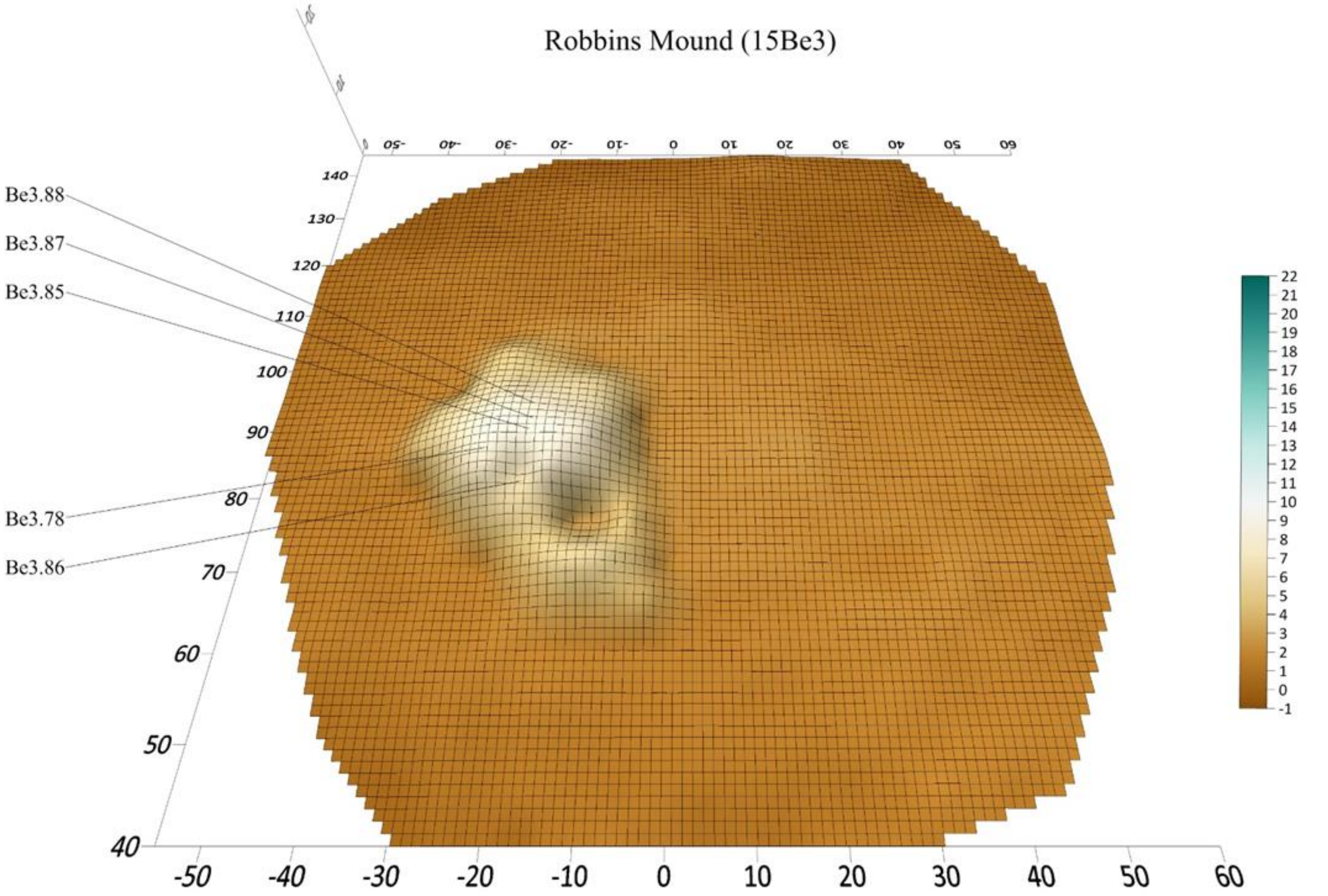


*Figure C.5***:** Robbins Mound Sequence – 5. Mound surface after the addition of the earth covering Be3.78, Be3.85, Be3.86, Be3.87, and Be3.88.

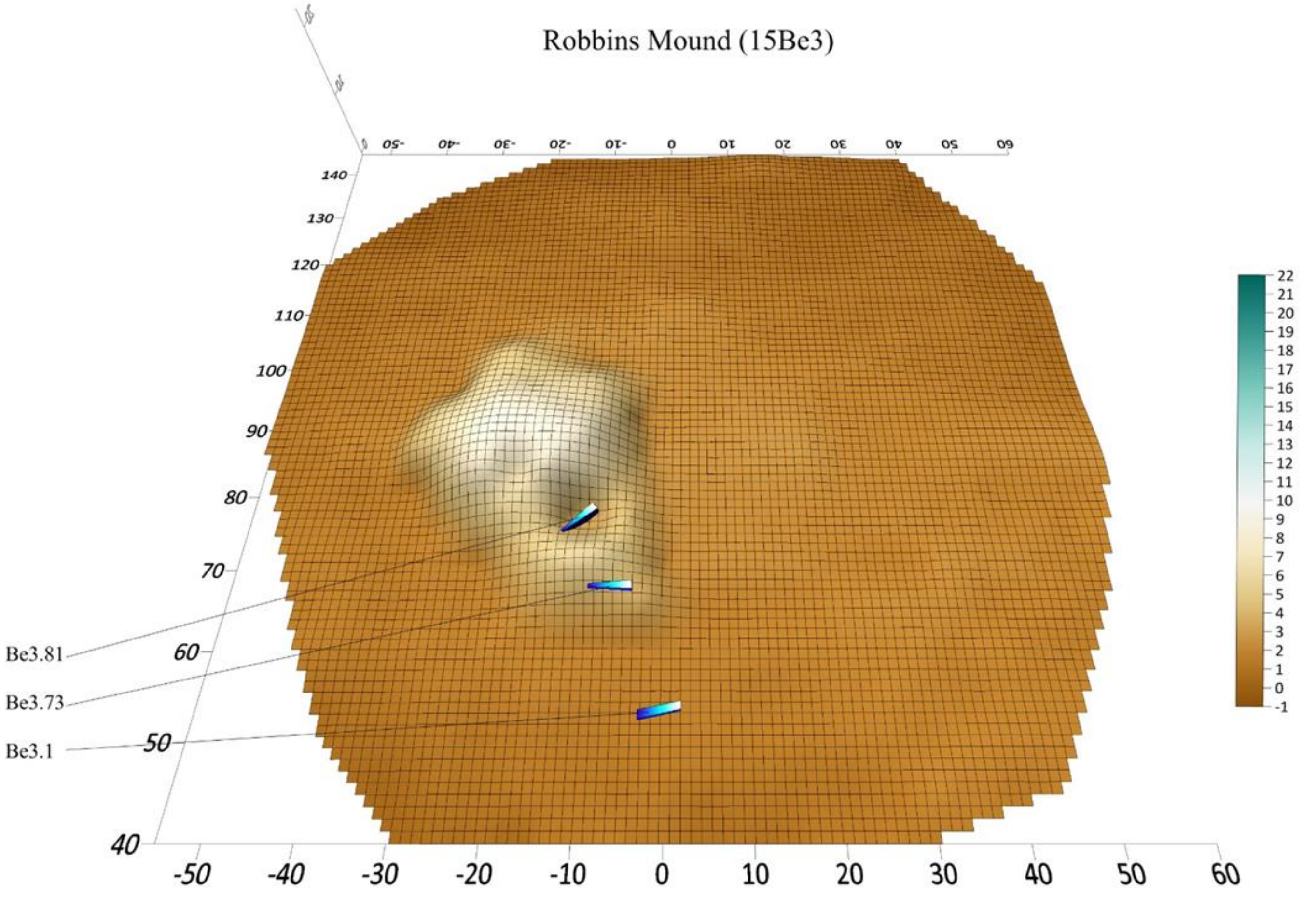


*Figure C.6***:** Robbins Mound Sequence – 6. Following the placement of earth over the first group of interments, individuals Be3.1, Be3.73, and Be3.81 were deposited in the second interment episode.

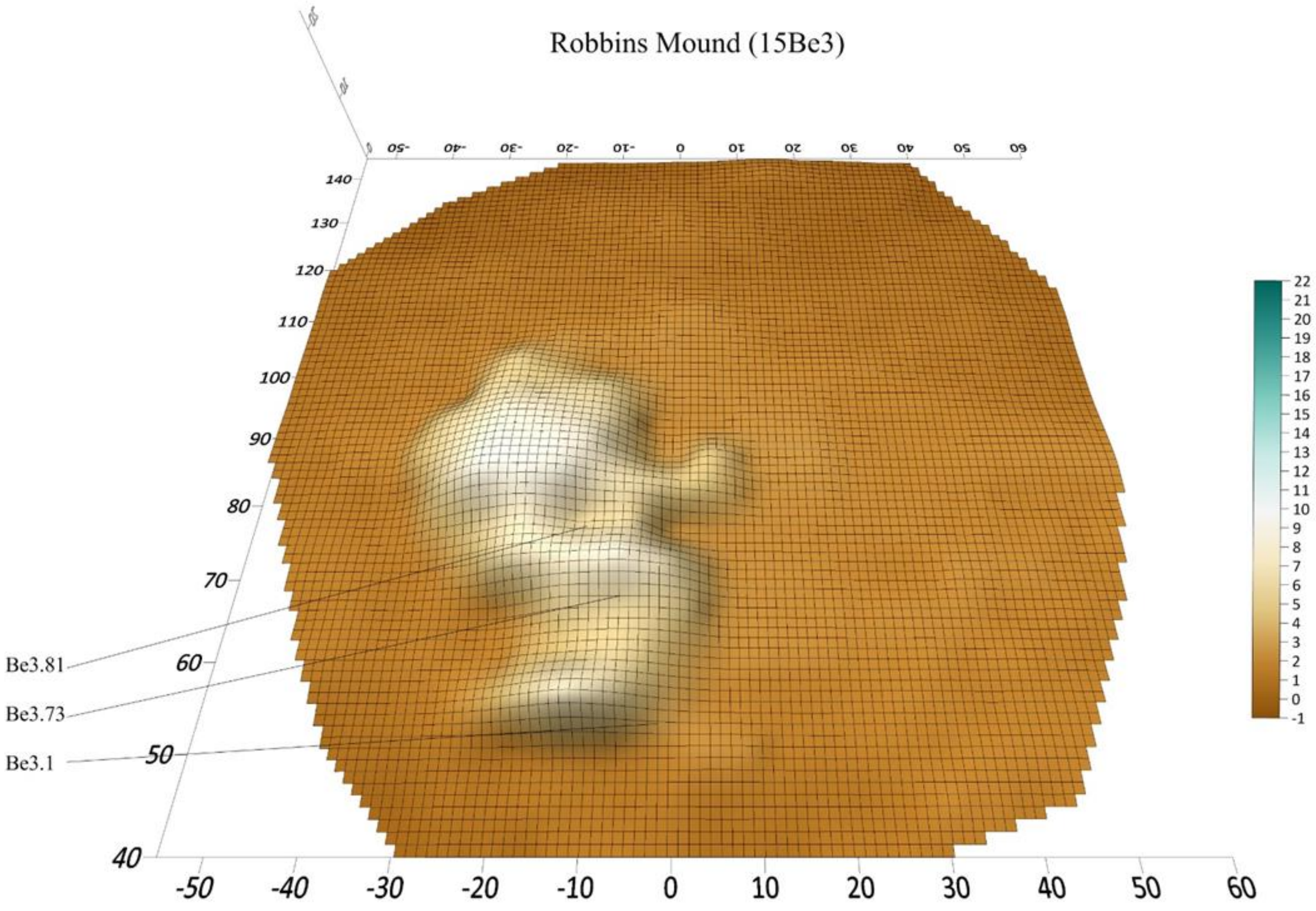


Figure C.7: Robbins Mound Sequence – 7. Mound surface after the addition of earth covering individuals Be3.1, Be3.73, and Be3.81.

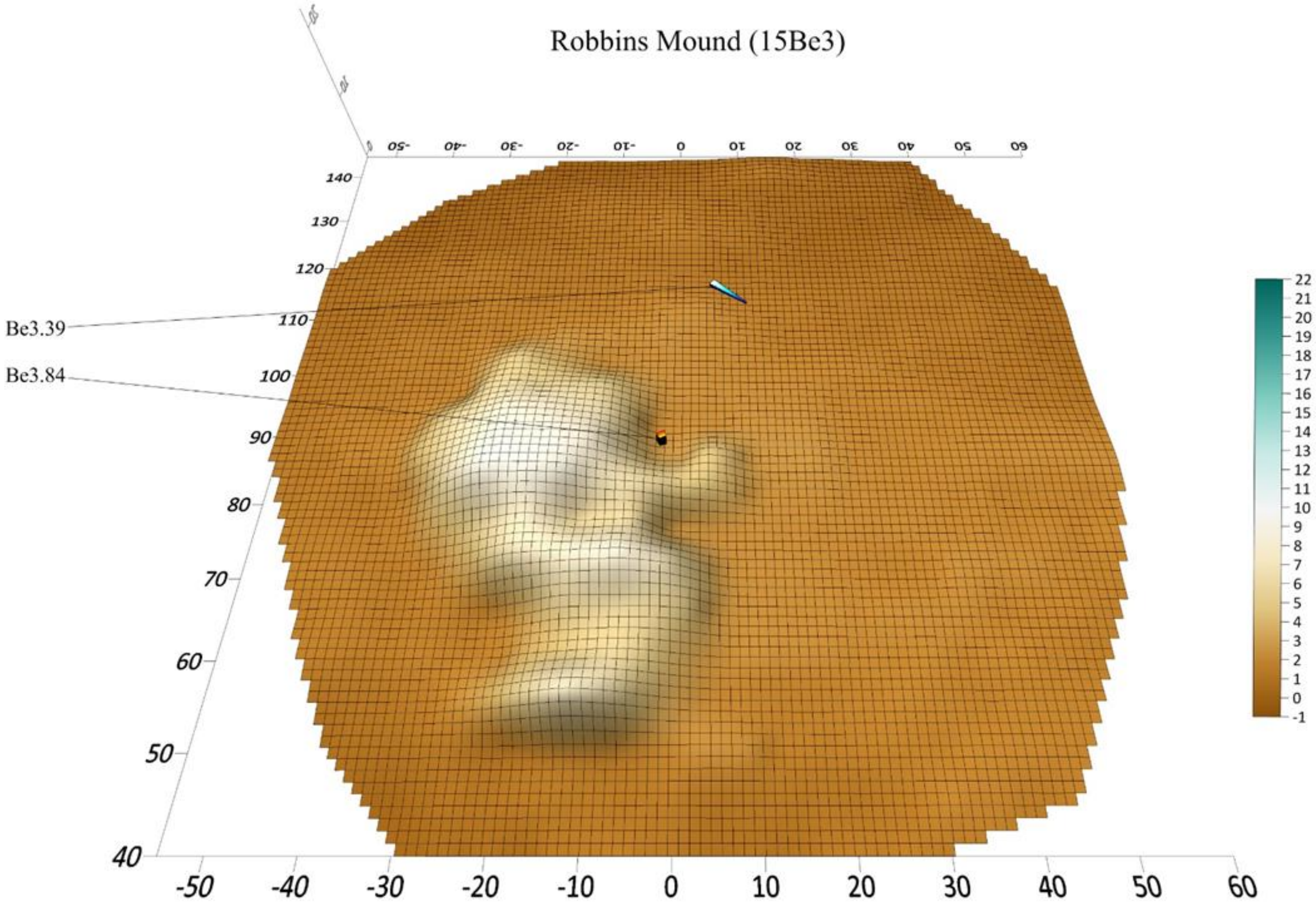


Figure C.8: Robbins Mound Sequence – 8. Placement of individuals Be3.39 and Be3.84 in the third interment episode.

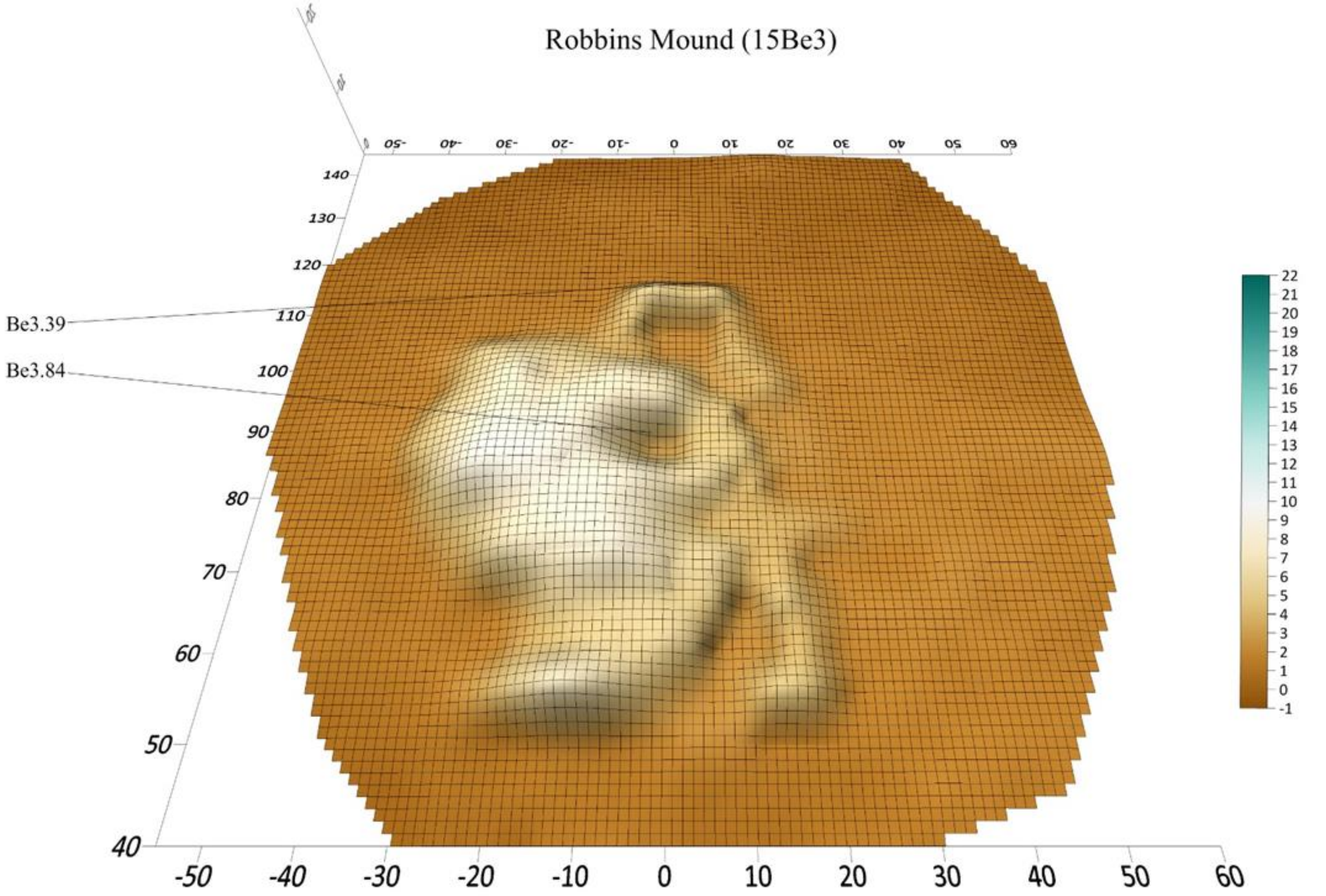


*Figure C.9***:** Robbins Mound Sequence – 9. Mound surface after the addition of earth covering individuals Be3.39 and Be3.84.

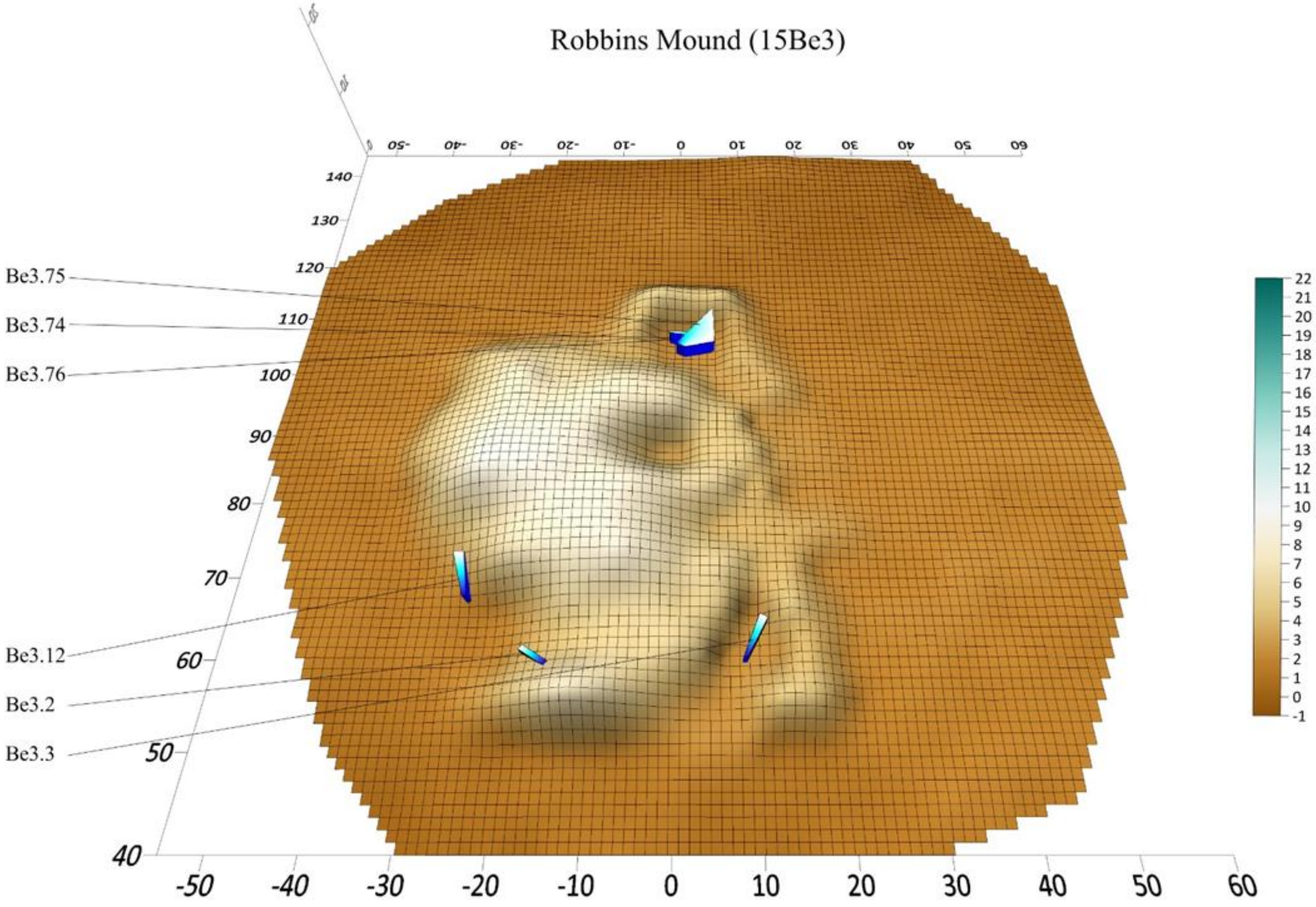


Figure C.10: Robbins Mound Sequence – 10. Placement of individuals Be3.2, Be3.3, Be3.12, Be3.74, Be3.75, and Be3.76 in the fourth interment episode.

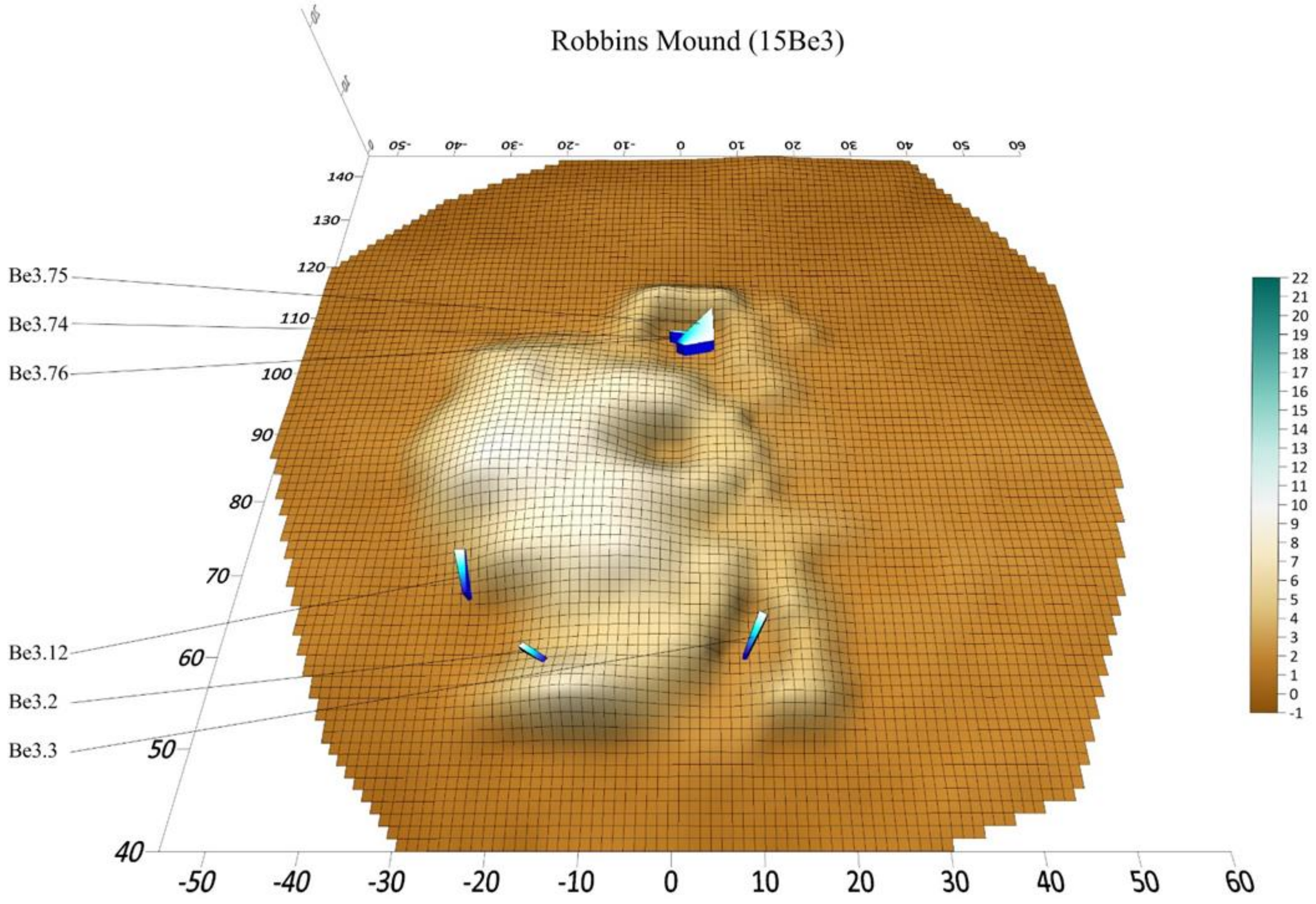


Figure C.11: Robbins Mound Sequence – 11. Addition of a small mound of dirt near the grid northeast of the mound.

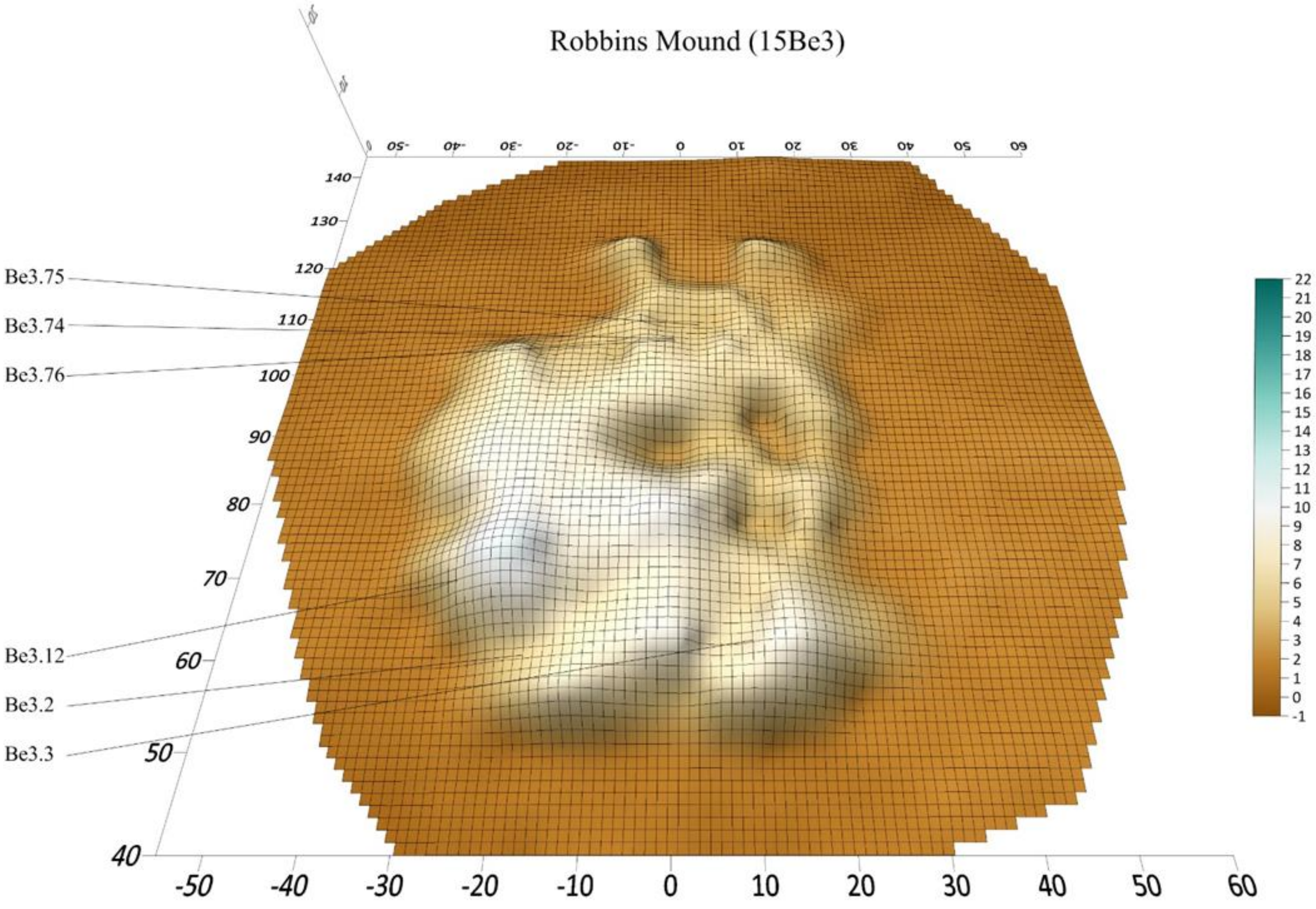


Figure C.12: Robbins Mound Sequence – 12. Mound surface after the addition of earth covering individuals Be3.2, Be3.3, Be3.12, Be3.74, Be3.75, and Be3.76.

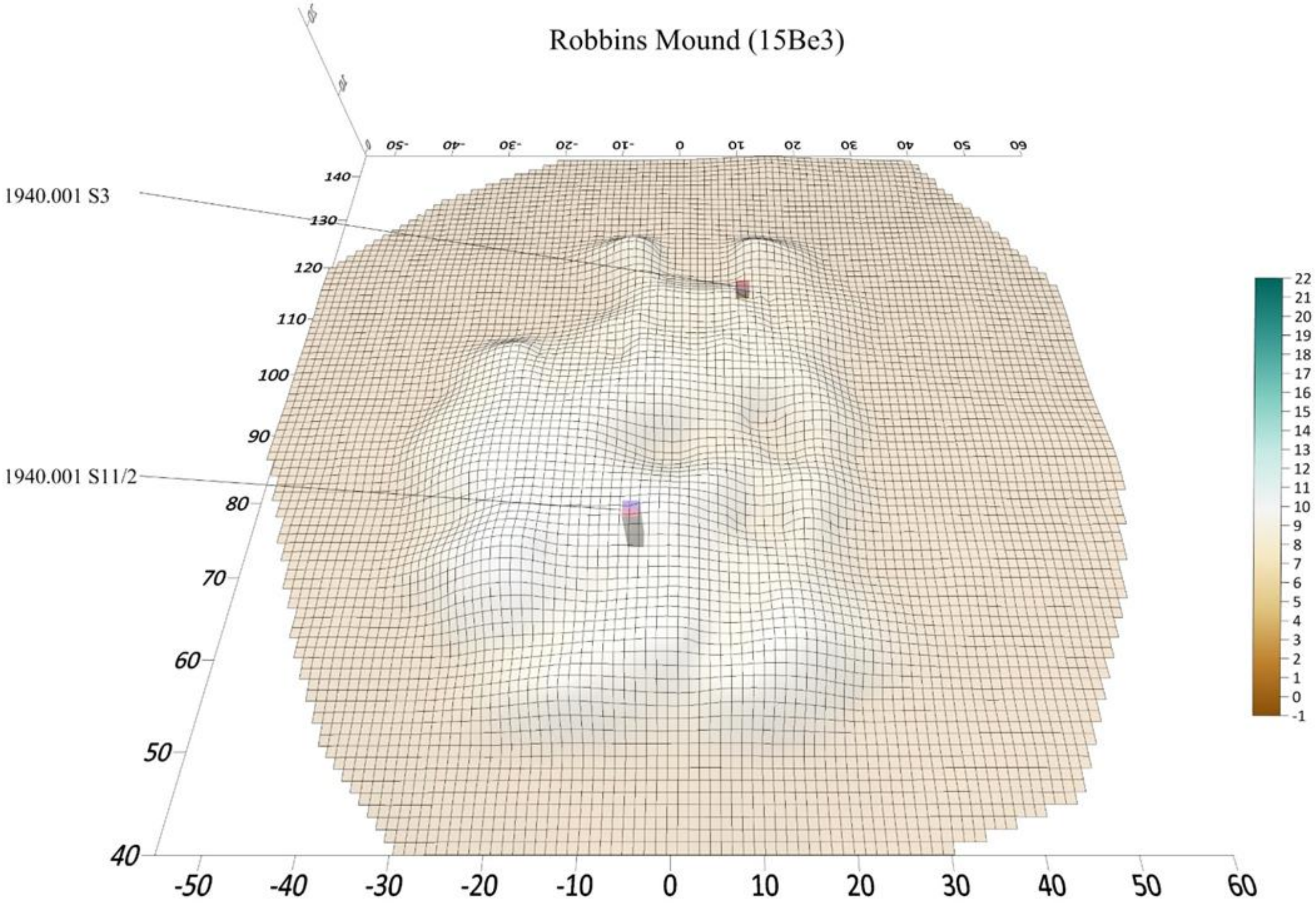
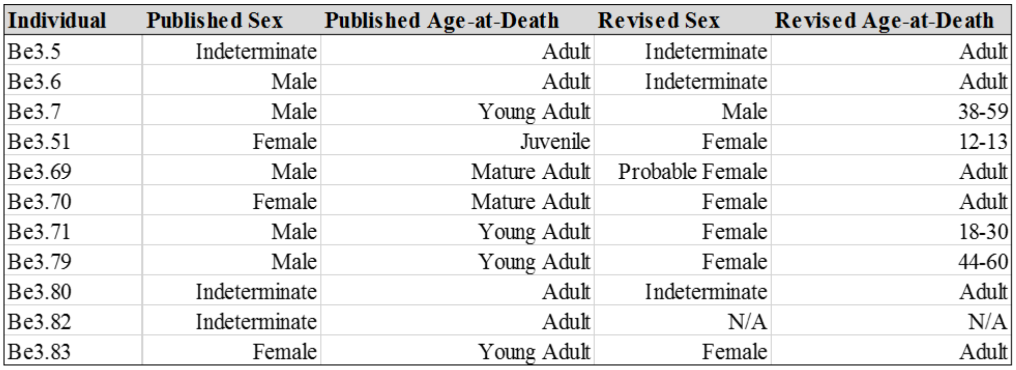


*Figure C.13***:** Robbins Mound Sequence – 13. Estimated locations of 1940.001 S3 and 1940.001 S11/2, submitted for radiocarbon dating, within the fill covering the fourth interment episode.

Table C.5

Demographic Characteristics of Interment Episode

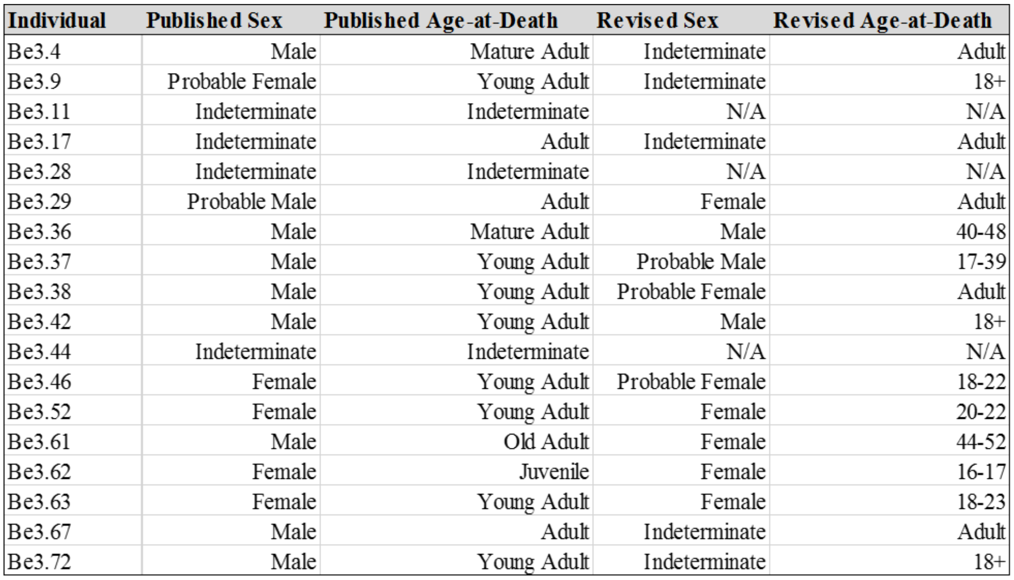


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.5	Indeterminate	Adult	Indeterminate	Adult
Be3.6	Male	Adult	Indeterminate	Adult
Be3.7	Male	Young Adult	Male	38-59
Be3.51	Female	Juvenile	Female	12-13
Be3.69	Male	Mature Adult	Probable Female	Adult
Be3.70	Female	Mature Adult	Female	Adult
Be3.71	Male	Young Adult	Female	18-30
Be3.79	Male	Young Adult	Female	44-60
Be3.80	Indeterminate	Adult	Indeterminate	Adult
Be3.82	Indeterminate	Adult	N/A	N/A
Be3.83	Female	Young Adult	Female	Adult

See Figures C.14 through C.16

Table C.6

Demographic Characteristics of Interment Episode 6

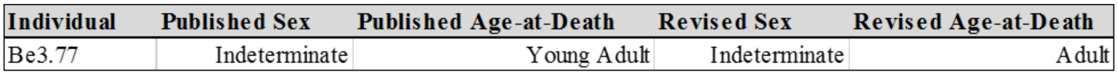


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.4	Male	Mature Adult	Indeterminate	Adult
Be3.9	Probable Female	Young Adult	Indeterminate	18+
Be3.11	Indeterminate	Indeterminate	N/A	N/A
Be3.17	Indeterminate	Adult	Indeterminate	Adult
Be3.28	Indeterminate	Indeterminate	N/A	N/A
Be3.29	Probable Male	Adult	Female	Adult
Be3.36	Male	Mature Adult	Male	40-48
Be3.37	Male	Young Adult	Probable Male	17-39
Be3.38	Male	Young Adult	Probable Female	Adult
Be3.42	Male	Young Adult	Male	18+
Be3.44	Indeterminate	Indeterminate	N/A	N/A
Be3.46	Female	Young Adult	Probable Female	18-22
Be3.52	Female	Young Adult	Female	20-22
Be3.61	Male	Old Adult	Female	44-52
Be3.62	Female	Juvenile	Female	16-17
Be3.63	Female	Young Adult	Female	18-23
Be3.67	Male	Adult	Indeterminate	Adult
Be3.72	Male	Young Adult	Indeterminate	18+

See Figures C.17 through C.19

Table C.7

Demographic Characteristics of Interment Episode 7



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.77	Indeterminate	Young Adult	Indeterminate	Adult

See Figures C.18 and C.19

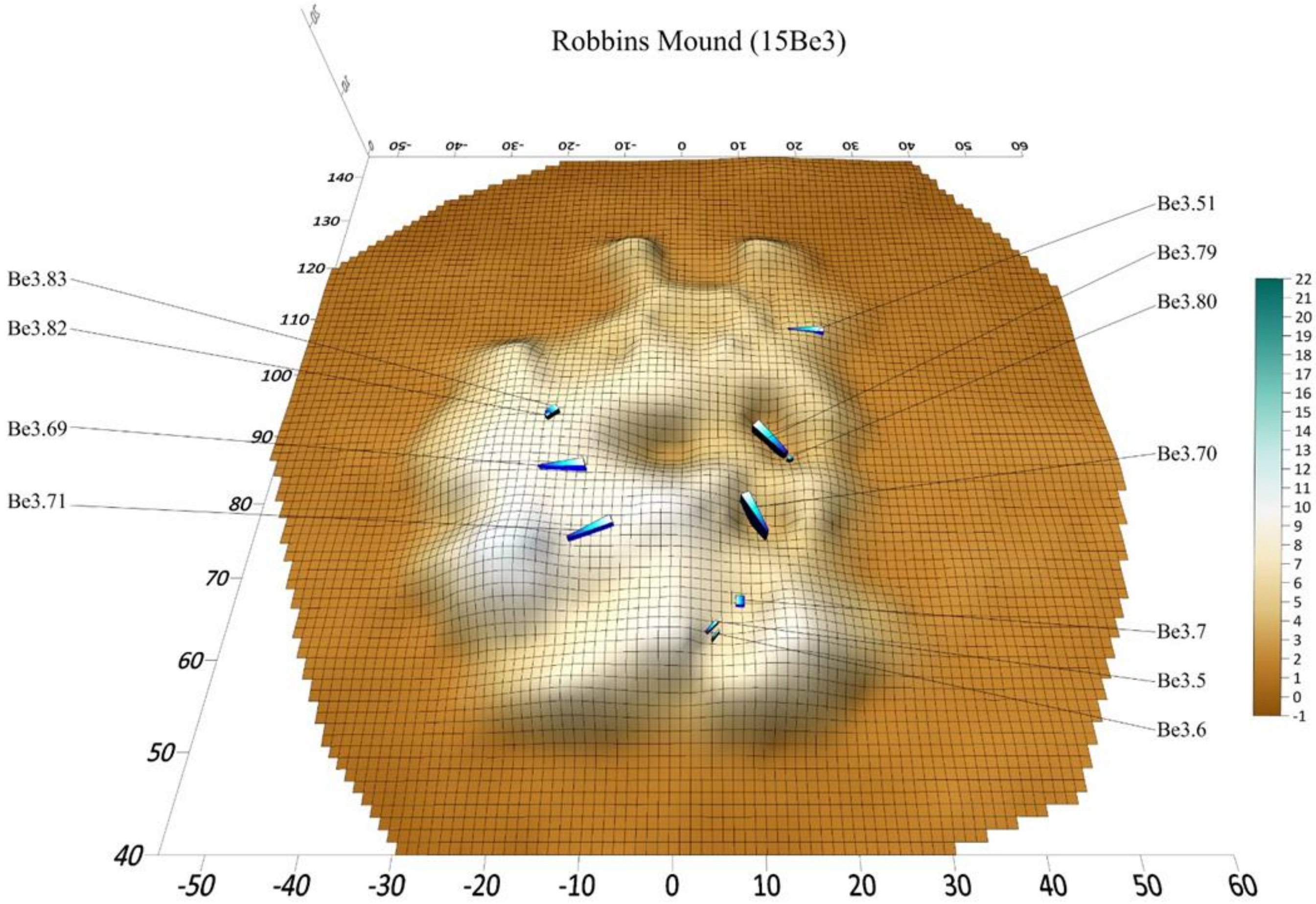


*Figure C.14***:** Robbins Mound Sequence – 14. Placement of individuals Be3.5, Be3.6, Be3.7, Be3.51, Be3.69, Be3.70, Be3.71, Be3.79, Be3.80, Be3.82, and Be3.83 within the fifth interment episode.

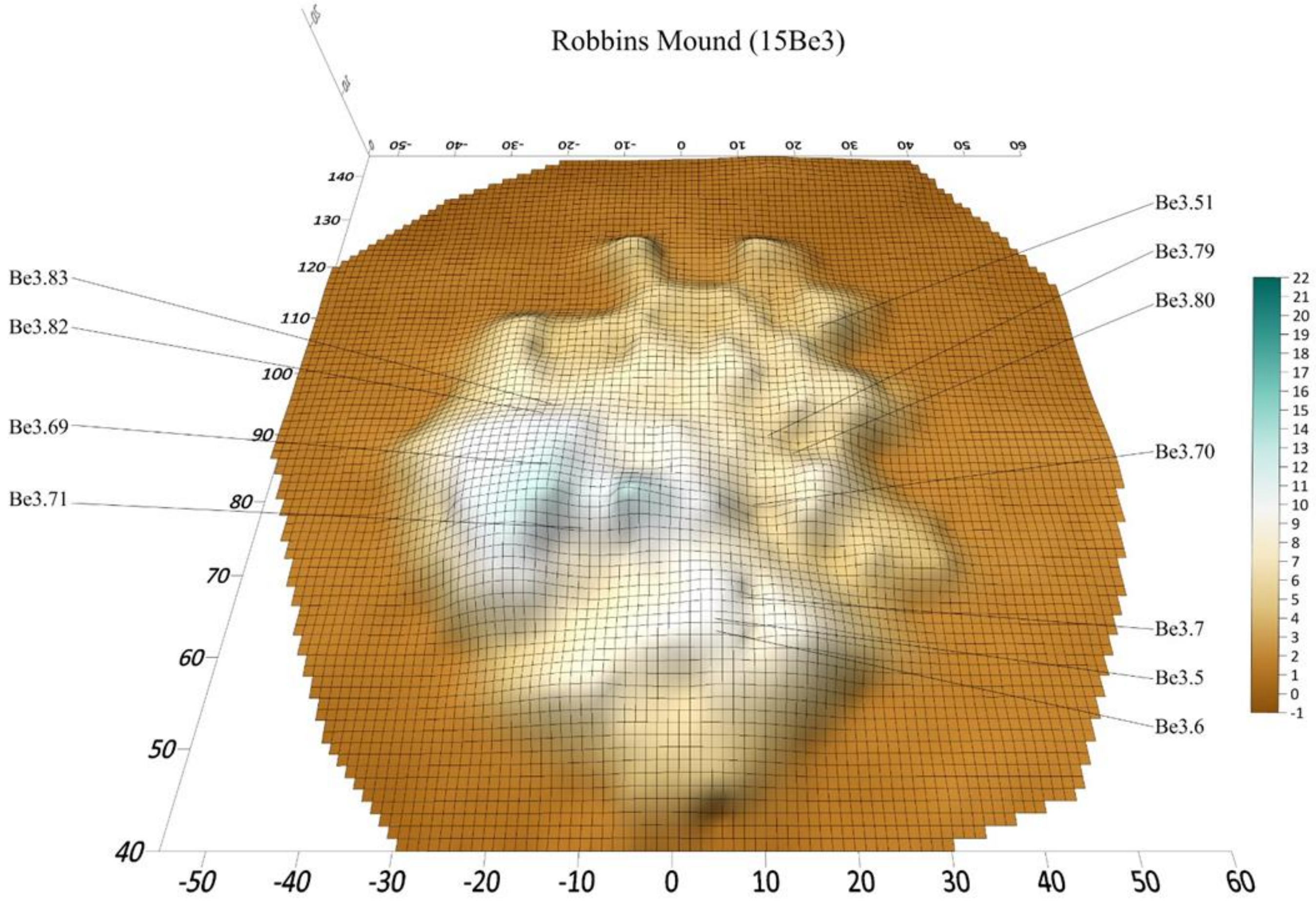


Figure C.15: Robbins Mound Sequence – 15. Mound surface after the addition of earth covering individuals Be3.5, Be3.6, Be3.7, Be3.51, Be3.69, Be3.70, Be3.71, Be3.79, Be3.80, Be3.82, and Be3.83.

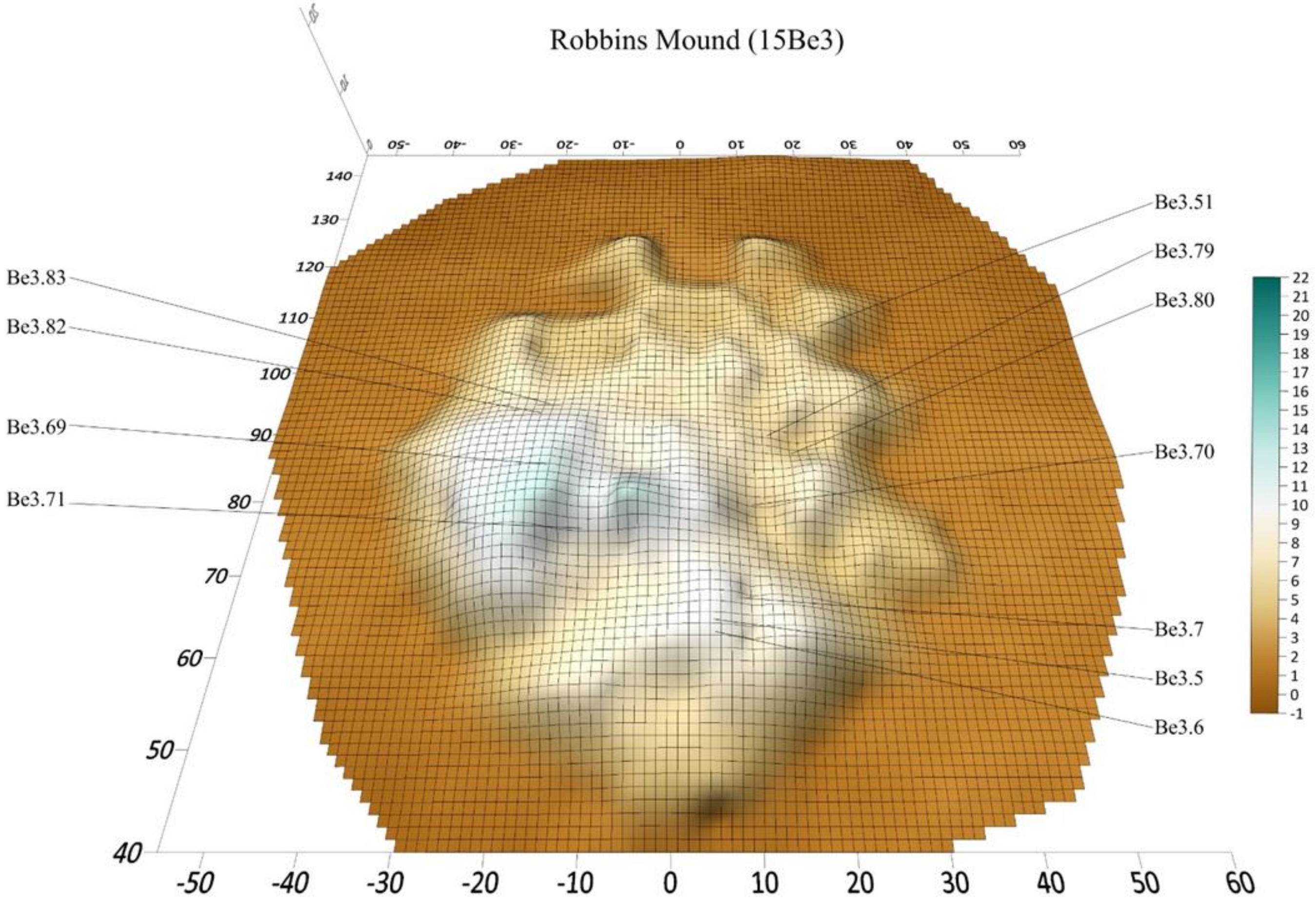


Figure C.16: Robbins Mound Sequence – 16. Mound surface after the addition of a small amount of earth at its northern margin, likely in preparation for the placement of Be3.17 as part of the sixth interment episode (see Figure C.17).

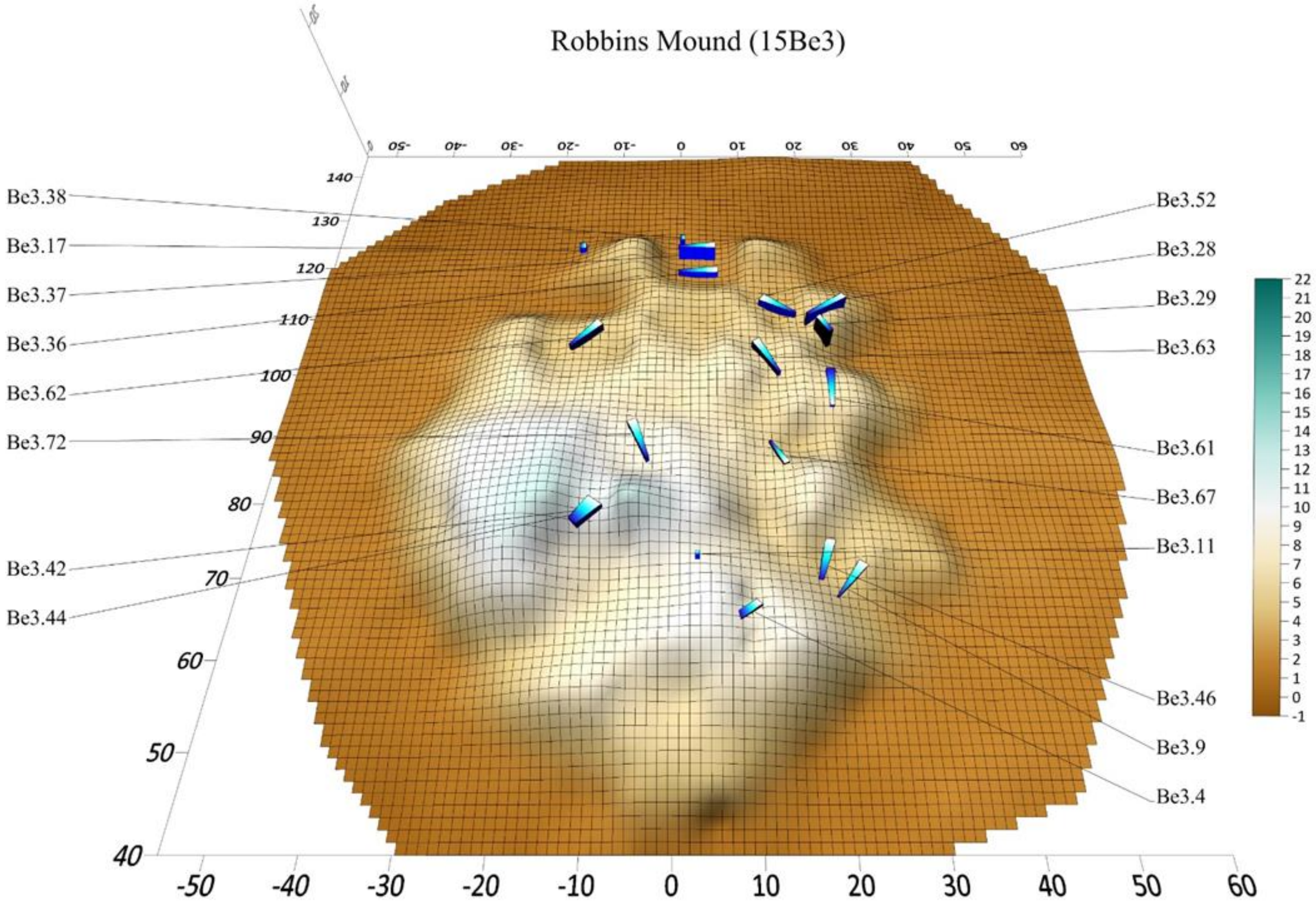


Figure C.17: Robbins Mound Sequence – 17. Placement of individuals Be3.4, Be3.9, Be3.11, Be3.17, Be3.28, Be3.29, Be3.36, Be3.37, Be3.38, Be3.42, Be3.44, Be3.46, Be3.52, Be3.61, Be3.62, Be3.63, Be3.67, and Be3.72 in the sixth interment episode.

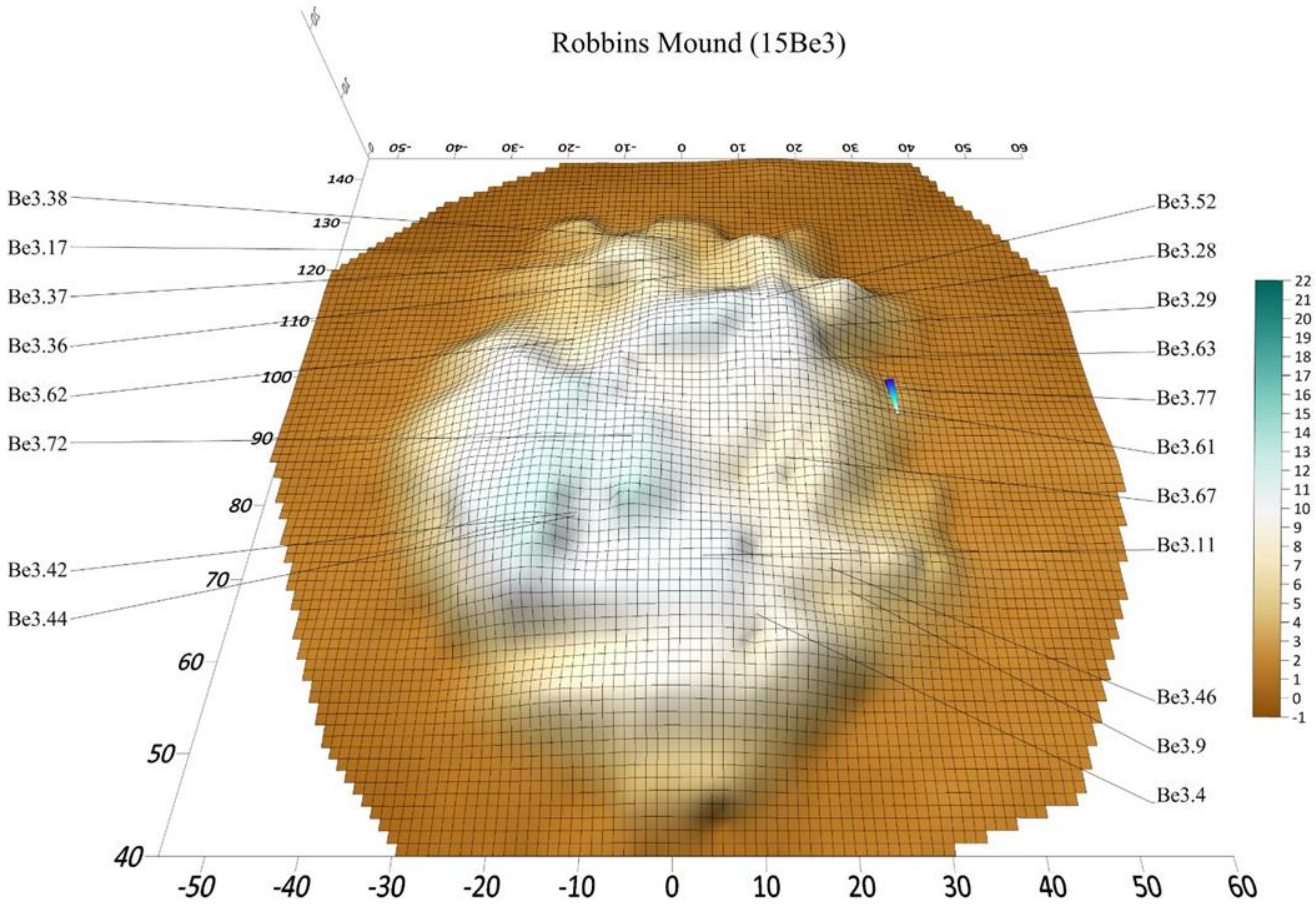


Figure C.18: Robbins Mound Sequence – 18. Mound surface after the addition of earth covering individuals Be3.4, Be3.9, Be3.11, Be3.17, Be3.28, Be3.29, Be3.36, Be3.37, Be3.38, Be3.42, Be3.44, Be3.46, Be3.52, Be3.61, Be3.62, Be3.63, Be3.67, and Be3.72. Note also the placement of Be3.77 on this surface. It is unclear whether this individual more properly belongs to the previous interment episode or the one that follows and so has been assigned to its own seventh interment episode.

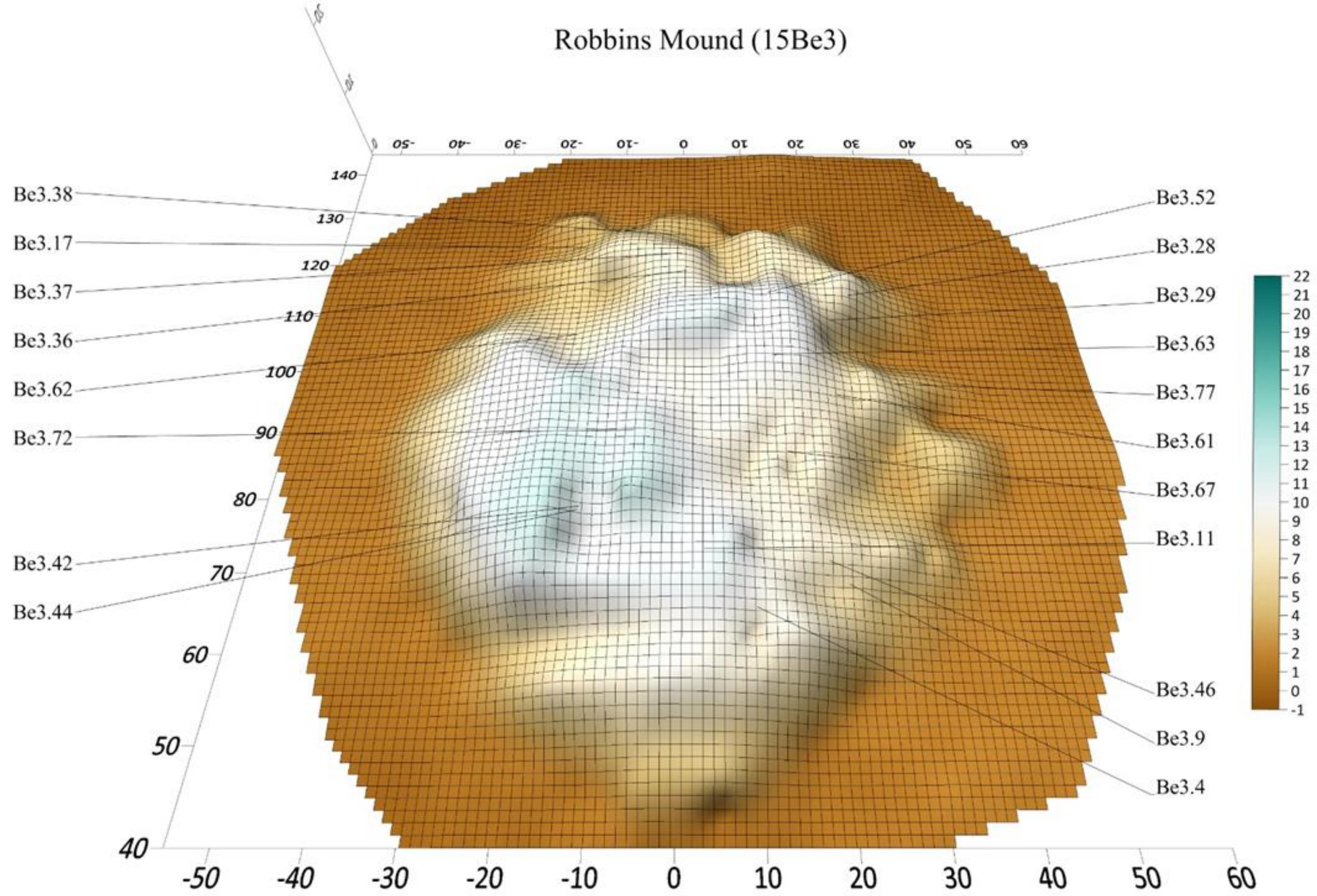
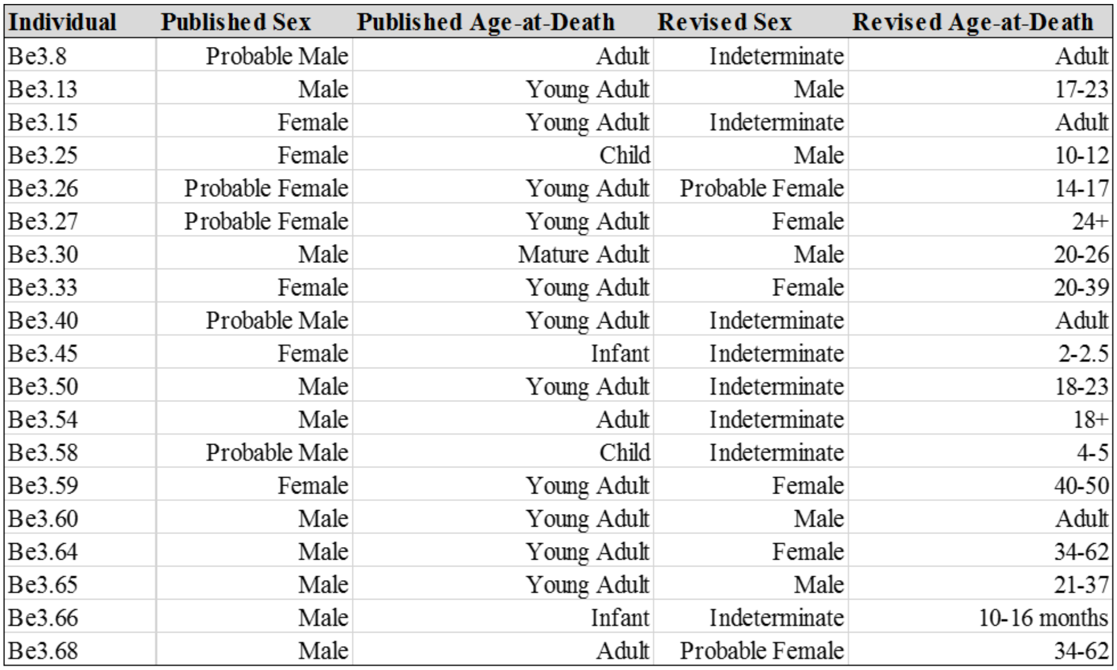


Figure C.19: Robbins Mound Sequence – 19. Mound surface after the addition of earth on the eastern aspect of its northern half, covering the interment of Be3.77.

Table C.8

Demographic Characteristics of Interment Episode 8

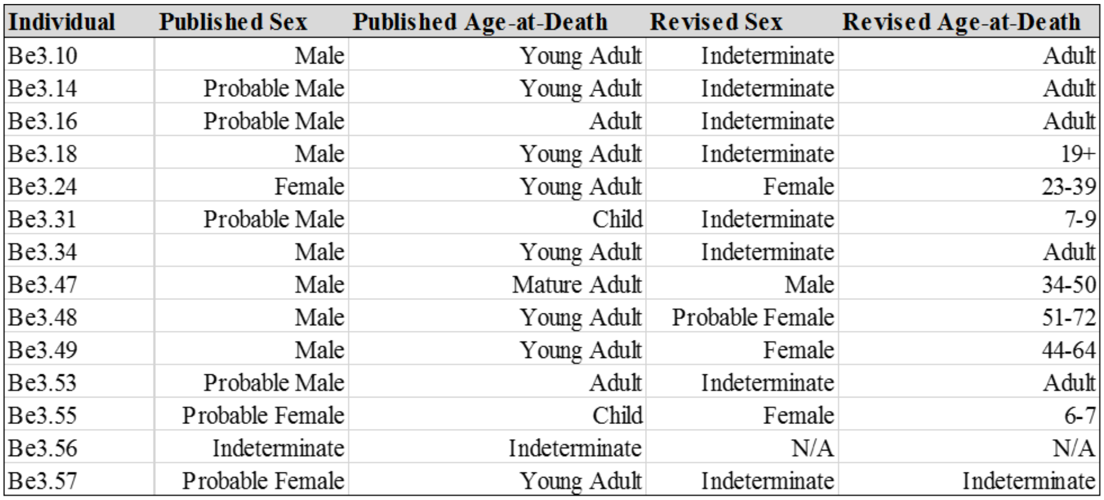


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.8	Probable Male	Adult	Indeterminate	Adult
Be3.13	Male	Young Adult	Male	17-23
Be3.15	Female	Young Adult	Indeterminate	Adult
Be3.25	Female	Child	Male	10-12
Be3.26	Probable Female	Young Adult	Probable Female	14-17
Be3.27	Probable Female	Young Adult	Female	24+
Be3.30	Male	Mature Adult	Male	20-26
Be3.33	Female	Young Adult	Female	20-39
Be3.40	Probable Male	Young Adult	Indeterminate	Adult
Be3.45	Female	Infant	Indeterminate	2-2.5
Be3.50	Male	Young Adult	Indeterminate	18-23
Be3.54	Male	Adult	Indeterminate	18+
Be3.58	Probable Male	Child	Indeterminate	4-5
Be3.59	Female	Young Adult	Female	40-50
Be3.60	Male	Young Adult	Male	Adult
Be3.64	Male	Young Adult	Female	34-62
Be3.65	Male	Young Adult	Male	21-37
Be3.66	Male	Infant	Indeterminate	10-16 months
Be3.68	Male	Adult	Probable Female	34-62

See Figures C.20 and C.21

Table C.9

Demographic Characteristics of Interment Episode 9



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.10	Male	Young Adult	Indeterminate	Adult
Be3.14	Probable Male	Young Adult	Indeterminate	Adult
Be3.16	Probable Male	Adult	Indeterminate	Adult
Be3.18	Male	Young Adult	Indeterminate	19+
Be3.24	Female	Young Adult	Female	23-39
Be3.31	Probable Male	Child	Indeterminate	7-9
Be3.34	Male	Young Adult	Indeterminate	Adult
Be3.47	Male	Mature Adult	Male	34-50
Be3.48	Male	Young Adult	Probable Female	51-72
Be3.49	Male	Young Adult	Female	44-64
Be3.53	Probable Male	Adult	Indeterminate	Adult
Be3.55	Probable Female	Child	Female	6-7
Be3.56	Indeterminate	Indeterminate	N/A	N/A
Be3.57	Probable Female	Young Adult	Indeterminate	Indeterminate

See Figures C.24 and C.25

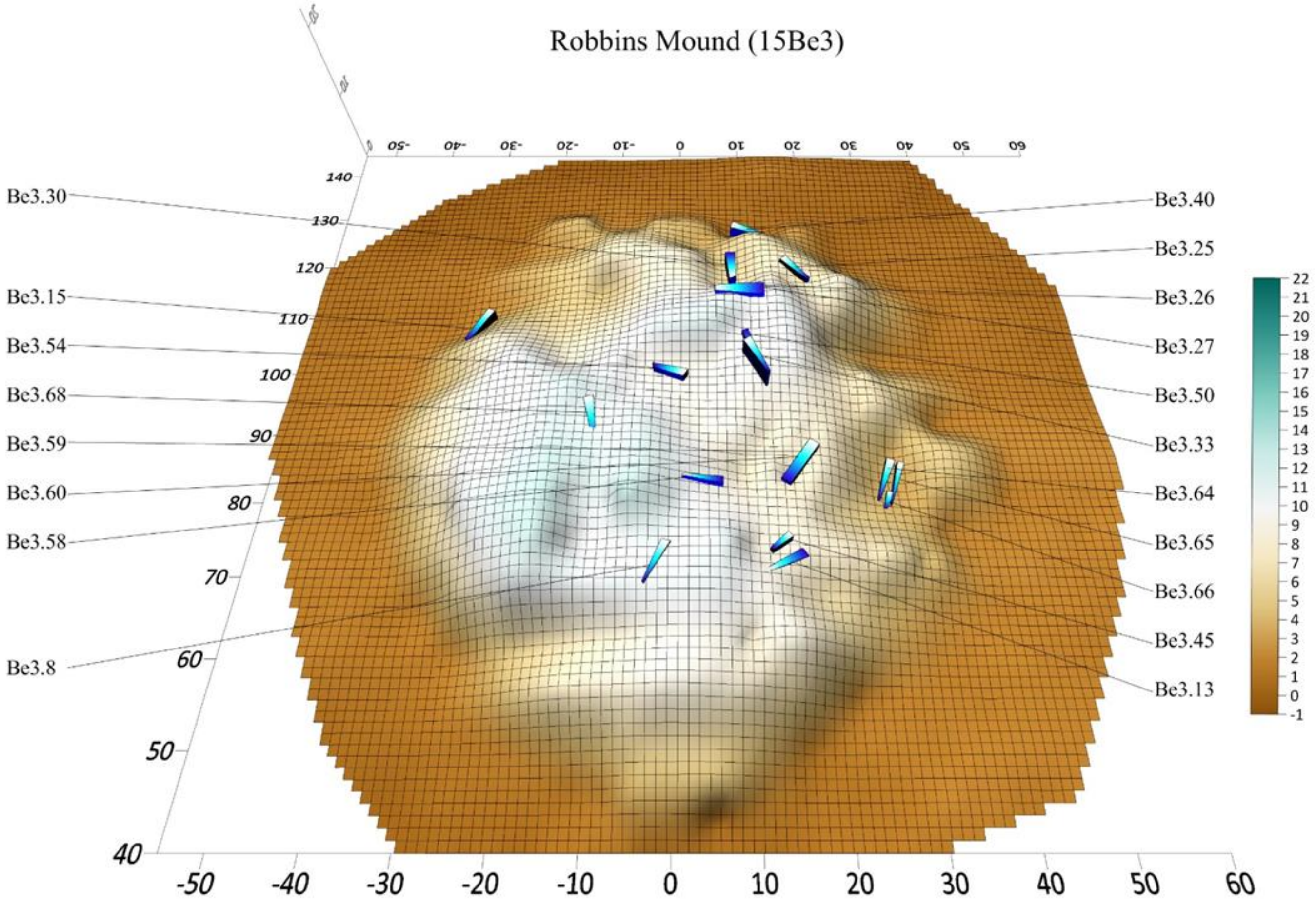


Figure C.20: Robbins Mound Sequence – 20. Placement of individuals Be3.8, Be3.13, Be3.15, Be3.25, Be3.26, Be3.27, Be3.30, Be3.33, Be3.40, Be3.45, Be3.50, Be3.54, Be3.58, Be3.59, Be3.60, Be3.64, Be3.65, Be3.66, and Be3.68 in the eighth interment episode.

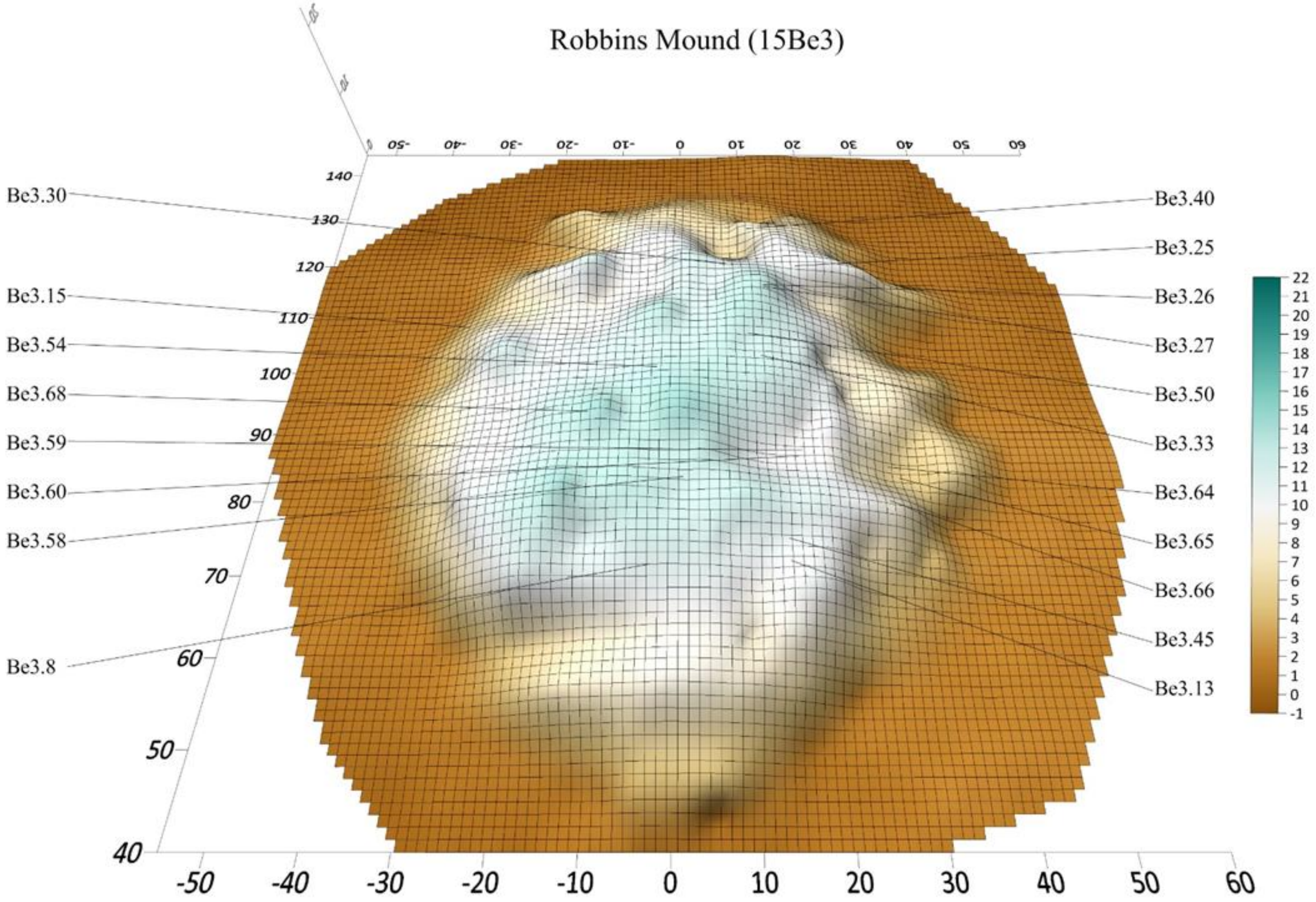


*Figure C.21***:** Robbins Mound Sequence – 21. Mound surface after the addition of earth covering individuals Be3.8, Be3.13, Be3.15, Be3.25, Be3.26, Be3.27, Be3.30, Be3.33, Be3.40, Be3.45, Be3.50, Be3.54, Be3.58, Be3.59, Be3.60, Be3.64, Be3.65, Be3.66, and Be3.68.eighth interment episode.

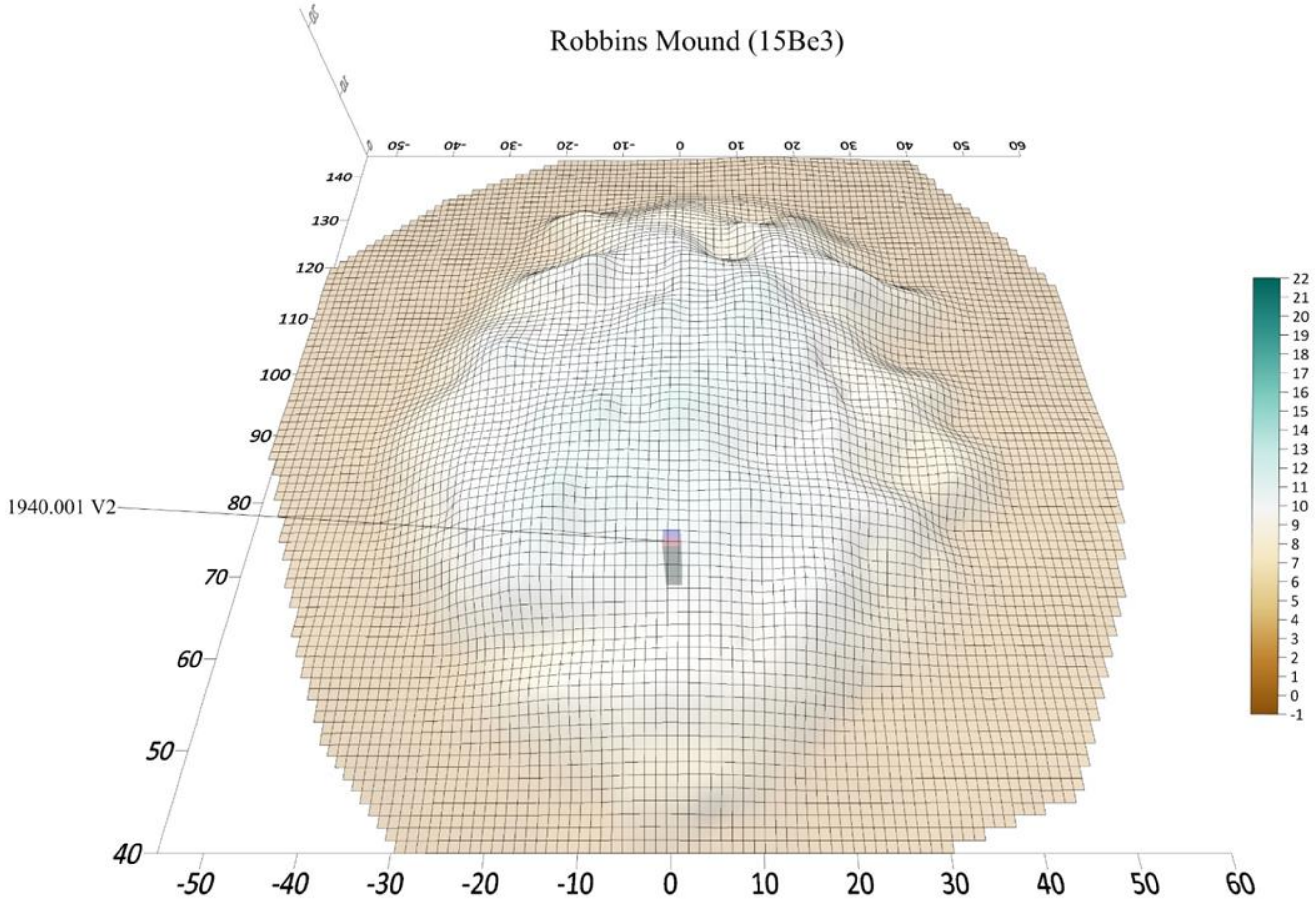


*Figure C.22***:** Robbins Mound Sequence – 22. Estimated location of 1940.001 V2, submitted for radiocarbon dating, within the fill covering the eighth interment episode.Be3.64, Be3.65, Be3.66, and Be3.68.eighth interment episode.

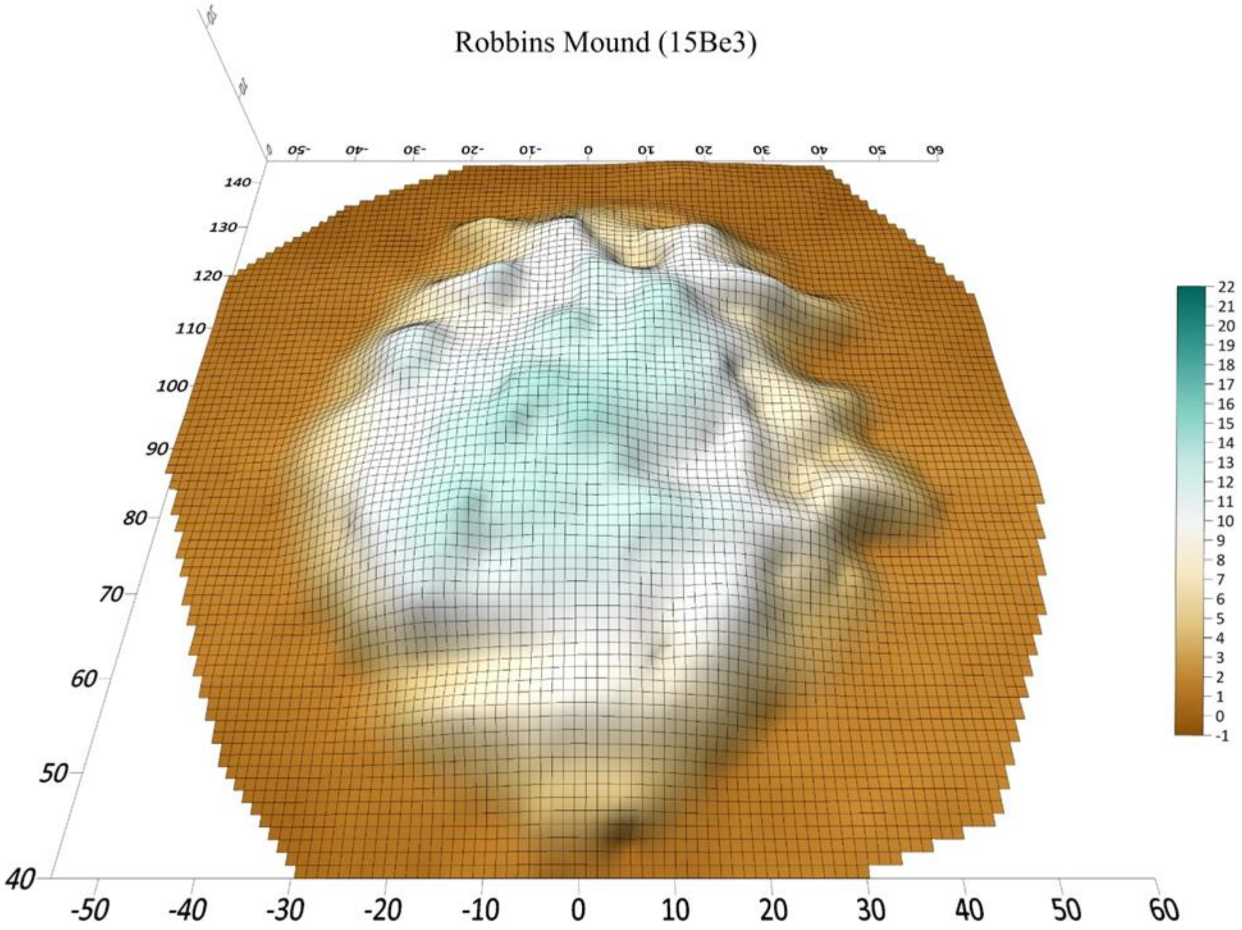


Figure C.23: Robbins Mound Sequence – 23. Mound surface after the addition of a small amount of fill on the eastern flank of the mound.

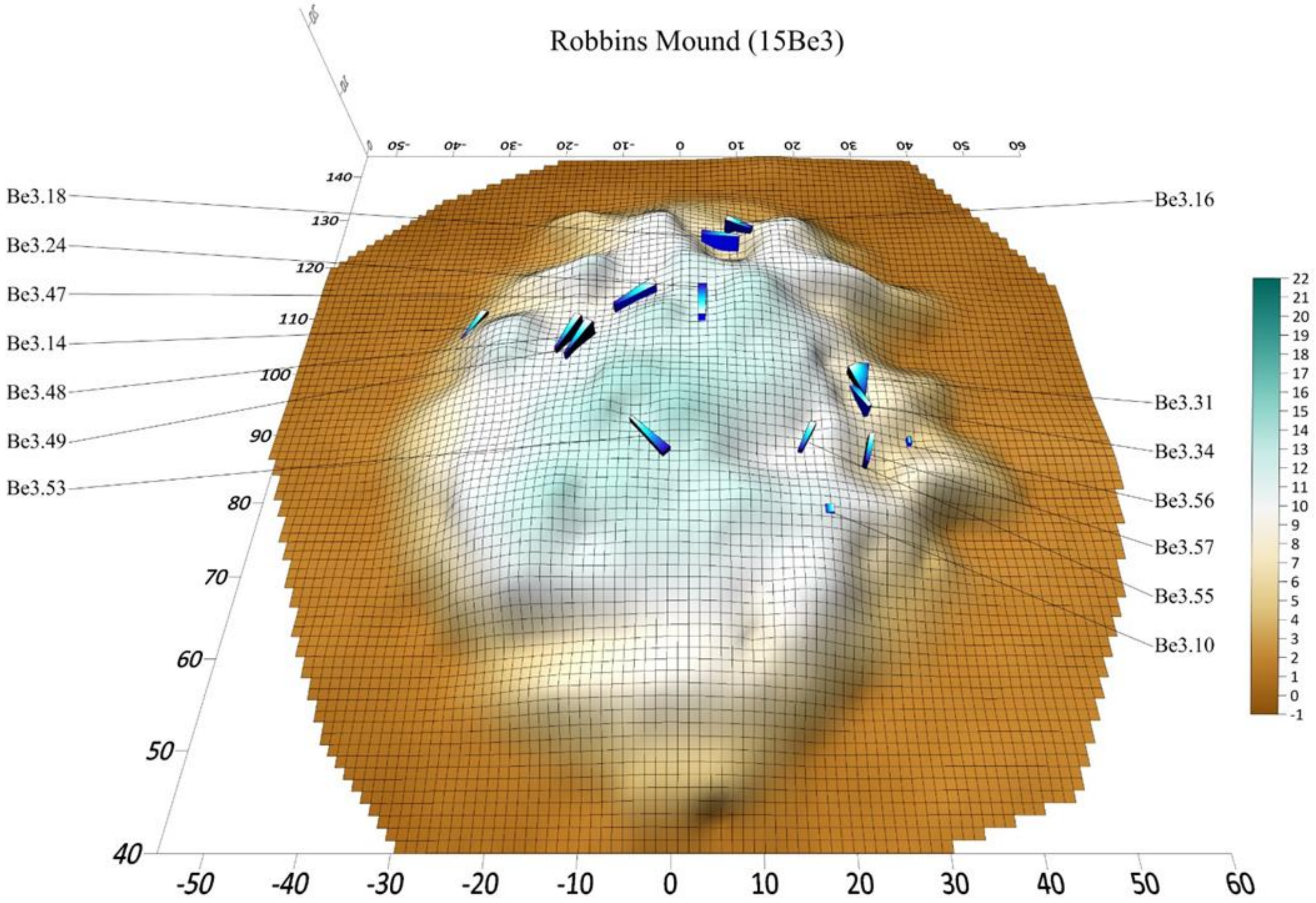


*Figure C.24***:** Robbins Mound Sequence – 24. Placement of individuals Be3.10, Be3.14, Be3.16, Be3.18, Be3.24, Be3.31, Be3.34, Be3.47, Be3.48, Be3.49, Be3.53, Be3.55, Be3.56, and Be3.57 in the ninth interment episode.

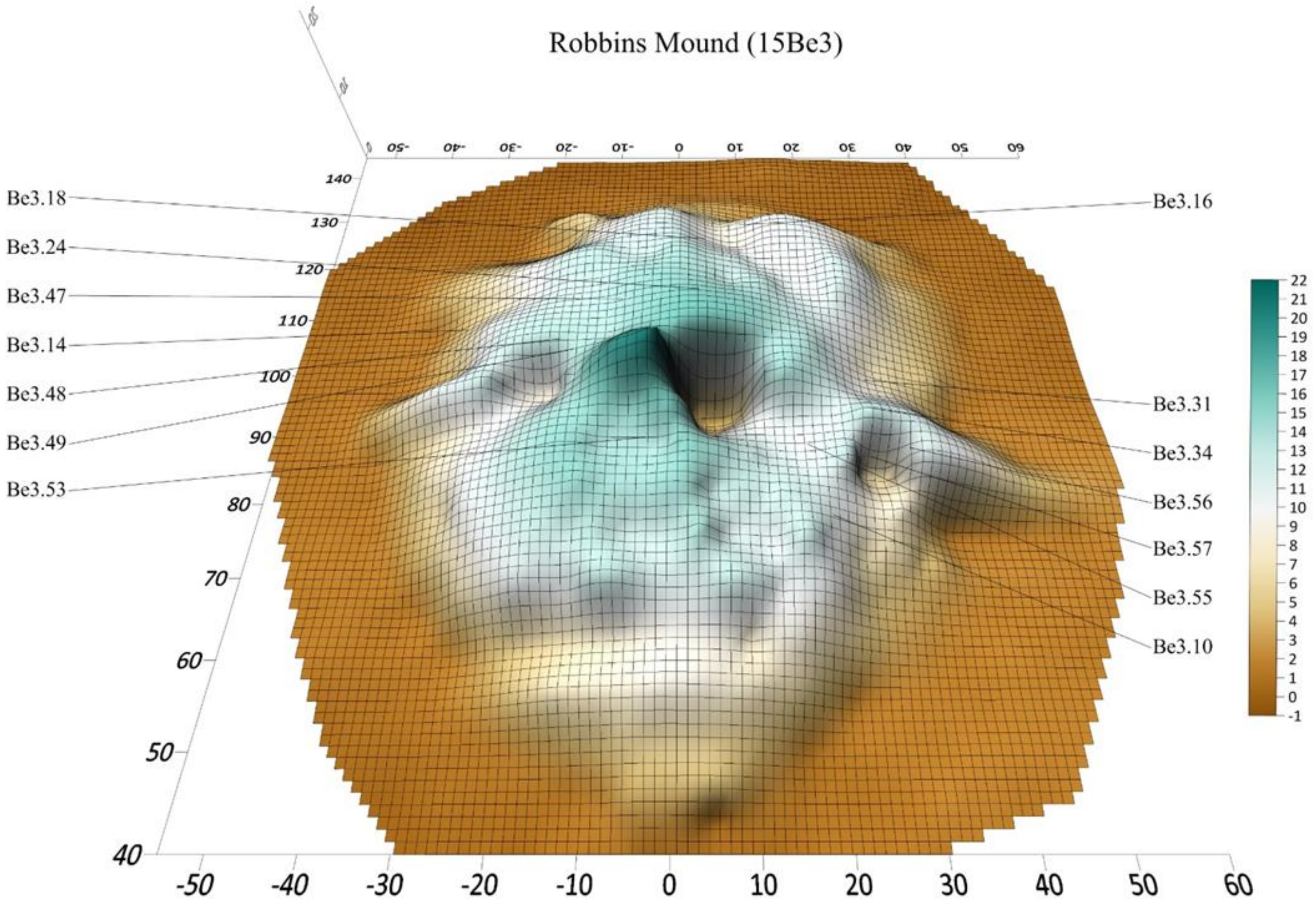
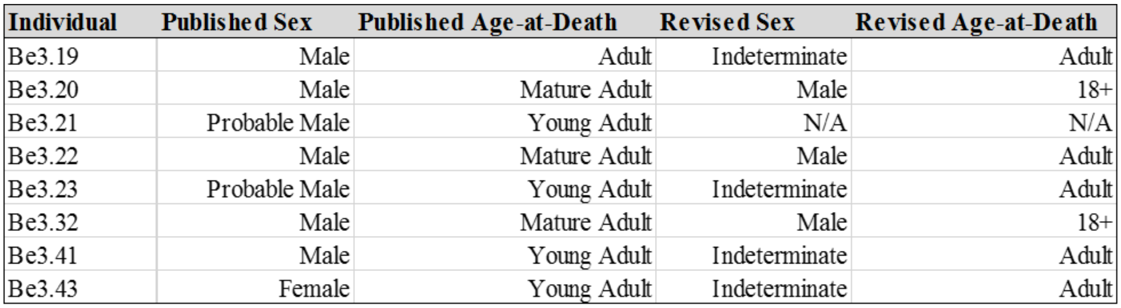


*Figure C.25***:** Robbins Mound Sequence – 25. Mound surface after the addition of earth covering individuals Be3.10, Be3.14, Be3.16, Be3.18, Be3.24, Be3.31, Be3.34, Be3.47, Be3.48, Be3.49, Be3.53, Be3.55, Be3.56, and Be3.57. Note the inferior extents of three large looter's pits across the mound's midsection.

Table C.10

Demographic Characteristics of Interment Episode 10

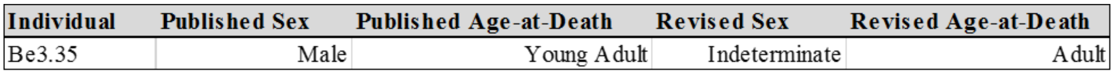


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.19	Male	Adult	Indeterminate	Adult
Be3.20	Male	Mature Adult	Male	18+
Be3.21	Probable Male	Young Adult	N/A	N/A
Be3.22	Male	Mature Adult	Male	Adult
Be3.23	Probable Male	Young Adult	Indeterminate	Adult
Be3.32	Male	Mature Adult	Male	18+
Be3.41	Male	Young Adult	Indeterminate	Adult
Be3.43	Female	Young Adult	Indeterminate	Adult

See Figures C.26 and C.27

Table C.11

Demographic Characteristics of Interment Episode 11



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be3.35	Male	Young Adult	Indeterminate	Adult

See Figure C.28

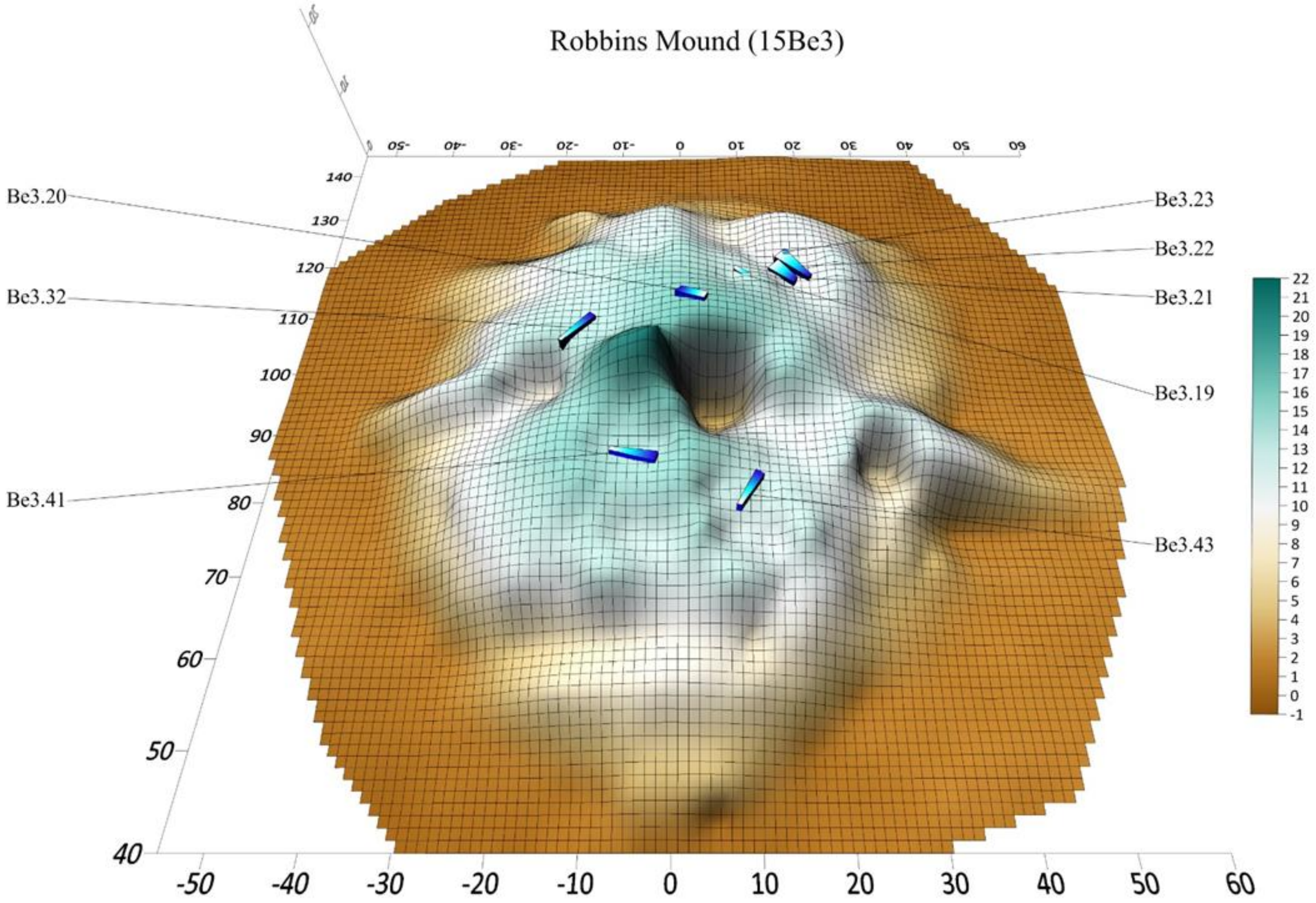


Figure C.26: Robbins Mound Sequence – 26. Placement of individuals Be3.19, Be3.20, Be3.21, Be3.22, Be3.23, Be3.32, Be3.41, and Be3.43 in the tenth interment episode.

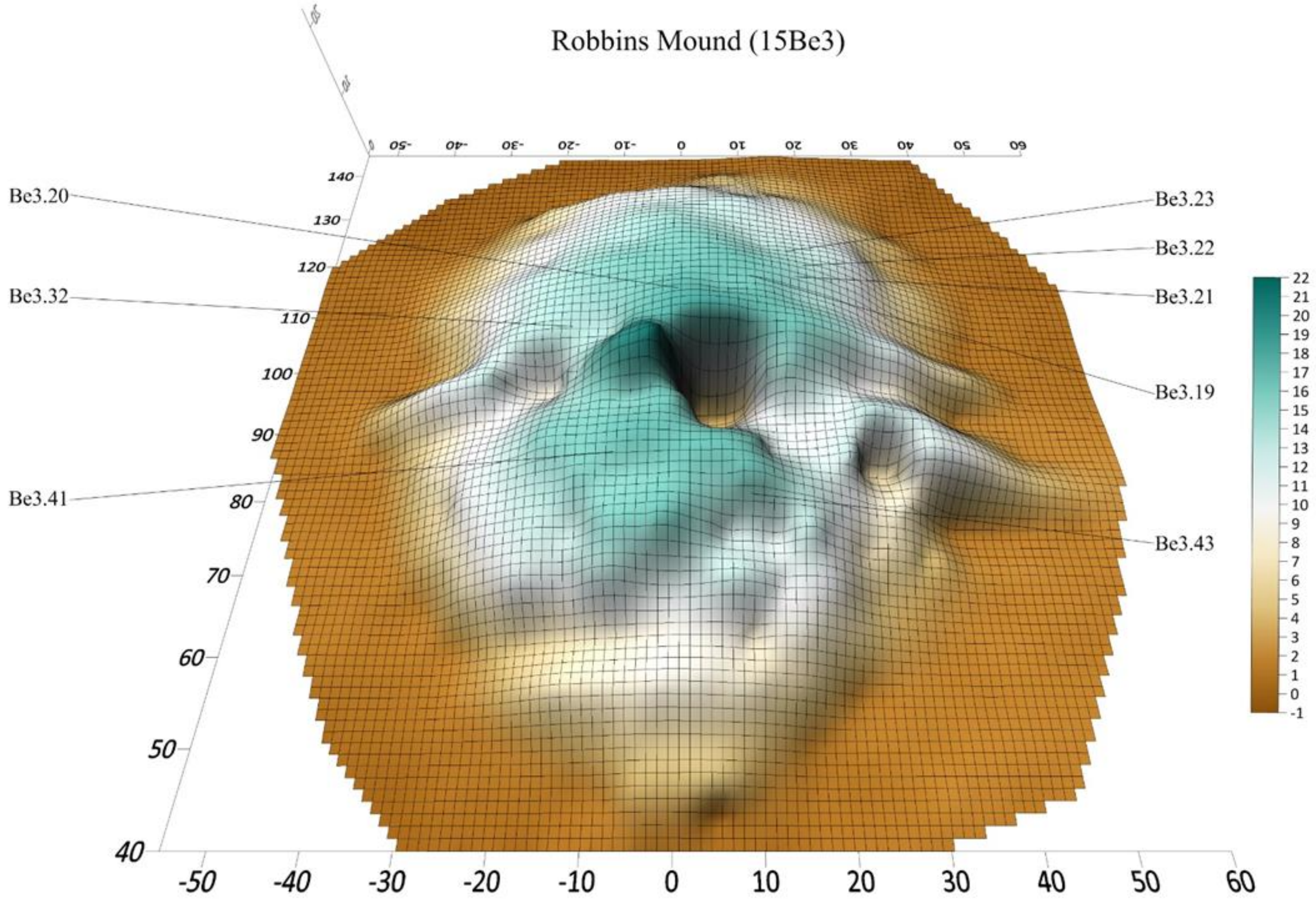


*Figure C.27***:** Robbins Mound Sequence – 27. Mound surface after the addition of earth covering individuals Be3.19, Be3.20, Be3.21, Be3.22, Be3.23, Be3.32, Be3.41, and Be3.43.

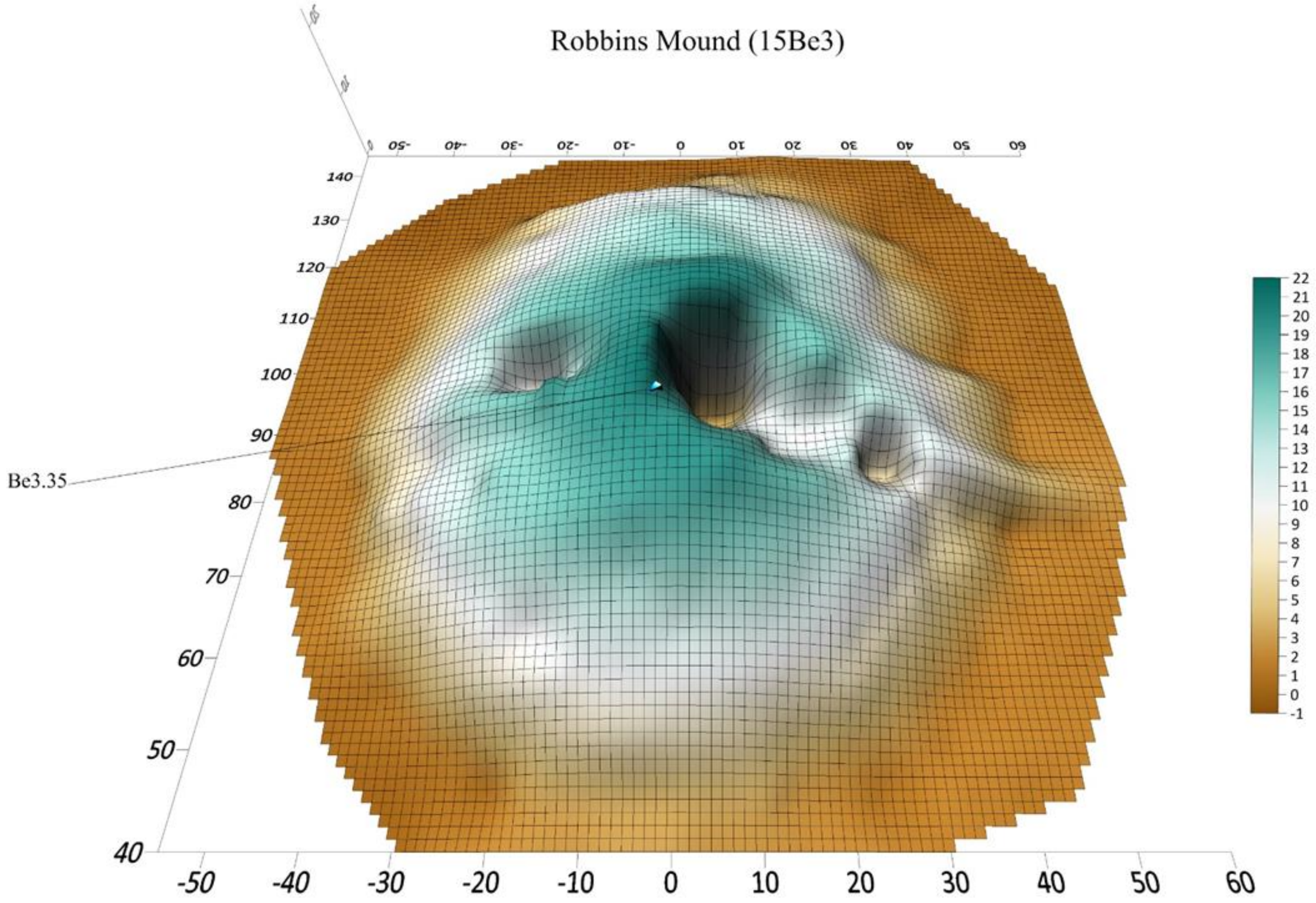


Figure C.28: Robbins Mound Sequence – 28. Mound surface after placement of additional earth, smoothing out surface irregularities. Note the position of individual Be3.35 (an isolated skull) on the edge of a large looter's pit. It is likely that this individual was displaced from its original context, but since this cannot be confirmed it is treated as an eleventh interment episode.

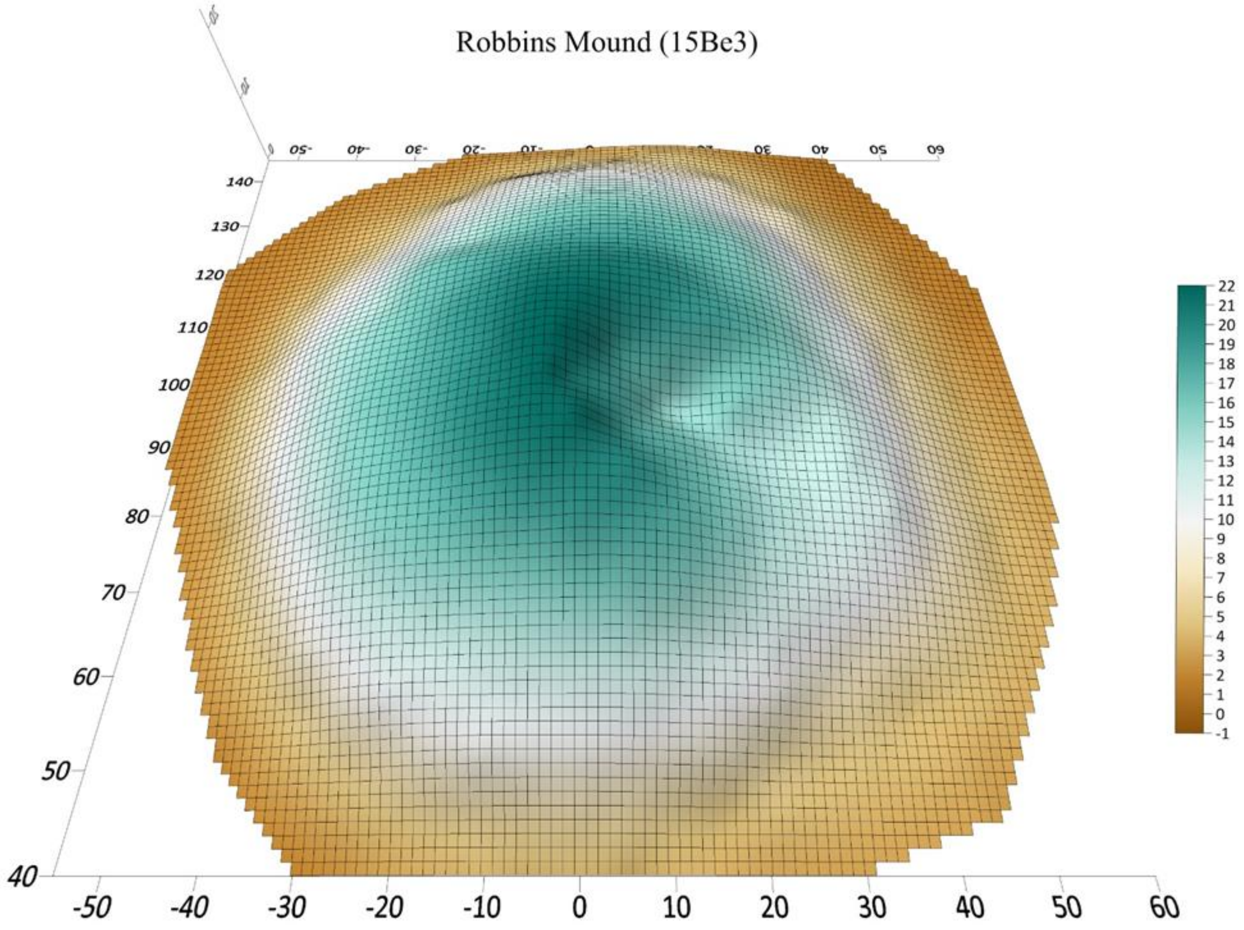


Figure C.29: Robbins Mound Sequence – 29. Surface of 15Be3 at the time of its excavation. Note subsidence of mound surface over the large central looter's pit.

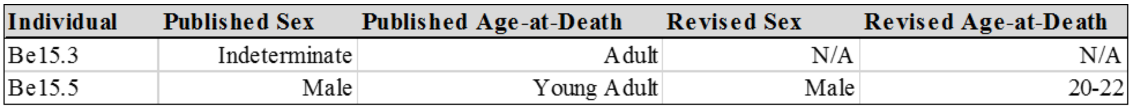
APPENDIX D:

CONSTRUCTION SEQUENCE FOR THE RILEY MOUND (15BE15)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Riley mound (15Be15) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

Table D.1

Demographic Characteristics of Interment Episode 1

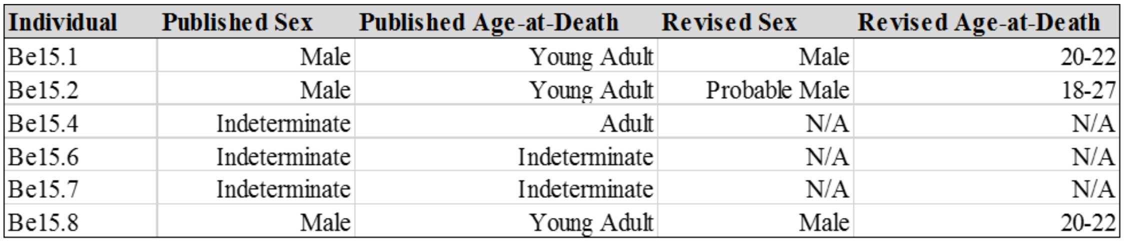


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be15.3	Indeterminate	Adult	N/A	N/A
Be15.5	Male	Young Adult	Male	20-22

See Figures D.2 and D.3

Table D.2

Demographic Characteristics of Interment Episode 2



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be15.1	Male	Young Adult	Male	20-22
Be15.2	Male	Young Adult	Probable Male	18-27
Be15.4	Indeterminate	Adult	N/A	N/A
Be15.6	Indeterminate	Indeterminate	N/A	N/A
Be15.7	Indeterminate	Indeterminate	N/A	N/A
Be15.8	Male	Young Adult	Male	20-22

See Figure D.6

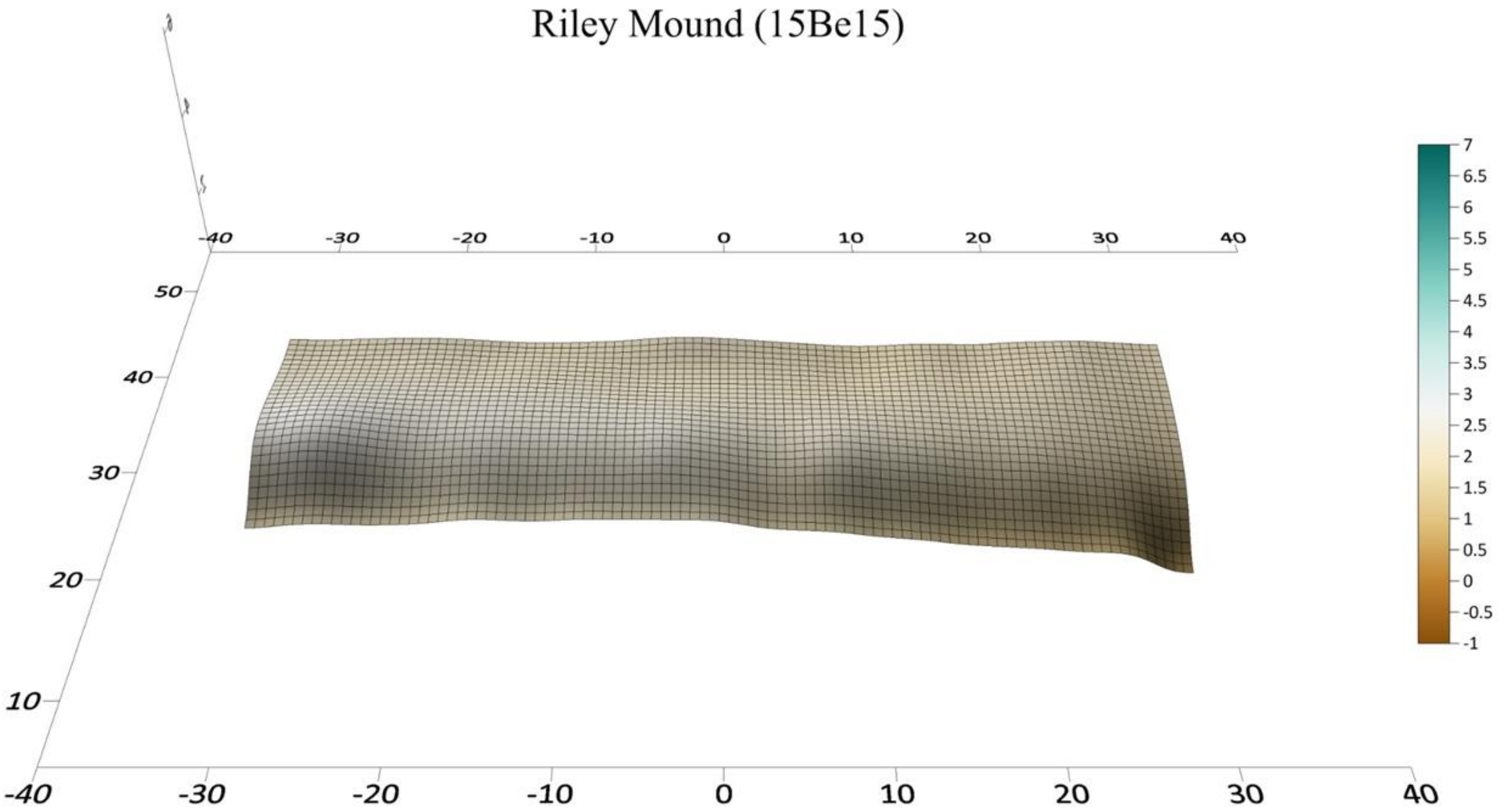


*Figure D.1***.** Riley Mound Sequence – 1. Mound base for 15Be15.

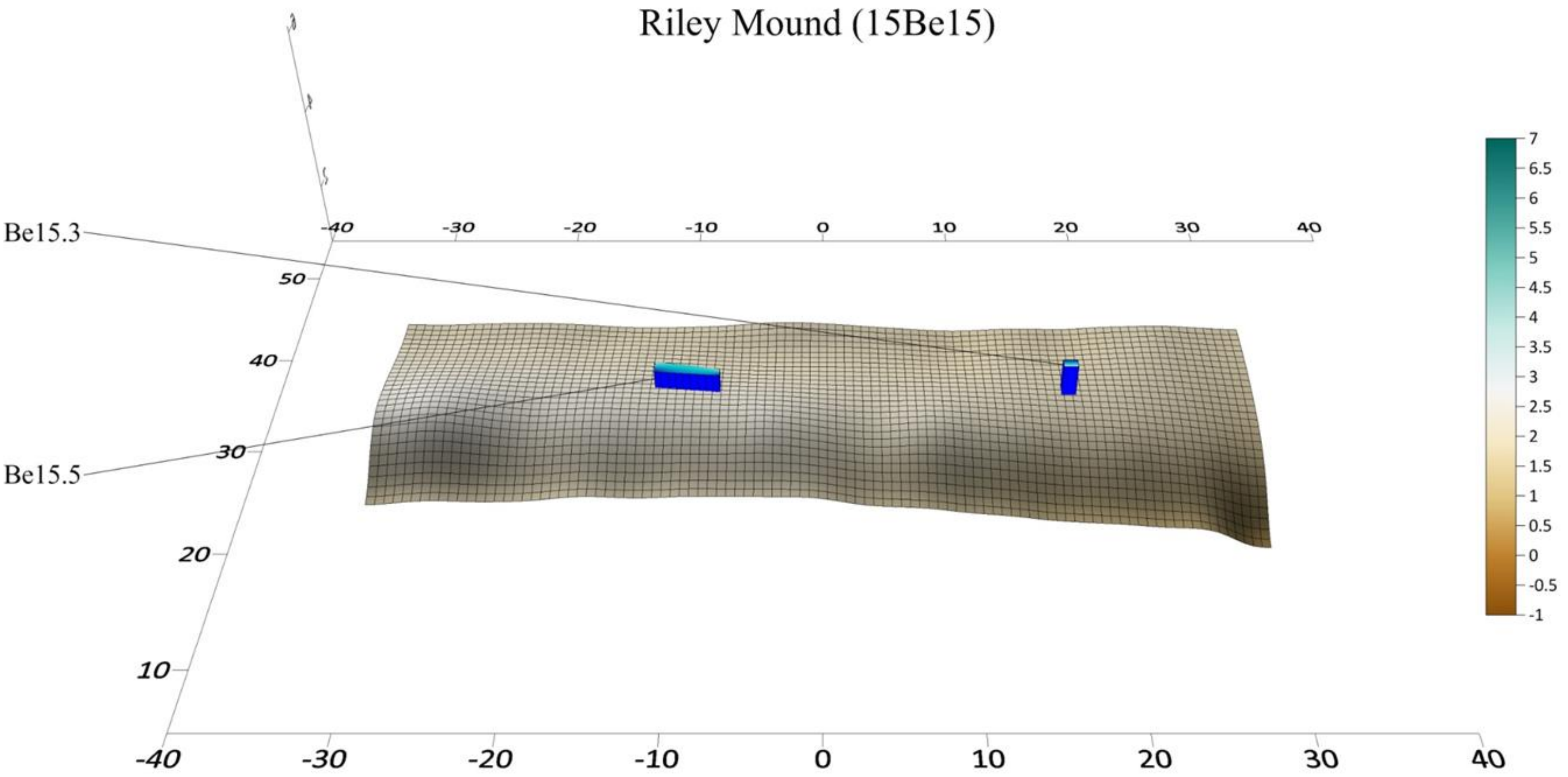


*Figure D.2***.** Riley Mound Sequence – 2. Placement of individuals Be15.3 and Be15.5 during the first episode of interment. Although not noted in the excavation reports, their depths indicate that these interments were excavated into what Webb refers to as the ‘old humus’ (‘OH’) layer (Webb, 1943b).

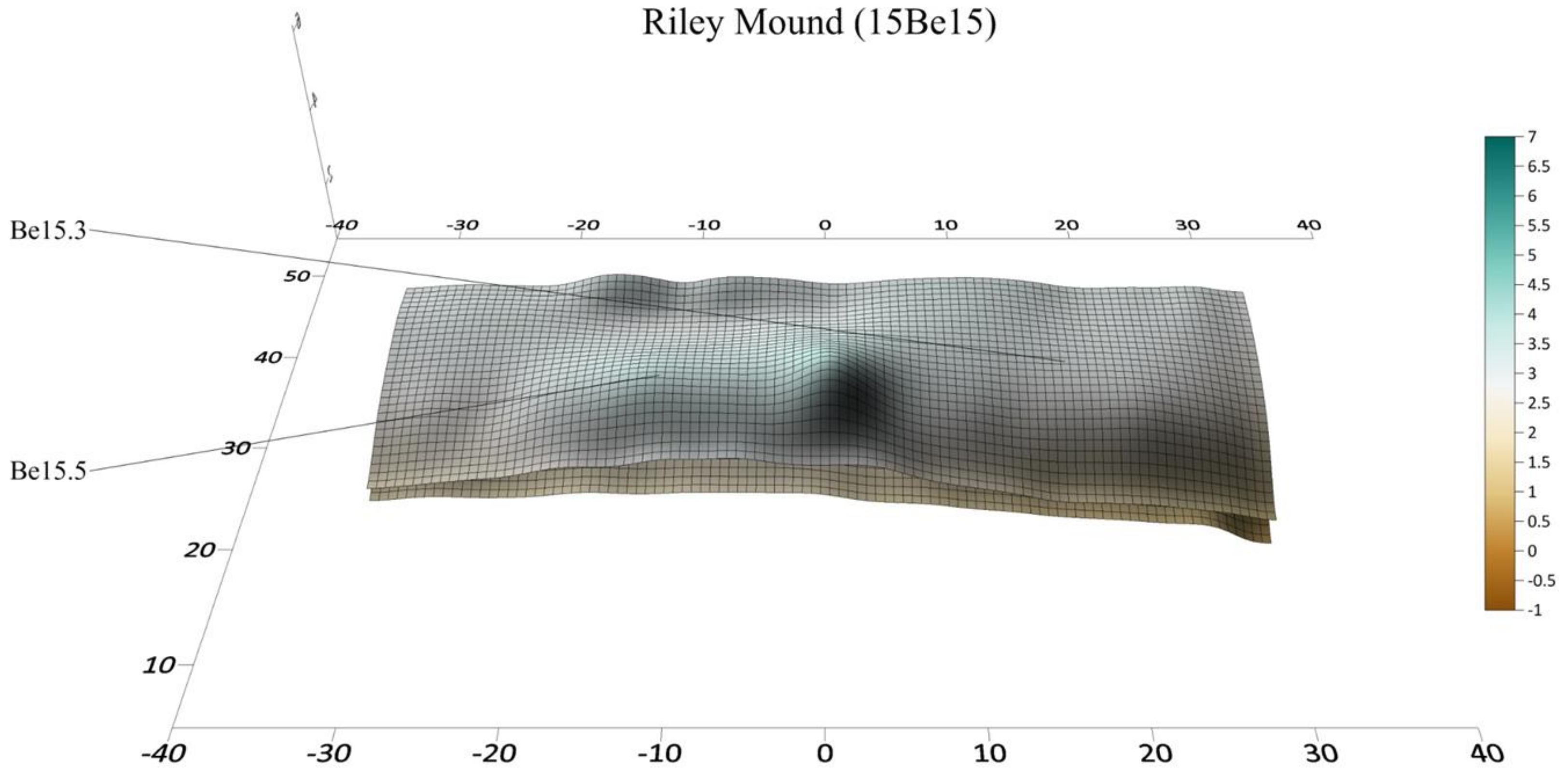


*Figure D.3***.** Riley Mound Sequence – 3. Mound surface after deposition of the OH layer. Despite its label, this is likely an anthropogenic deposit as it was noted by Webb to contain "midden material" (1943b: 596).

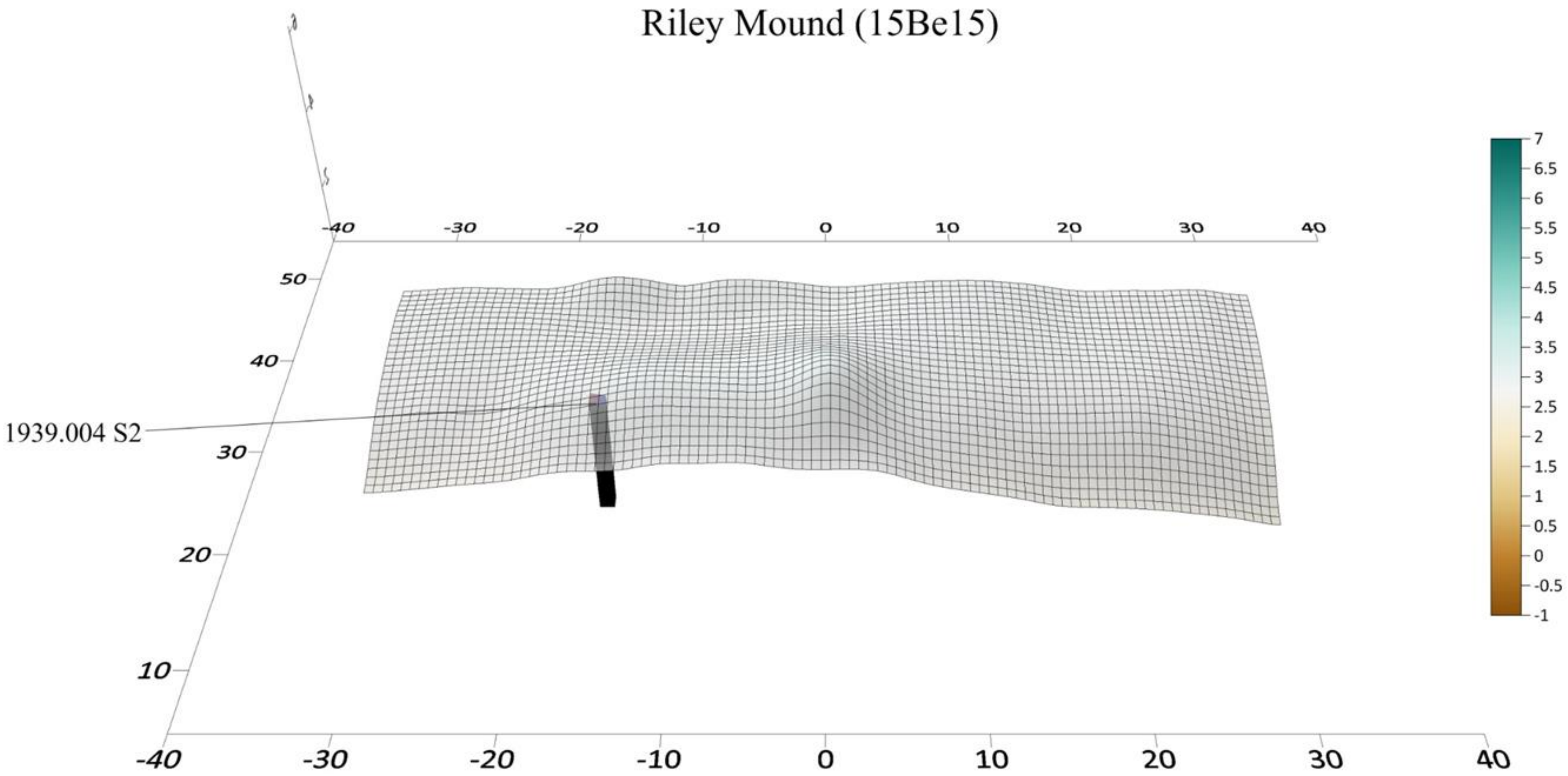


*Figure D.4***.** Riley Mound Sequence – 4. Estimated location from which 1939.004 S2, a sample submitted for radiocarbon dating, was recovered within the OH layer.

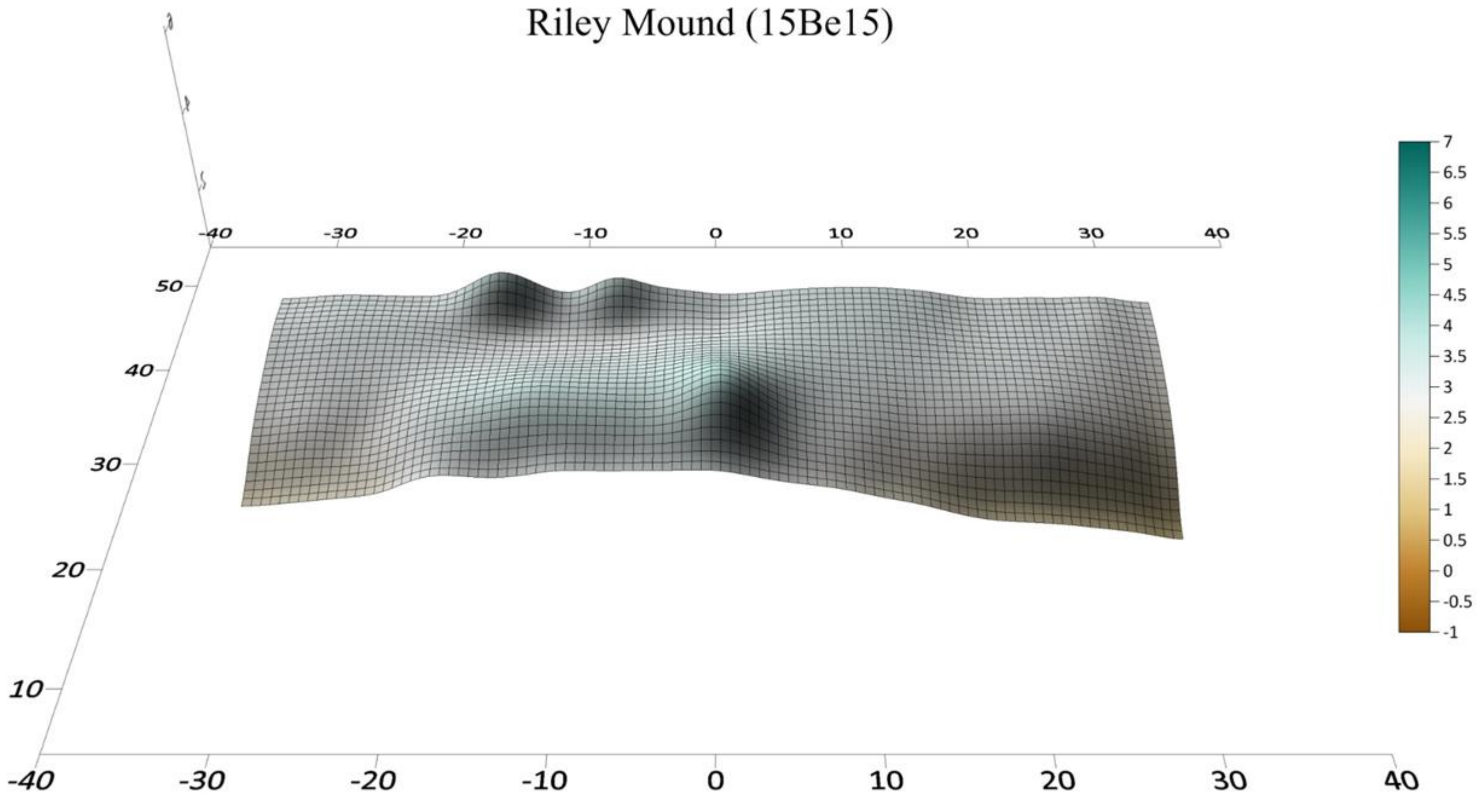


*Figure D.5***.** Riley Mound Sequence – 5. Mound surface after the deposit of a layer of ash above the OH layer.

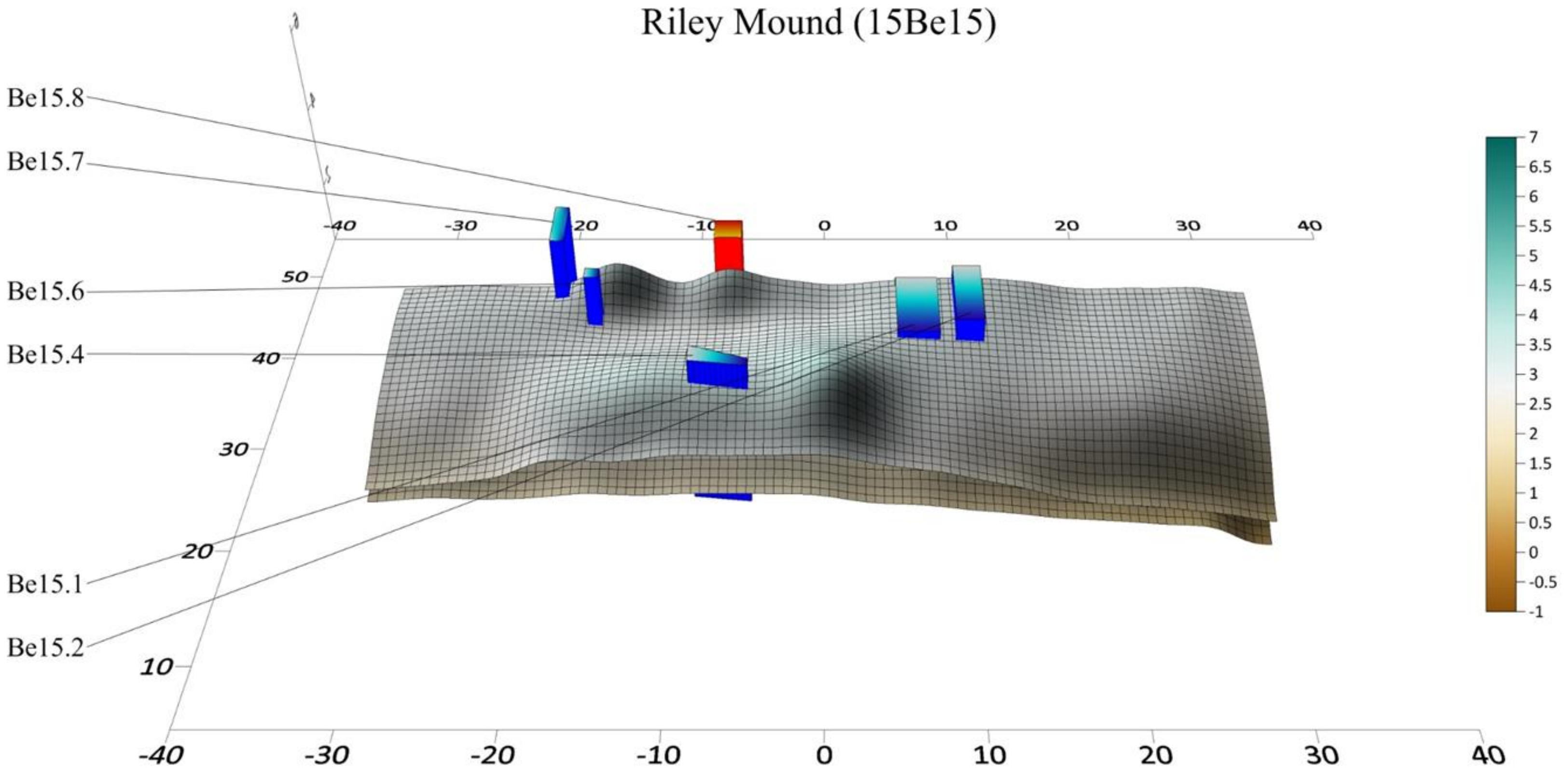


*Figure D.6***.** Riley Mound Sequence – 6. Placement of individuals Be15.1, Be15.2, Be15.4, Be15.6, Be15.7, and Be15.8 during the second interment episode. These burials are all located within the fill used to make up the main body of the mound (see Figure D.7).

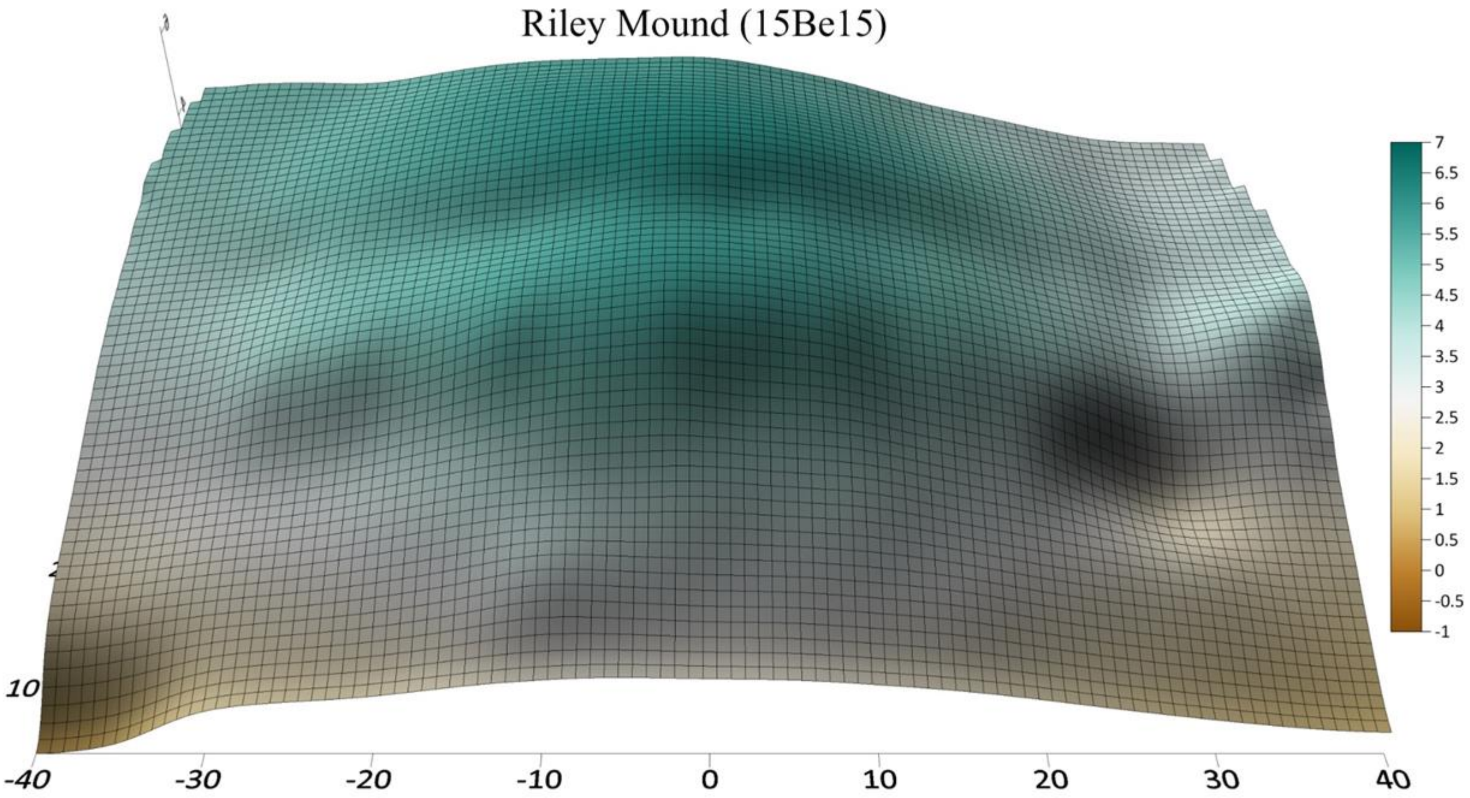


*Figure D.7***.** Riley Mound Sequence – 7. Mound surface at the time of excavation.

APPENDIX E

CONSTRUCTION SEQUENCE FOR THE LANDING MOUND (15BE17)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Landing mound (15Be17) as well as descriptions of the demographic characteristics of the burials in its single group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

Table E.1

Demographic Characteristics of Interment Episode 1

Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be17.1	Probable Female	22	N/A	N/A
Be17.2	Probable Male	22	Indeterminate	25+
Be17.3	Probable Female	16-17	Indeterminate	14-16
Be17.4	Probable Male	4-5	Indeterminate	2-3
Be17.5	Male	24	Male	20-22
Be17.6	Male	30-35	Male	45-59
Be17.7	Male	Young Adult	Male	25-30
Be17.8	Probable Male	Adult	N/A	N/A
Be17.9	Indeterminate	Adult	Indeterminate	Adult
Be17.10	Indeterminate	Indeterminate	N/A	N/A
Be17.11	Indeterminate	Indeterminate	N/A	N/A
Be17.12	Indeterminate	Indeterminate	N/A	N/A
Be17.13	Male	30	Male	40-55
Be17.14	Male	30	Male	40-50
Be17.15	Female	21-22	Female	18-21

See Figure E.5

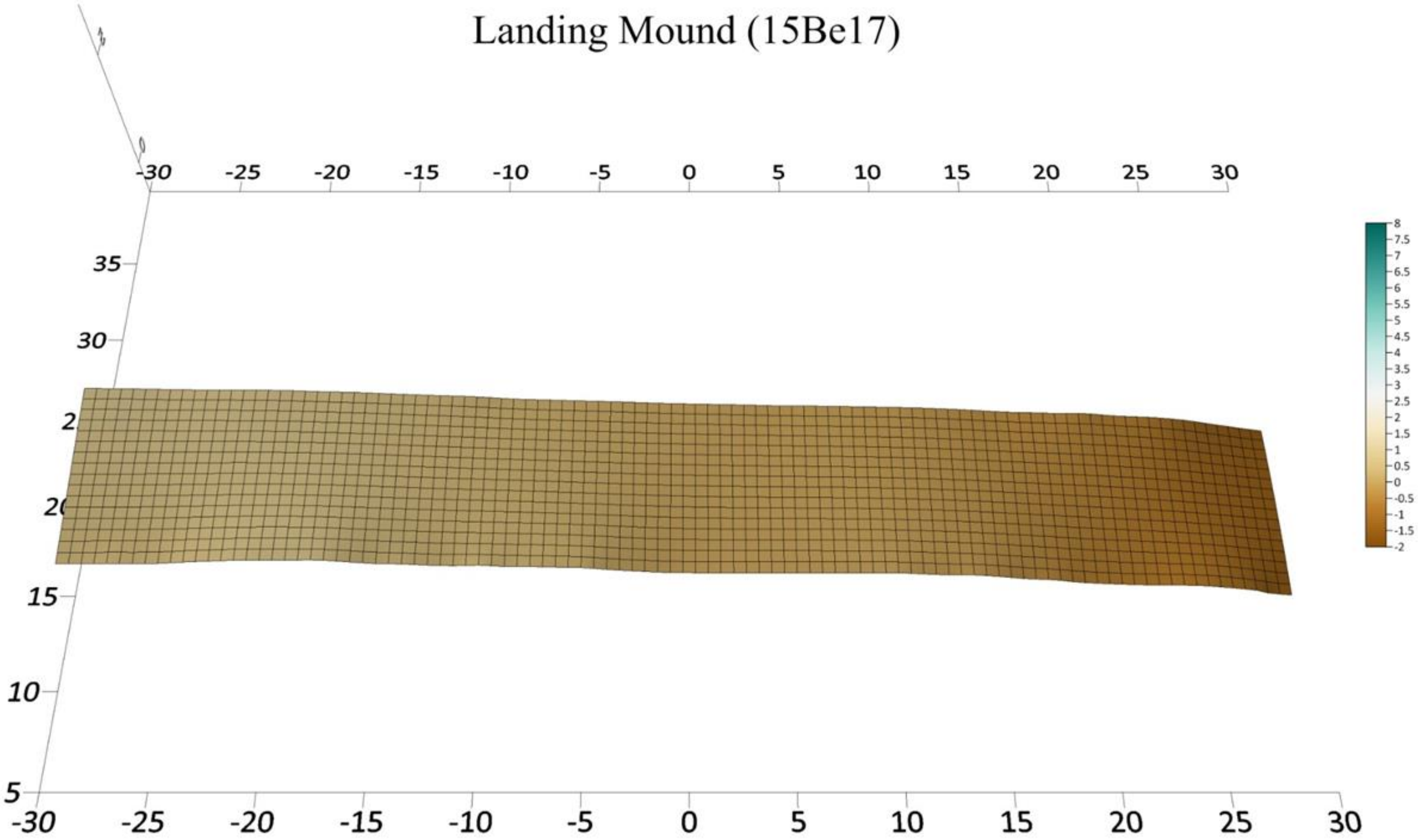


*Figure E.1***.** Landing Mound Sequence – 1. Undisturbed base of the Landing mound.

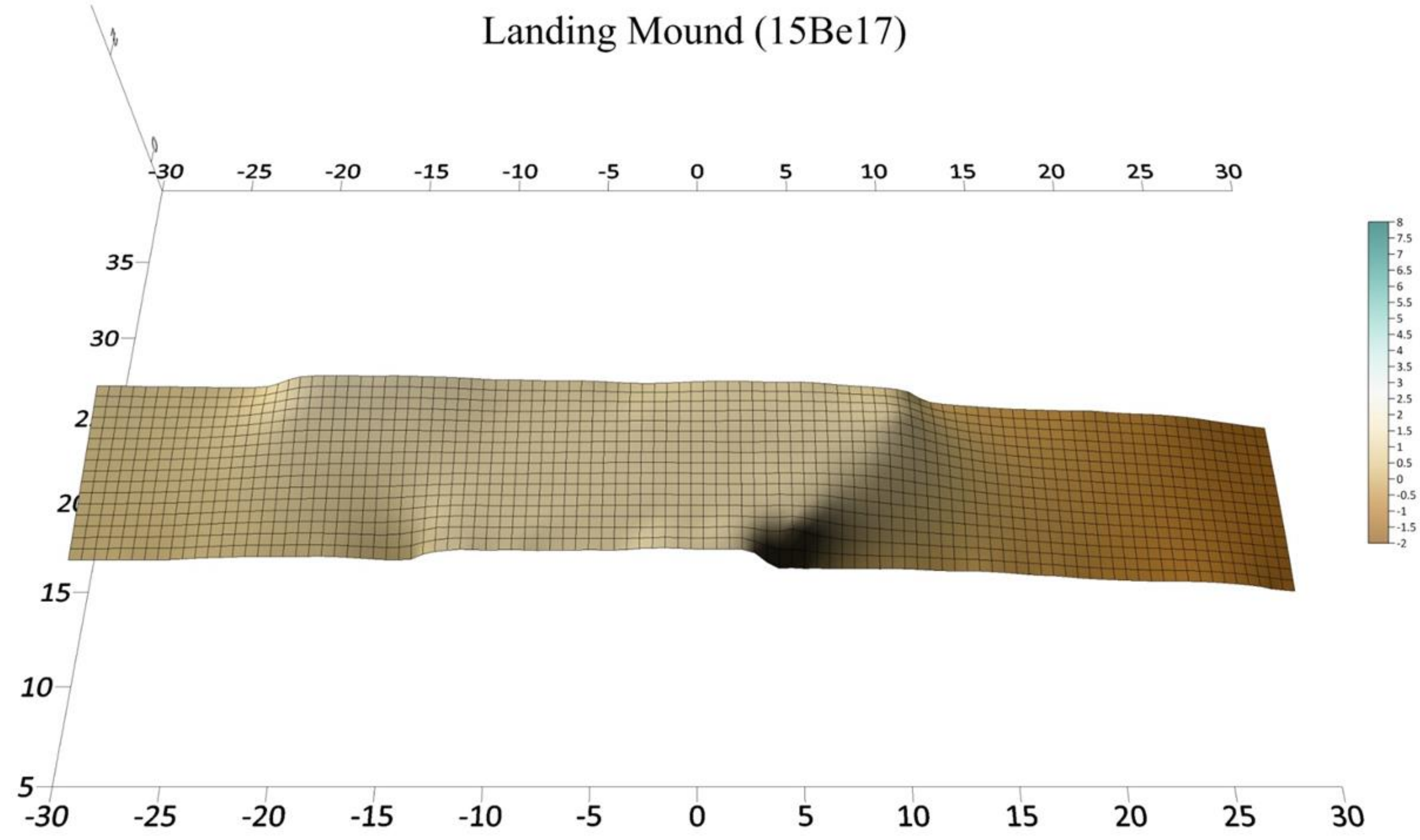


Figure E.2. Landing Mound Sequence – 2. Raised surface resulting from deposit of ‘old humus’ (‘OH’) layer. This layer may be anthropogenic in that it was noted to have contained a small amount of “midden debris” (Webb, 1943b:597).

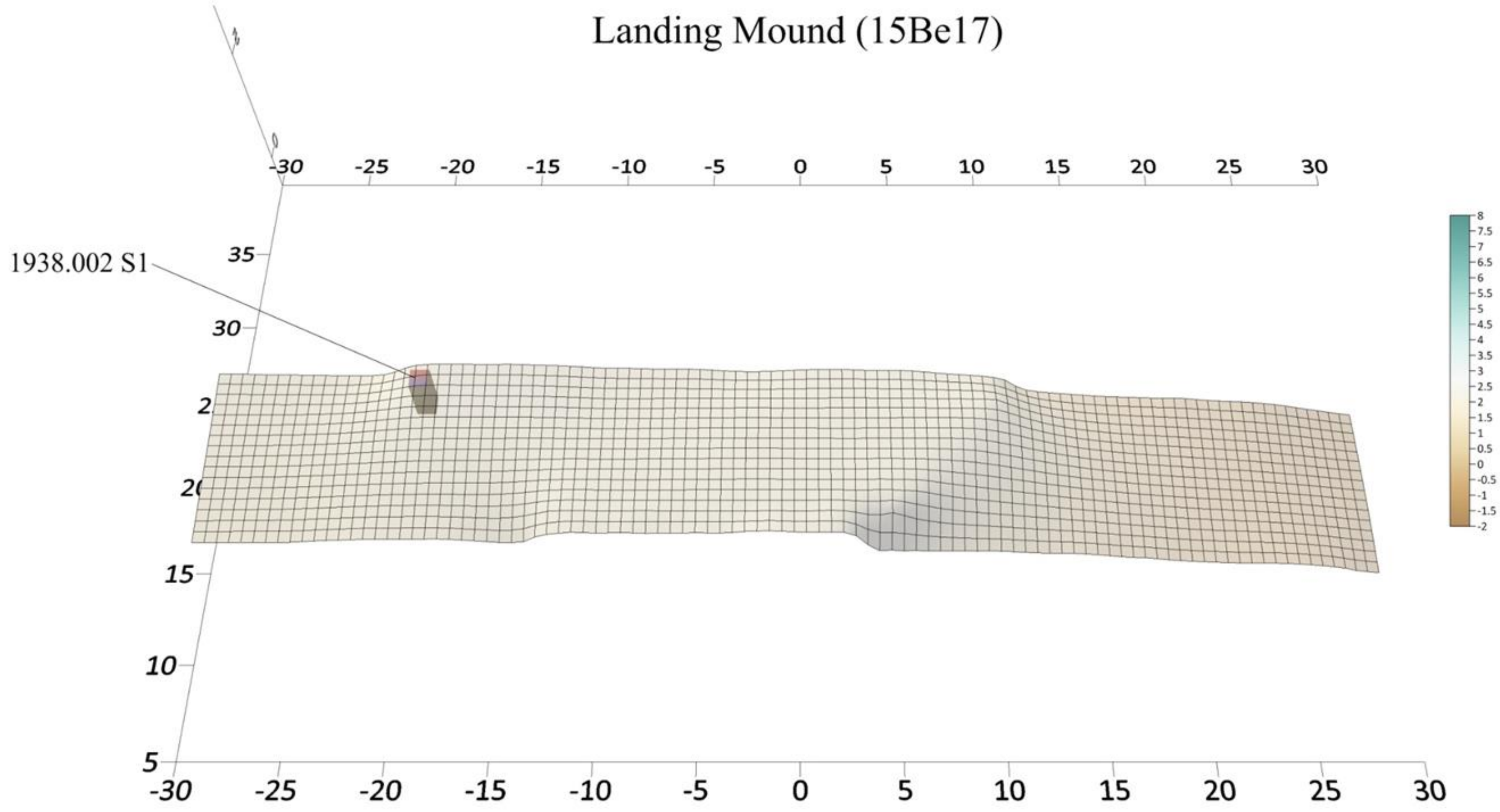


*Figure E.3***.** Landing Mound Sequence – 3. Estimated location from which 1938.002 S1, a sample submitted for radiocarbon dating, was recovered in the OH layer.

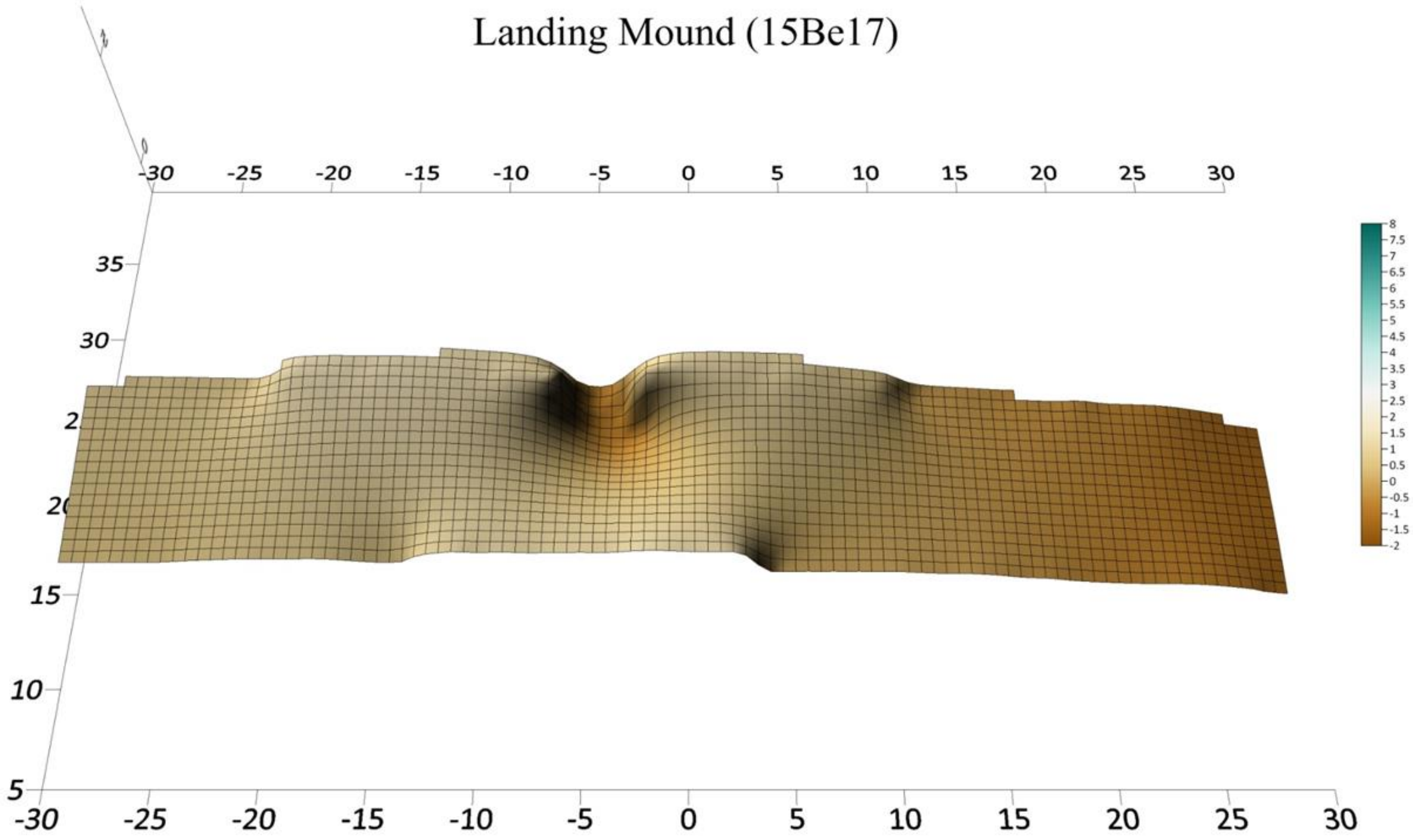


*Figure E.4***.** Landing Mound Sequence – 4. Excavation of a central pit through the OH layer and into the undisturbed subsoil in preparation for the placement of interments (see Figure E.5).

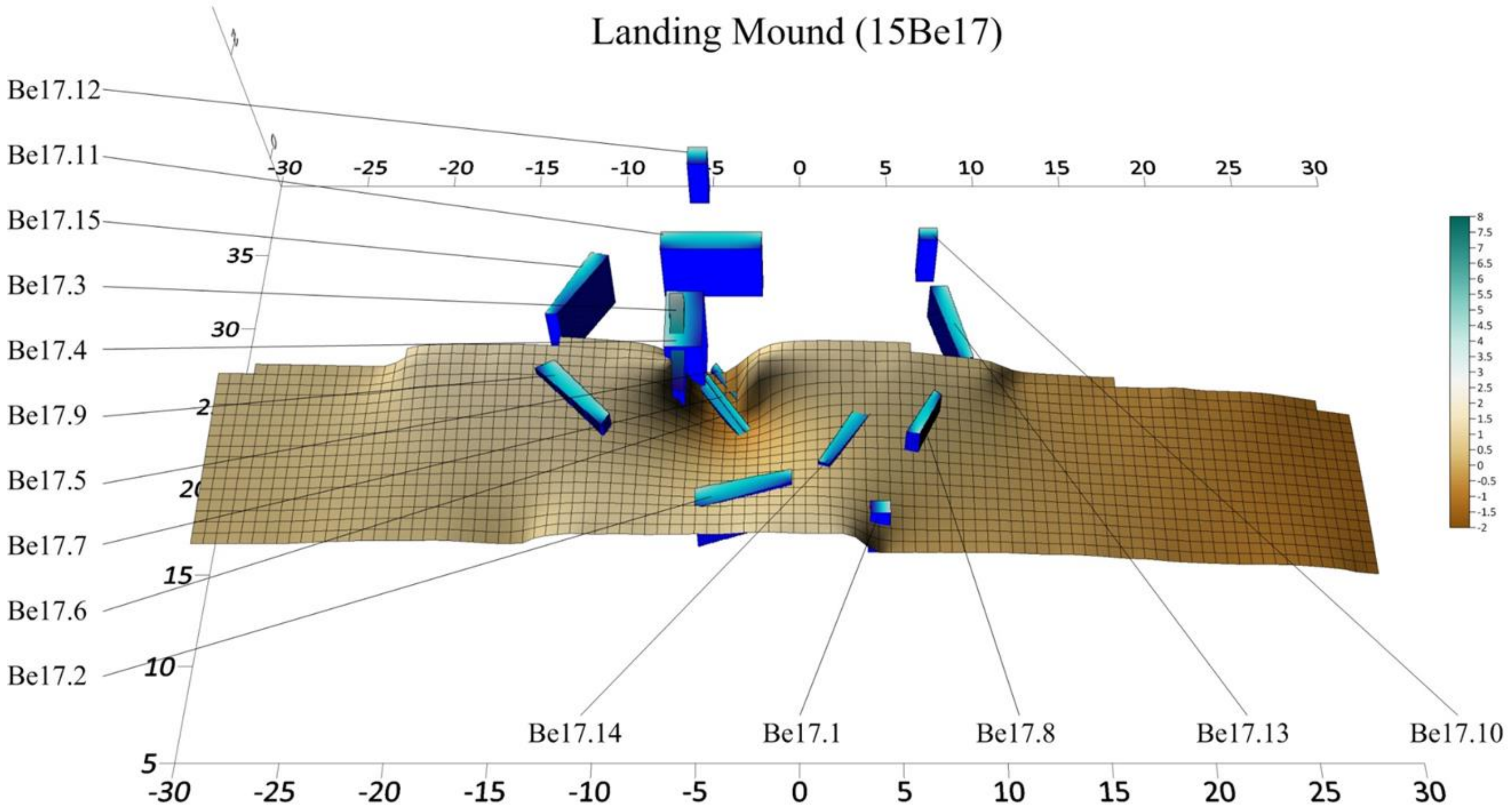


*Figure E.5***.** Landing Mound Sequence – 5. Placement of individuals Be17.1 through Be17.15 both in and around the central pit. All of these individuals were then covered by the fill composing the bulk of this mound (see Figure E.6).

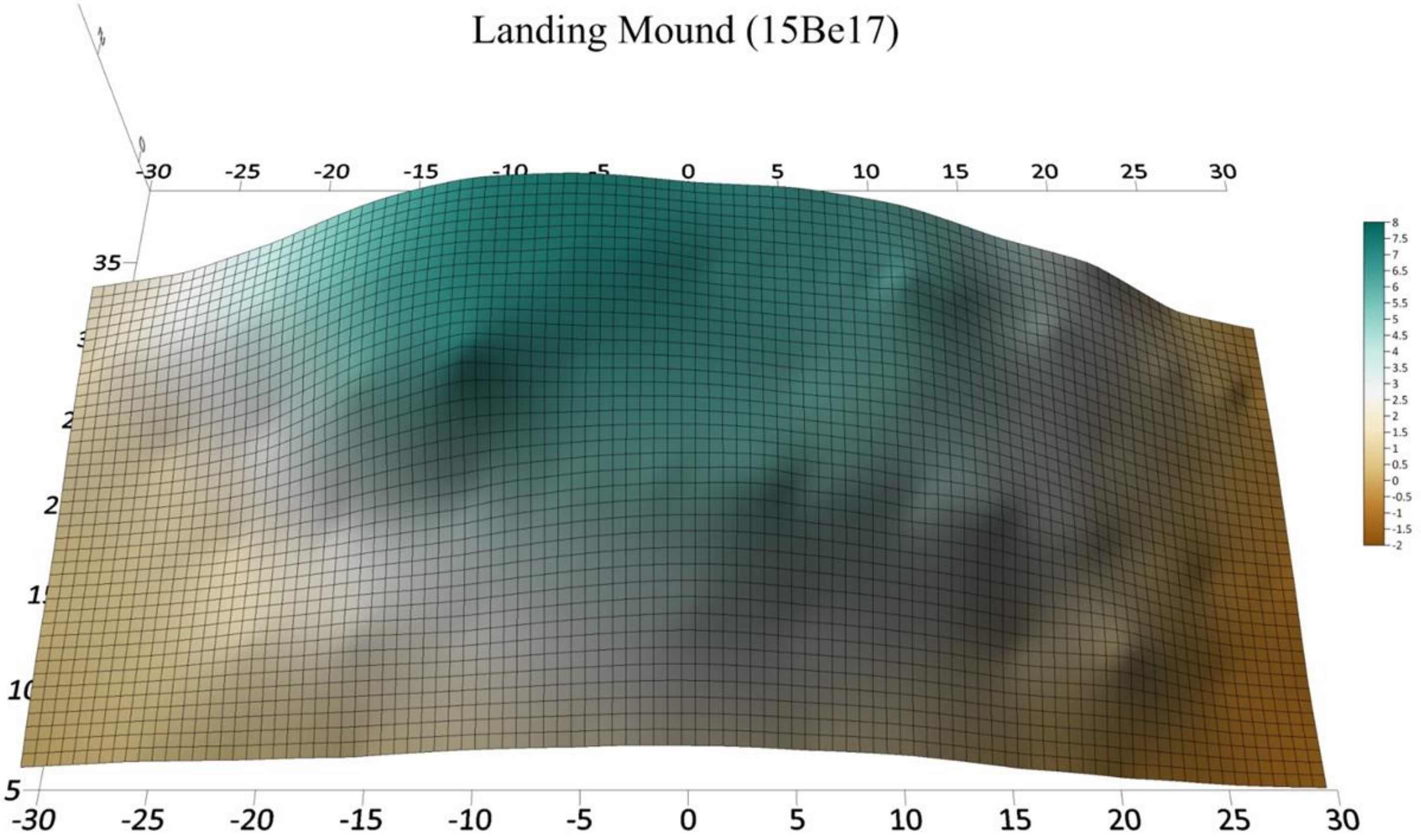


*Figure E.6***.** Landing Mound Sequence – 6. Surface of the Landing mound at the time of excavation.

APPENDIX F

CONSTRUCTION SEQUENCE FOR THE CRIGLER MOUND (15BE20)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Crigler mound (15Be20) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

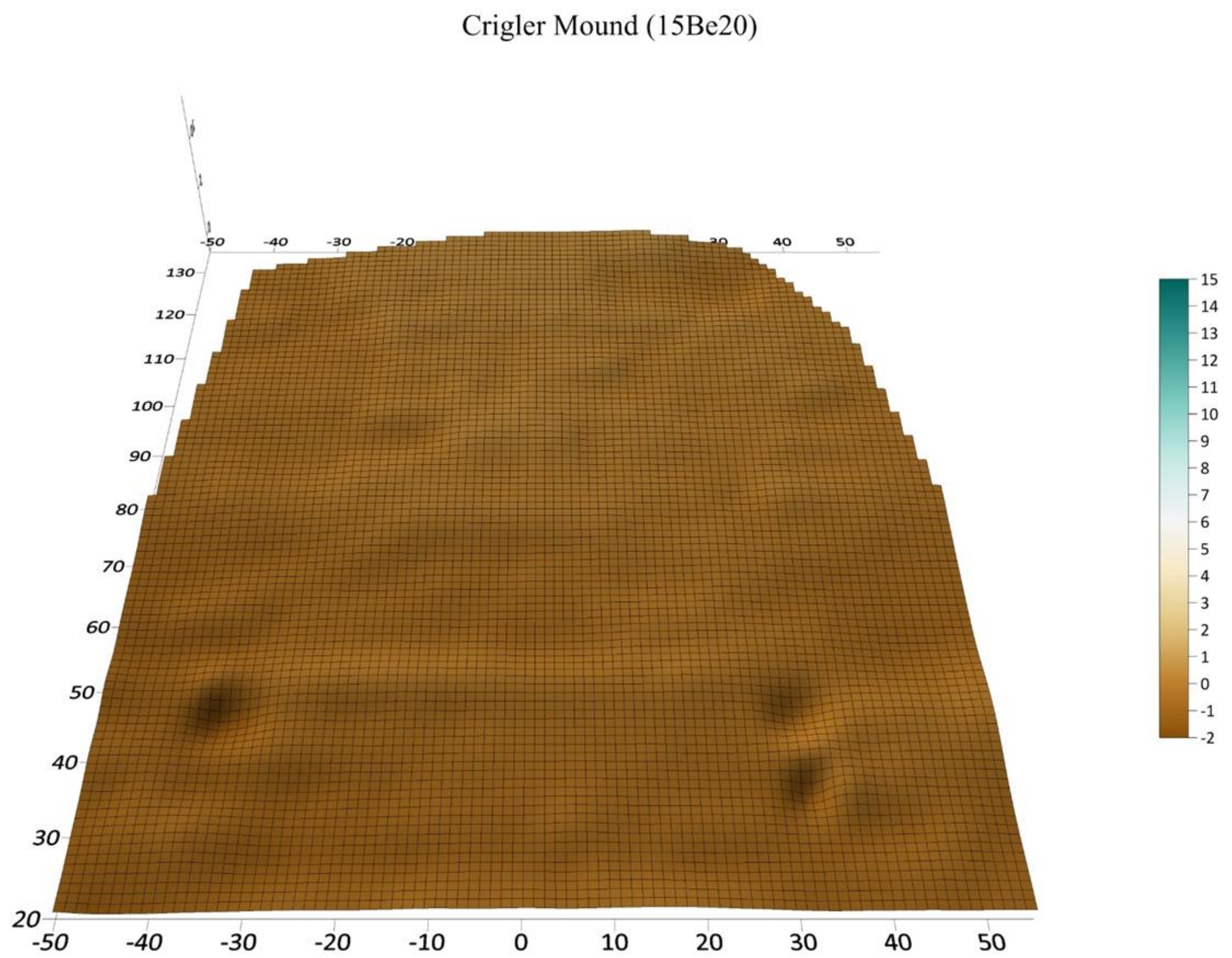


*Figure F.1***.** Crigler Mound Sequence – 1. Undisturbed subsoil at mound base. Depressions in foreground mark the locations of disturbances caused by tree stumps.

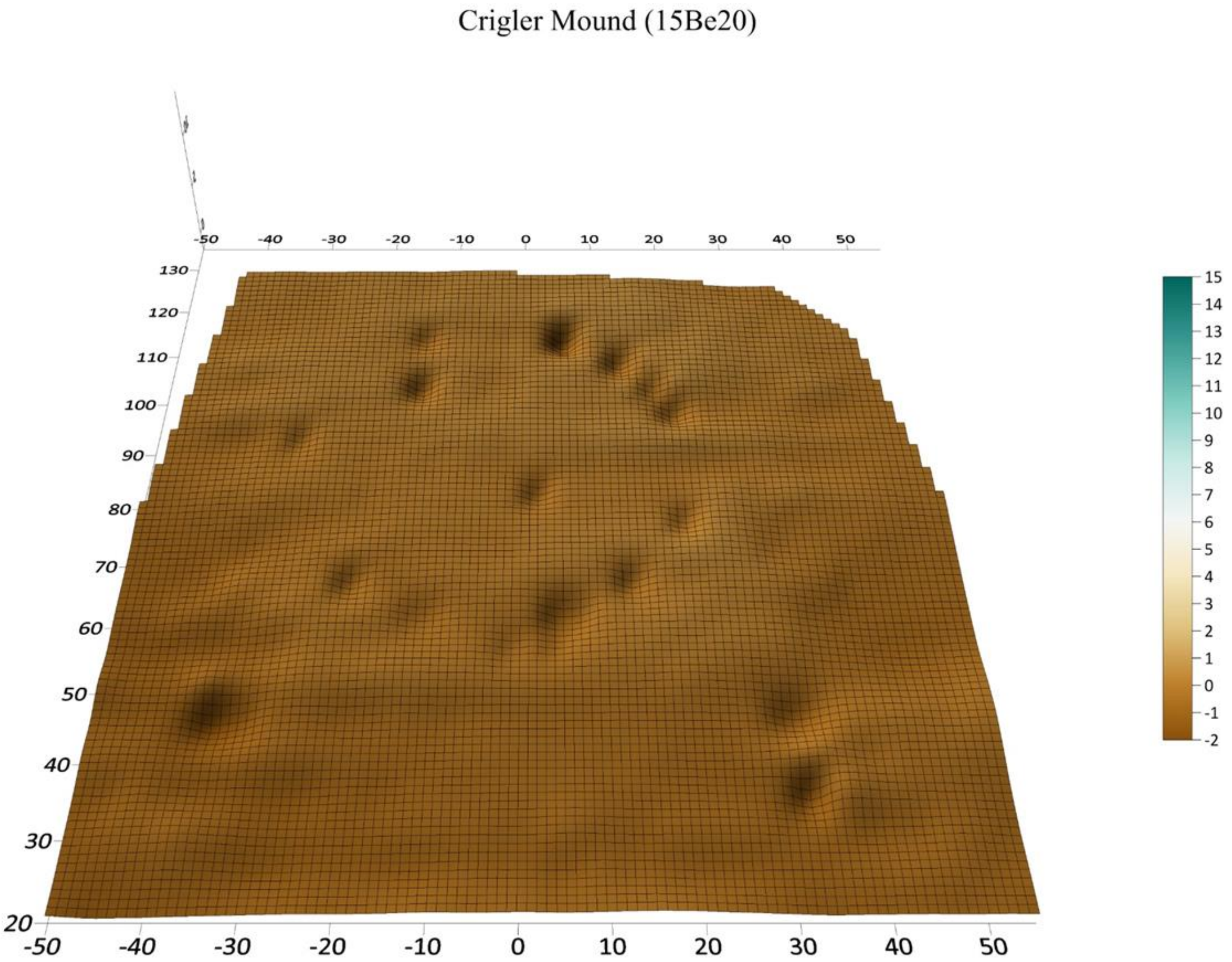


*Figure F.2***.** Crigler Mound Sequence – 2. Surface of the ‘old humus’ (‘OH’) layer, with evident postmolds from the submound, circular paired-post structure.

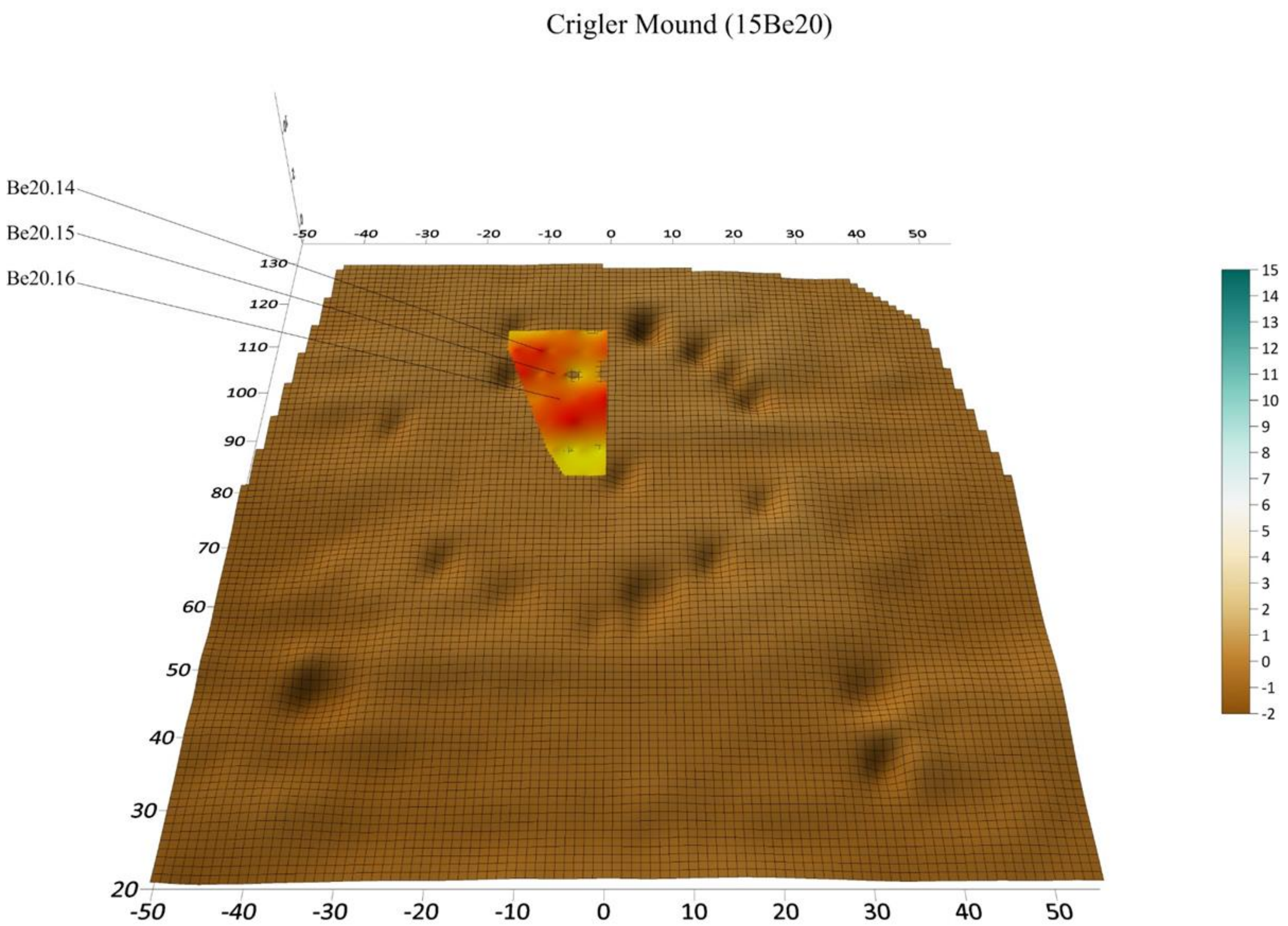
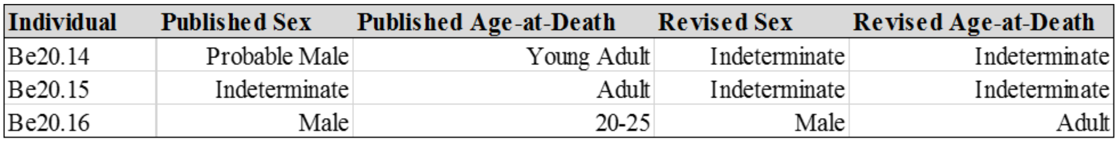


*Figure F.3***.** Crigler Mound Sequence – 3. Placement of individuals Be20.14, Be20.15, and Be20.16. These represent the redeposited calcined remains of at least three individuals (and likely more) scattered over the floor of the submound circular structure (Webb, 1943a).

Table F.1

Demographic Characteristics of Redeposited Cremations

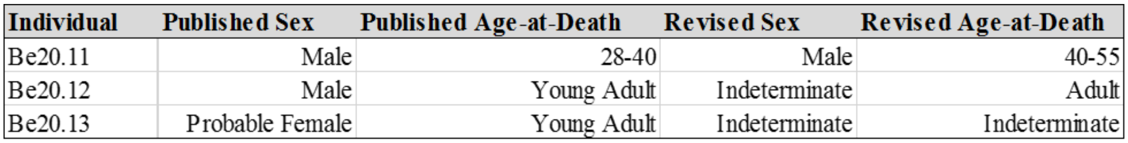


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be20.14	Probable Male	Young Adult	Indeterminate	Indeterminate
Be20.15	Indeterminate	Adult	Indeterminate	Indeterminate
Be20.16	Male	20-25	Male	Adult

See Figure F.3

Table F.2

Demographic Characteristics of Interment Episode 1

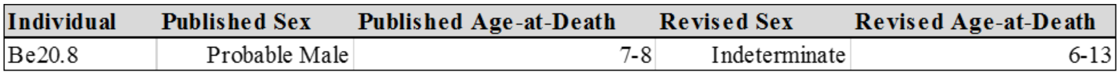


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be20.11	Male	28-40	Male	40-55
Be20.12	Male	Young Adult	Indeterminate	Adult
Be20.13	Probable Female	Young Adult	Indeterminate	Indeterminate

See Figure F.6

Table F.3

Demographic Characteristics of Interment Episode 2

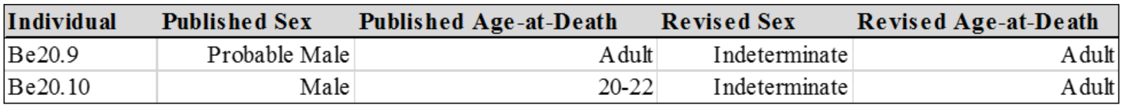


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be20.8	Probable Male	7-8	Indeterminate	6-13

See Figure F.8

Table F.4

Demographic Characteristics of Interment Episode 3

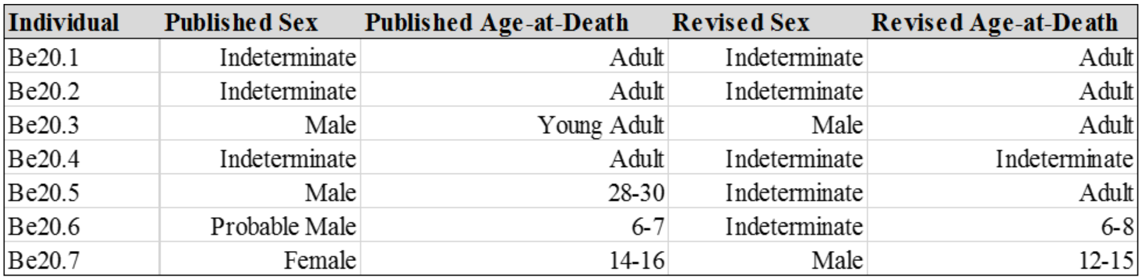


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be20.9	Probable Male	Adult	Indeterminate	Adult
Be20.10	Male	20-22	Indeterminate	Adult

See Figure F.13

Table F.5

Demographic Characteristics of Interment Episode 4



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be20.1	Indeterminate	Adult	Indeterminate	Adult
Be20.2	Indeterminate	Adult	Indeterminate	Adult
Be20.3	Male	Young Adult	Male	Adult
Be20.4	Indeterminate	Adult	Indeterminate	Indeterminate
Be20.5	Male	28-30	Indeterminate	Adult
Be20.6	Probable Male	6-7	Indeterminate	6-8
Be20.7	Female	14-16	Male	12-15

See Figure F.16

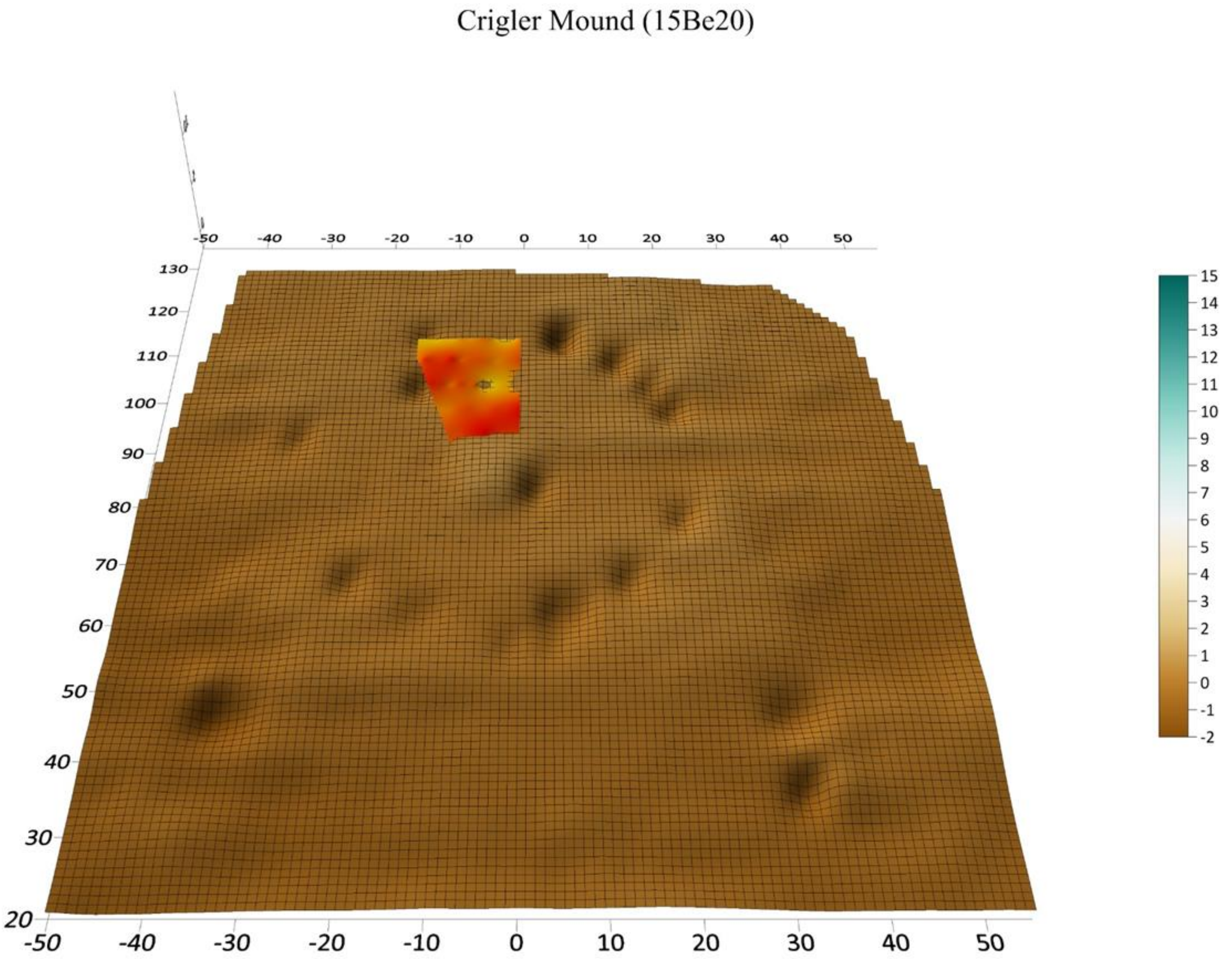


*Figure F.4***.** Crigler Mound Sequence – 4. Construction of a small ash dome in the center of the submound structure, partially covering the redeposited cremated remains.

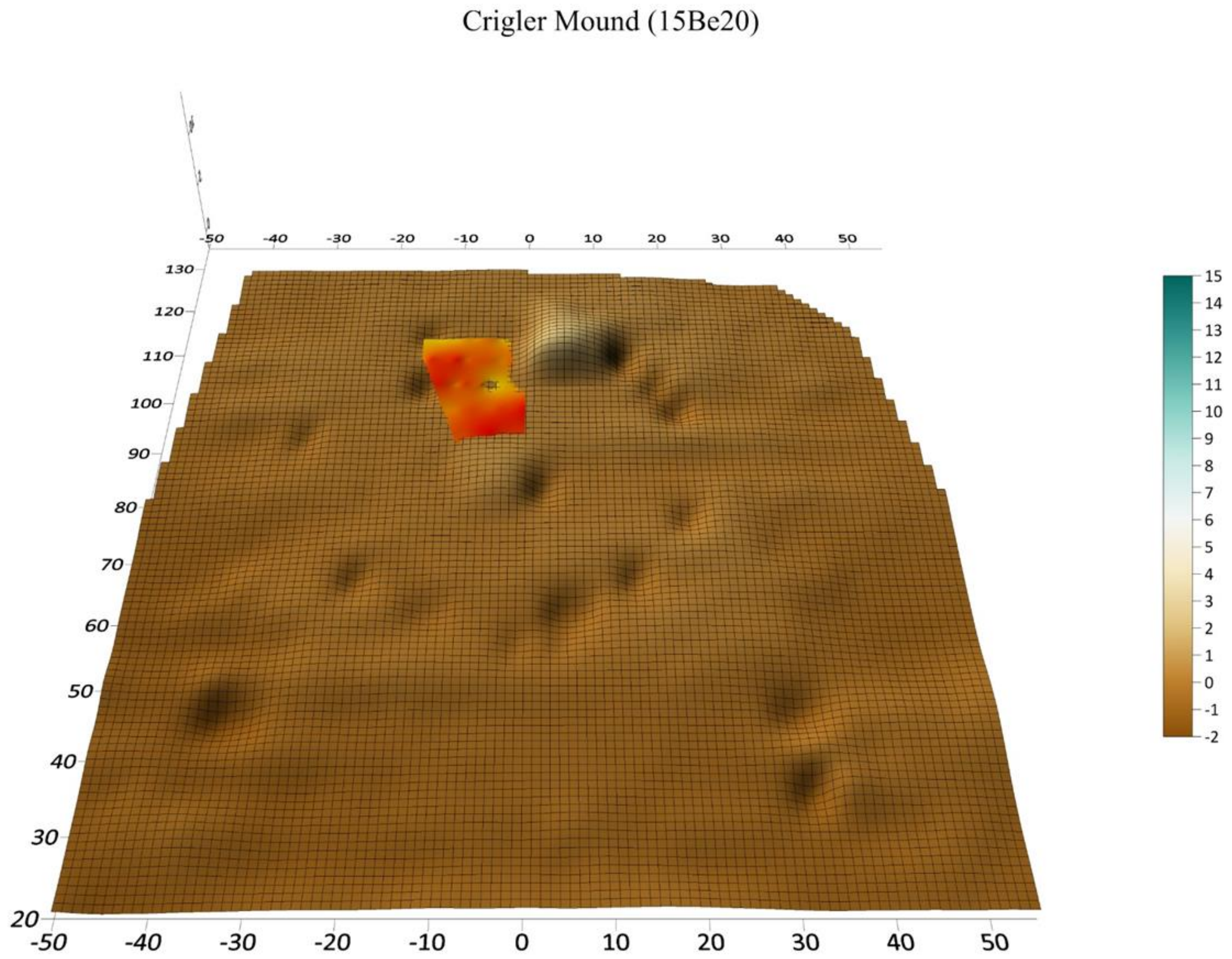


*Figure F.5***.** Crigler Mound Sequence – 5. Construction of a small clay platform that will become the east wall of Tomb 5.

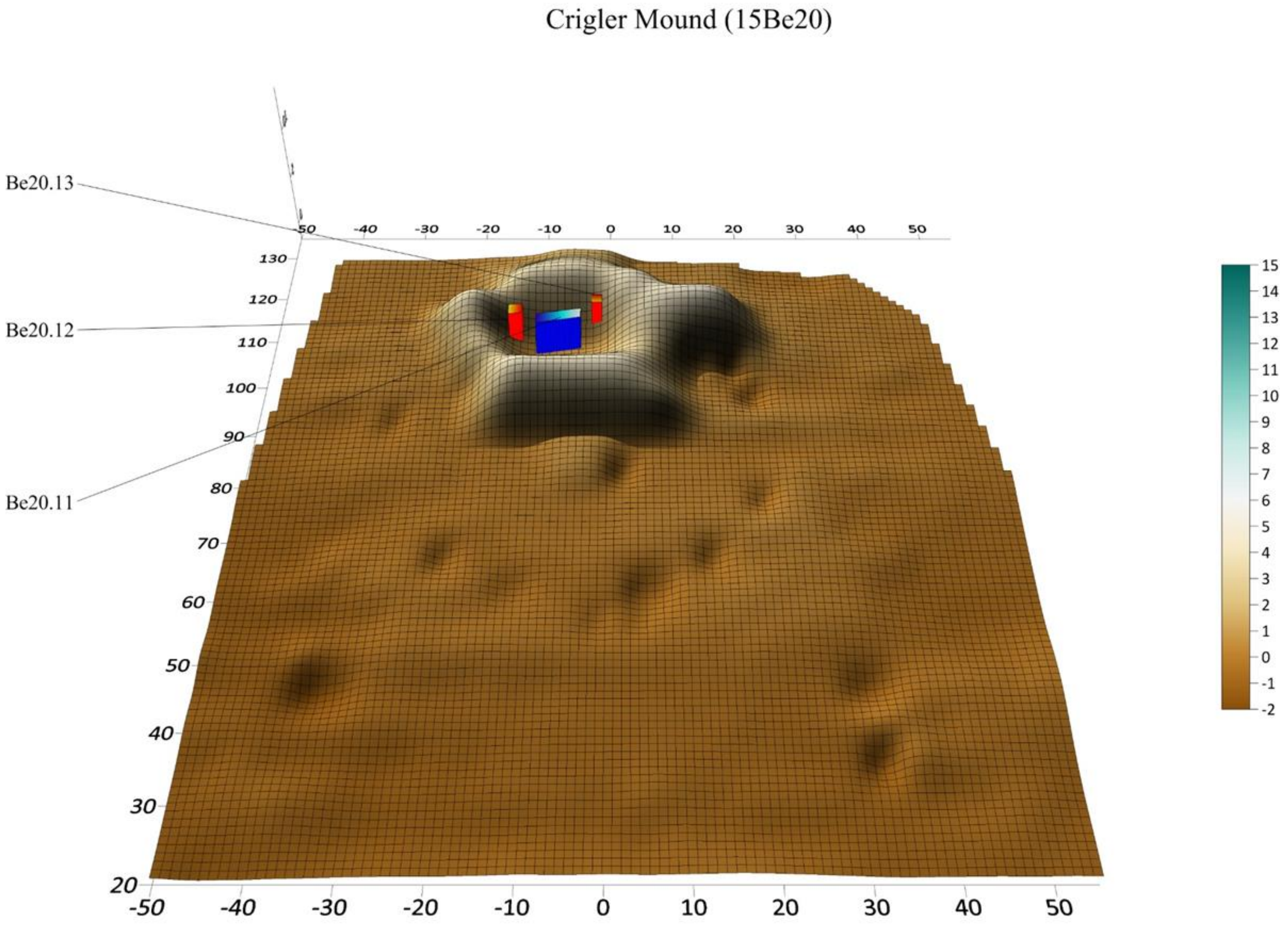


*Figure F.6***.** Crigler Mound Sequence – 6. Construction of Tomb 5 over the northern half of the submound circular structure and the placement of individuals Be20.11, Be20.12, and Be20.13 within it as the first interment episode.

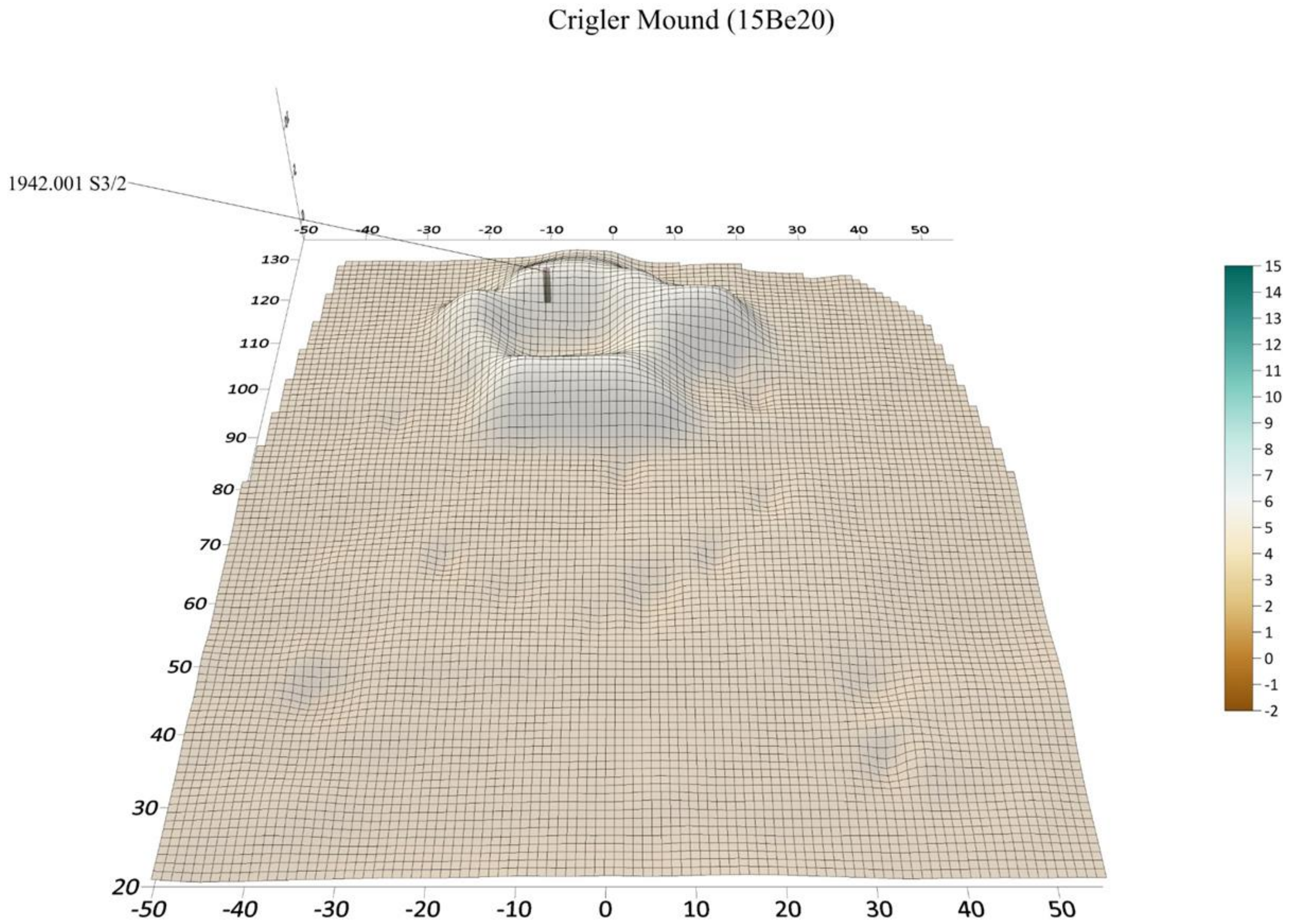


*Figure F.7***.** Crigler Mound Sequence – 7. Estimated location from which 1942.001 S3/2, a samples submitted for radiocarbon dating, was recovered.

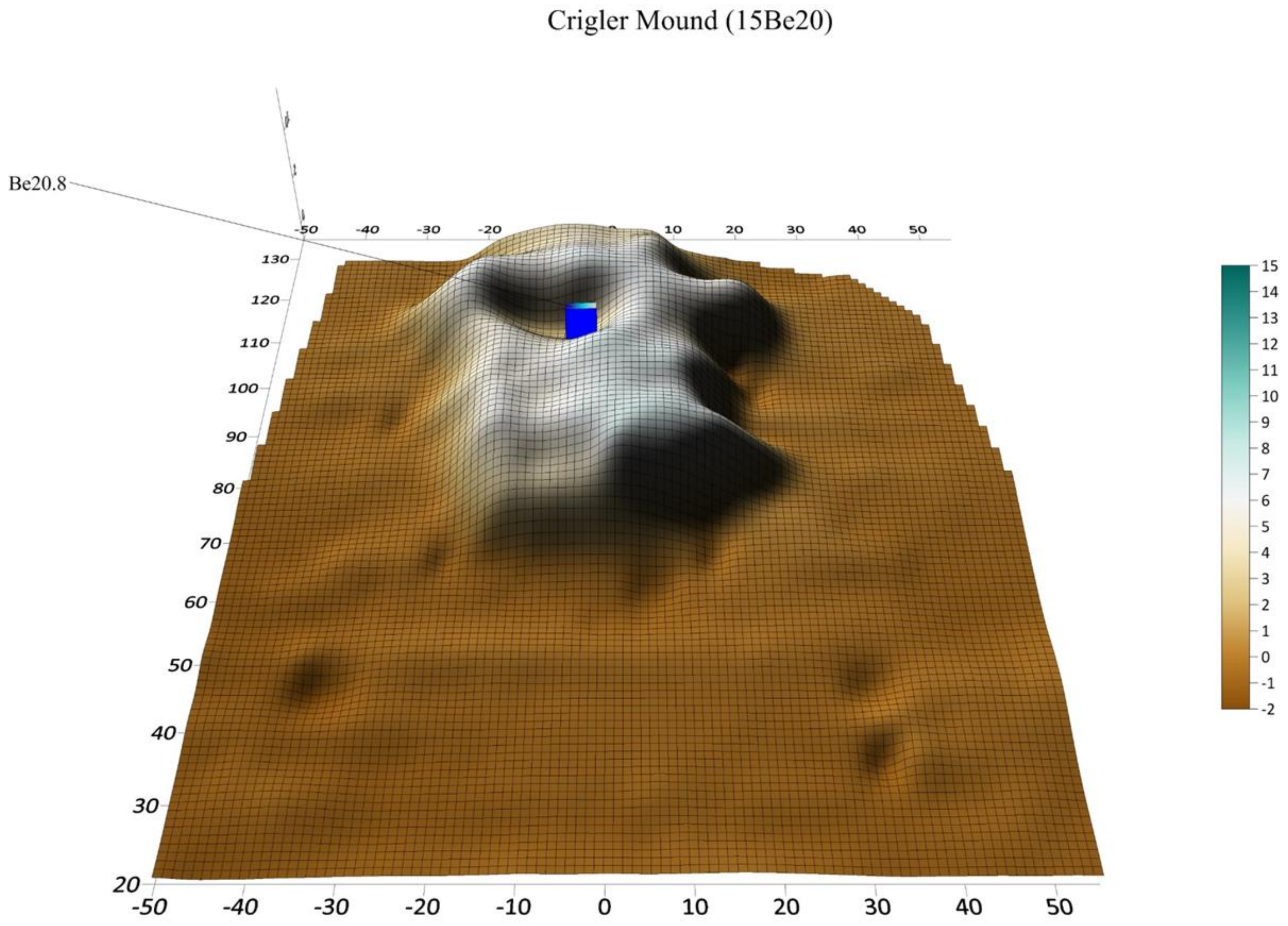


*Figure F.8***.** Crigler Mound Sequence – 8. Mound surface after the deposit of earth covering individuals Be20.11, Be20.12, and Be20.13 as well as the placement of individual Be20.8 either in the roof fill of Tomb 5 or, more likely, as part of the fill episode that led to the covering of the submound structure's footprint. This is considered to be the second interment episode.

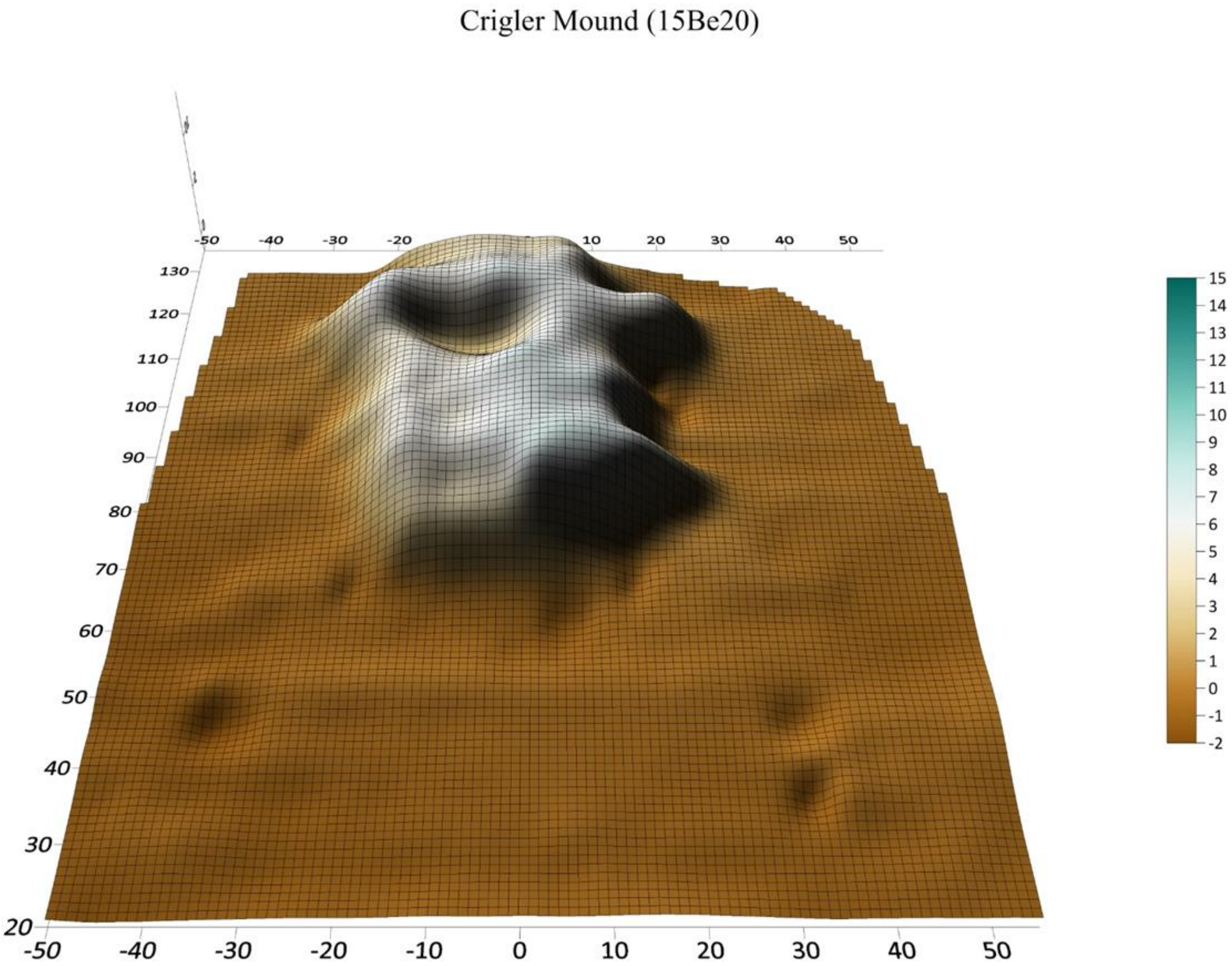


Figure F.9. Crigler Mound Sequence – 9. Surface of mound after minor deposit of earth at northern edge of the excavated area.

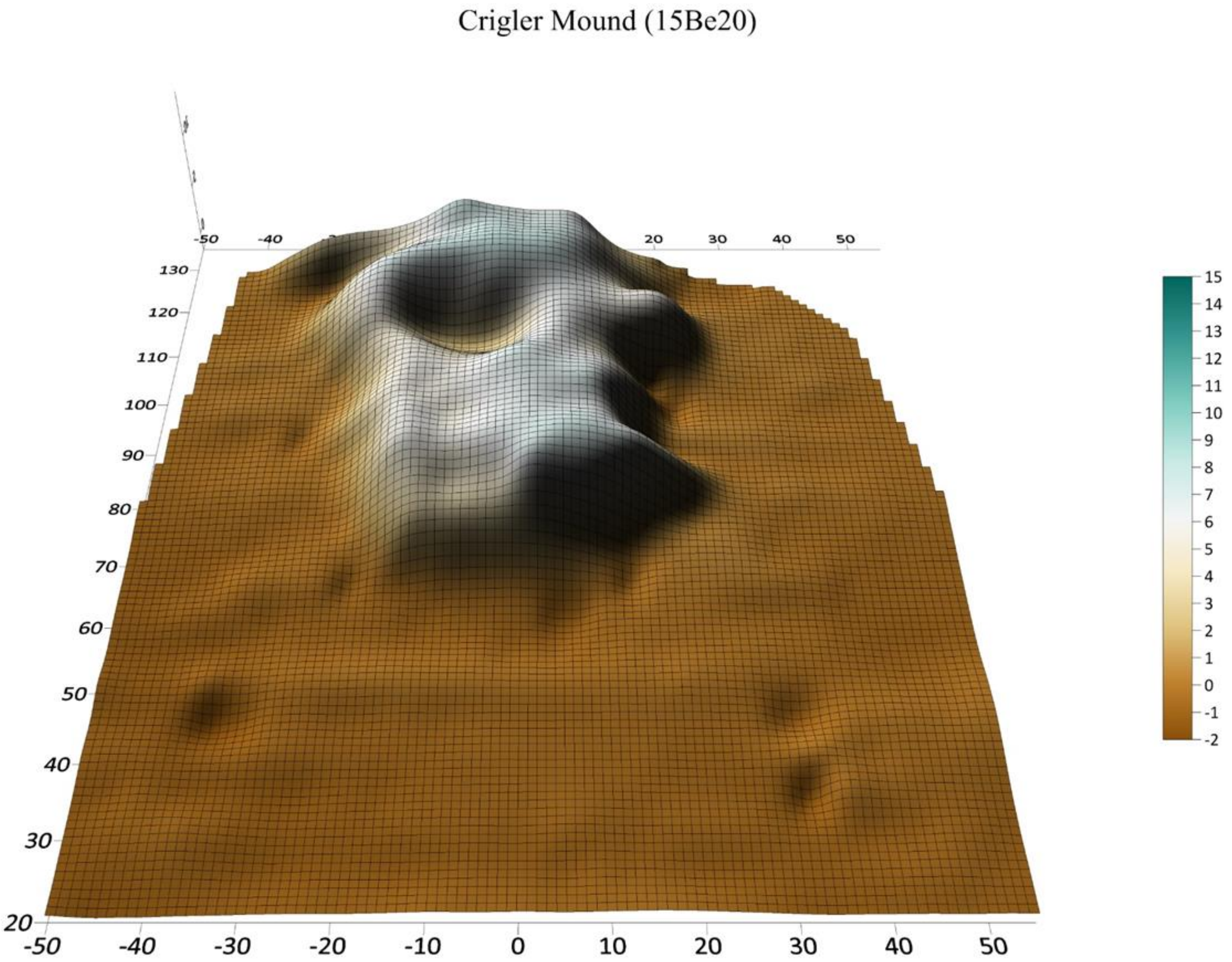


*Figure F.10***.** Crigler Mound Sequence – 10. Surface of mound after additional deposit of earth at northern edge of excavated area.

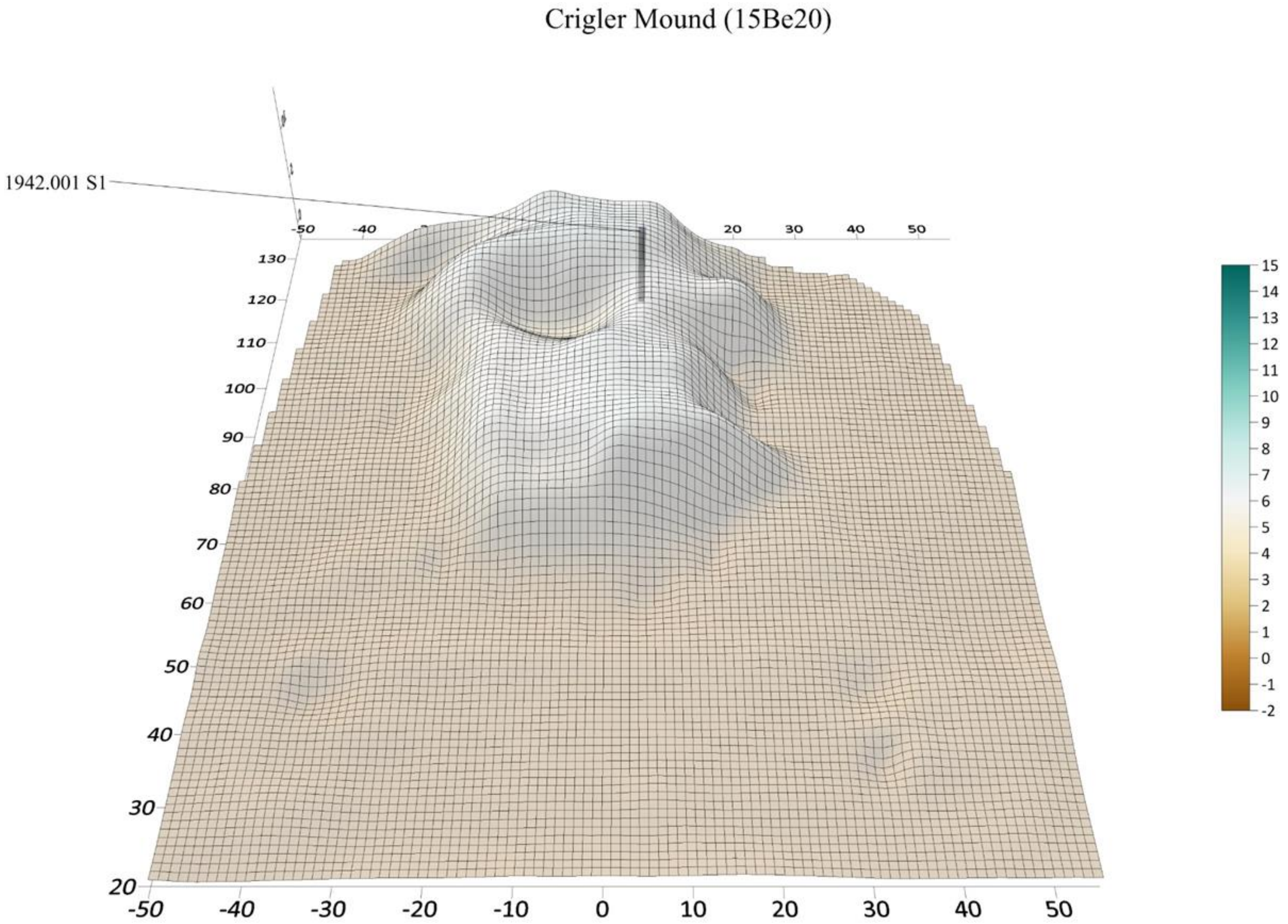


*Figure F.11***.** Crigler Mound Sequence – 11. Estimated location from which 1942.001 S1, a sample submitted for radiocarbon dating, was recovered.

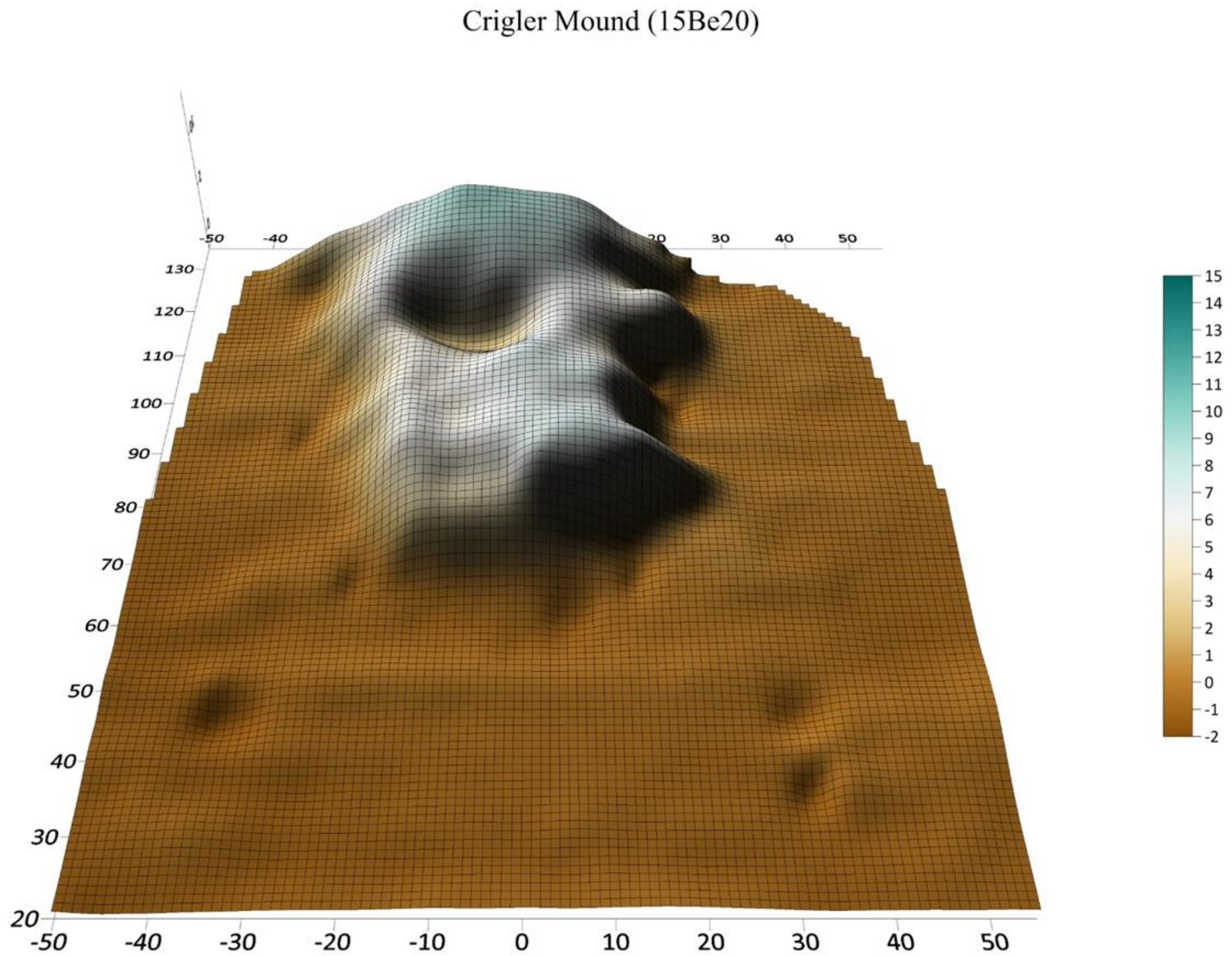


*Figure F.12***.** Crigler Mound Sequence – 12. Surface of mound after continued deposition of earth along northern edge of excavated area.

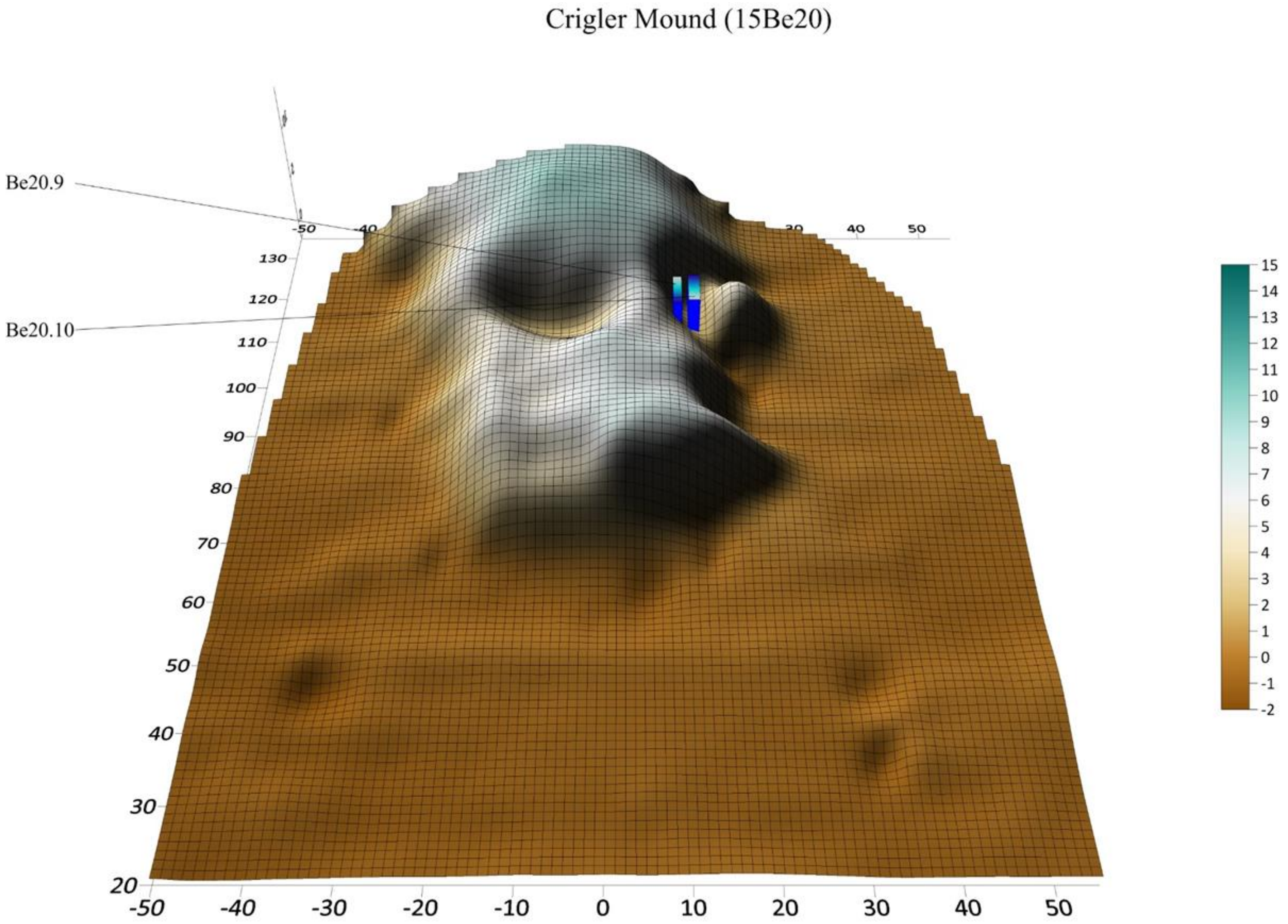


*Figure F.13***.** Crigler Mound Sequence – 13. Excavation of Tomb 6 and placement of individuals Be20.9 and Be20.10 during the third interment episode. Note also the continued deposition of earth along the northern edge of the excavated area.

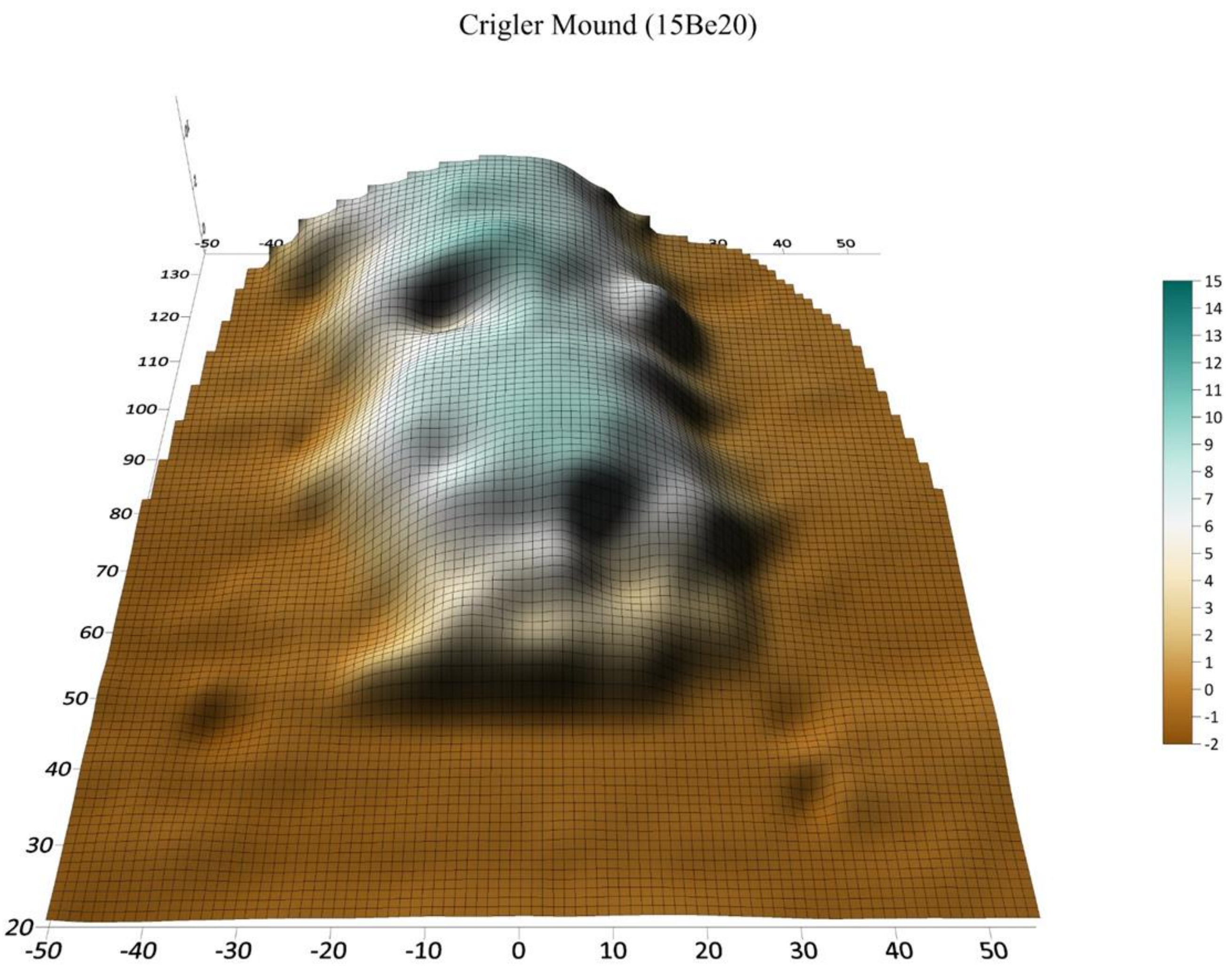
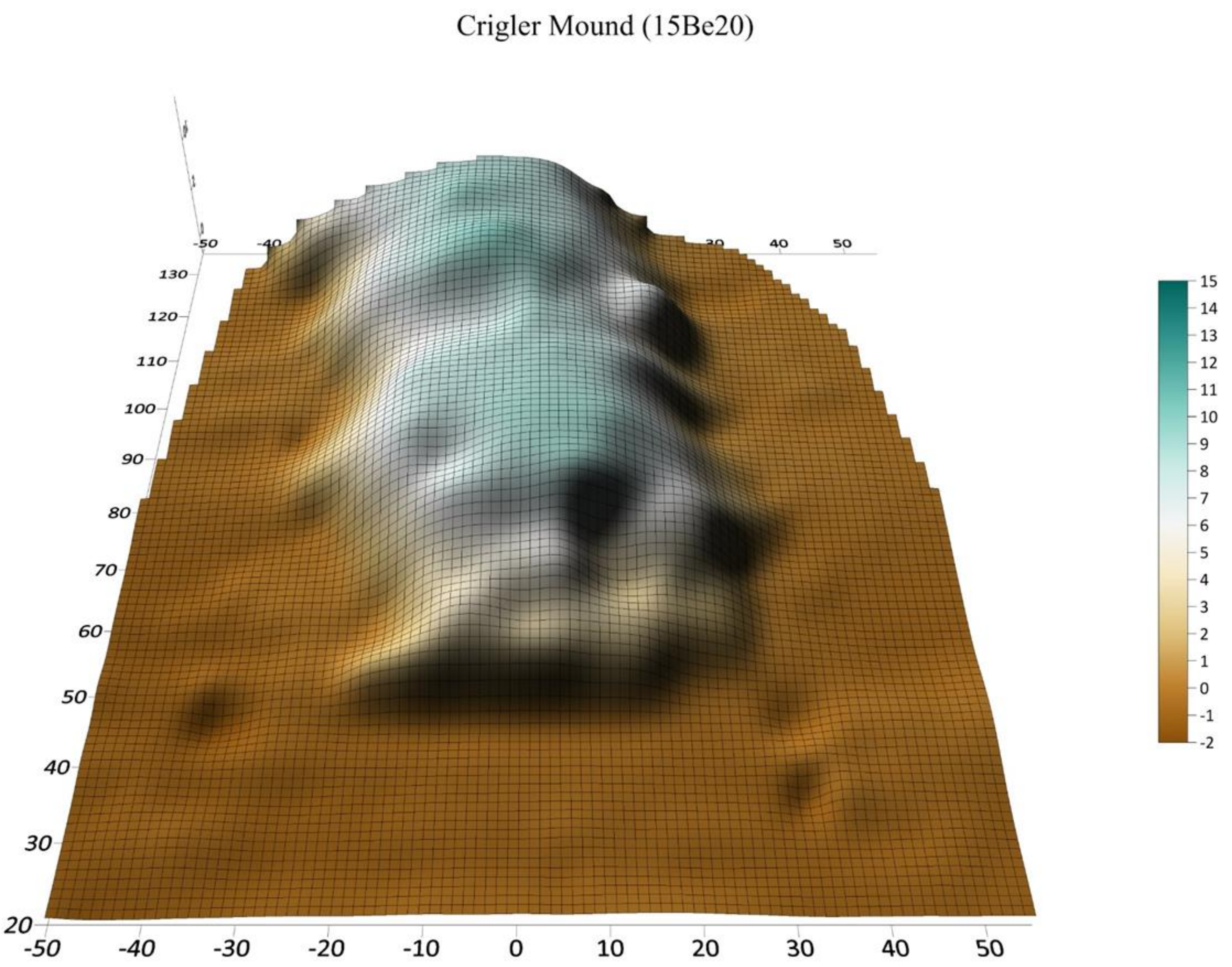


*Figure F.14***.** Crigler Mound Sequence – 14. Mound surface after deposition of earth over Tomb 6 and resulting in a southward extension of the mound.



Crigler Mound (15Be20)

*Figure F.15***.** Crigler Mound Sequence – 15. Deposit of mound fill in the cavity created by the collapse of Tomb 5, likely in preparation for the fourth interment episode (see Figure F.16).

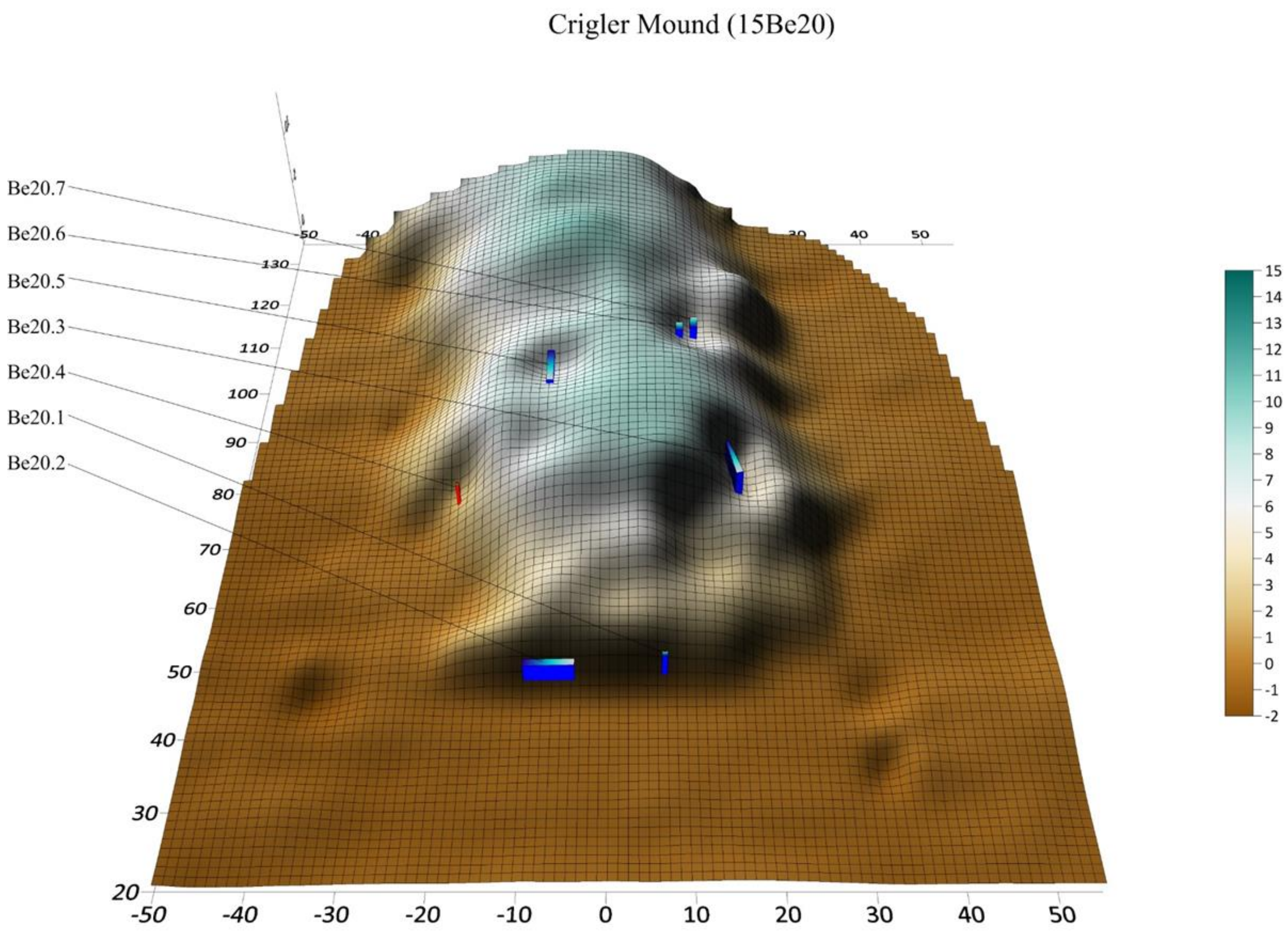


*Figure F.16***.** Crigler Mound Sequence – 16. Excavation of Tomb 1 (for the placement of Be20.3), Tomb 2 (for Be20.4), Tomb 3 (for Be20.5), and Tomb 4 (for Be20.6 and Be20.7) as well as the placement of Be20.1 and Be20.2 in the fourth interment episode. These individuals were then covered by a deposit of earth made over the entire mound (see Figure F.17).

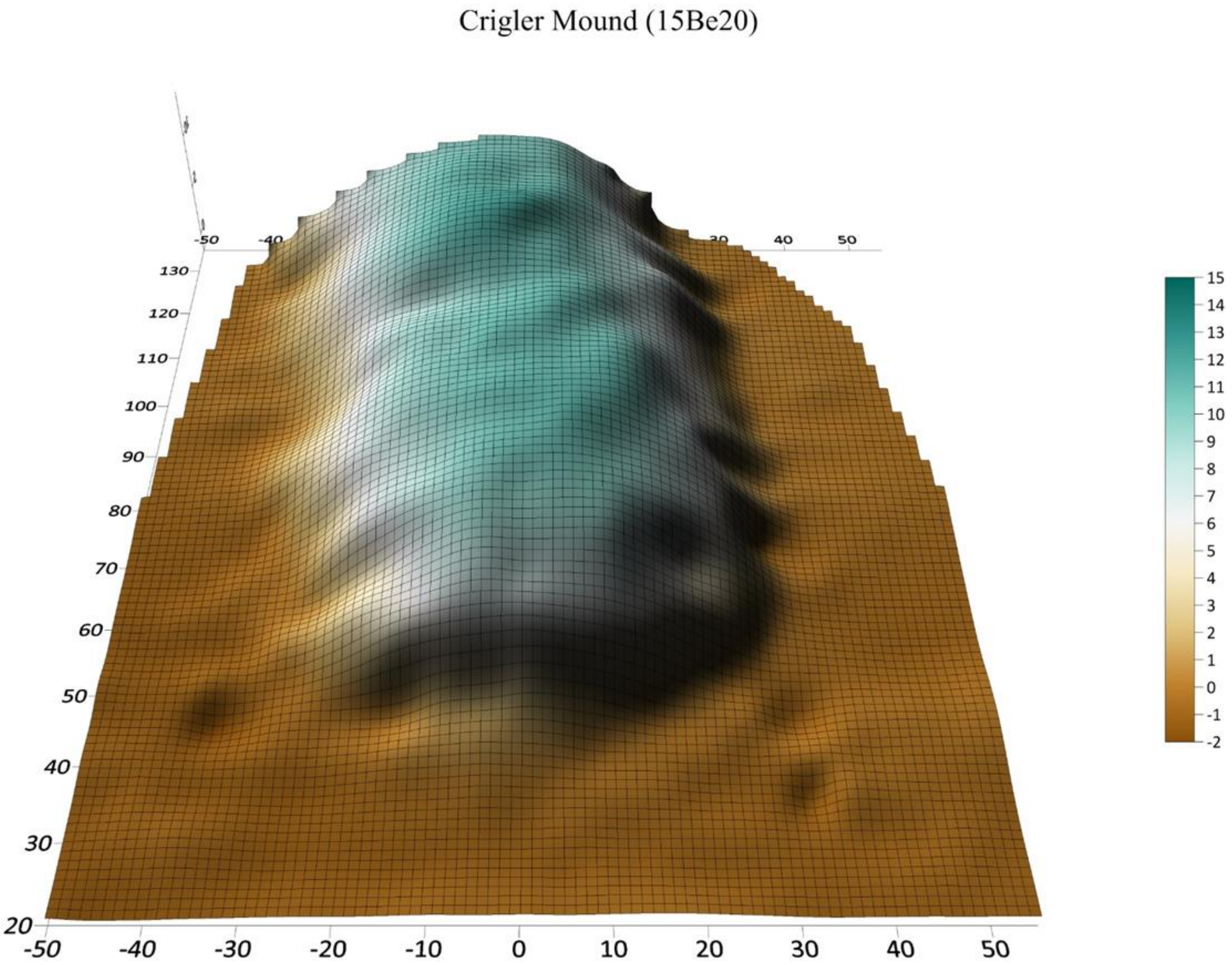


*Figure F.17***.** Crigler Mound Sequence – 17. Mound surface after the deposit of earth covering the fourth interment episode.

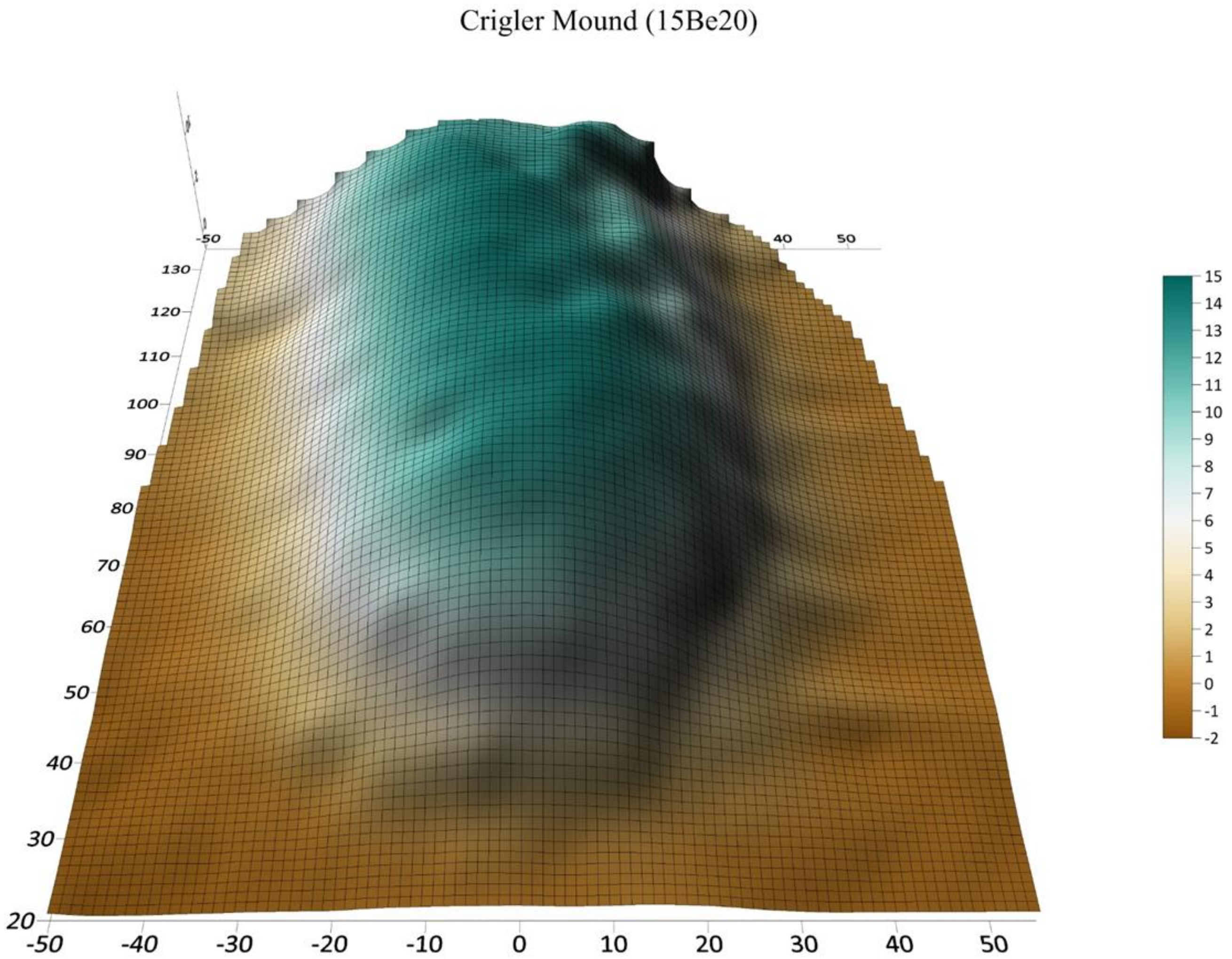


*Figure F.18***.** Crigler Mound Sequence – 18. Some time after the covering of the fourth interment episode, a second layer of earth was deposited over the entire mound, slightly expanding its size and smoothing its contours.

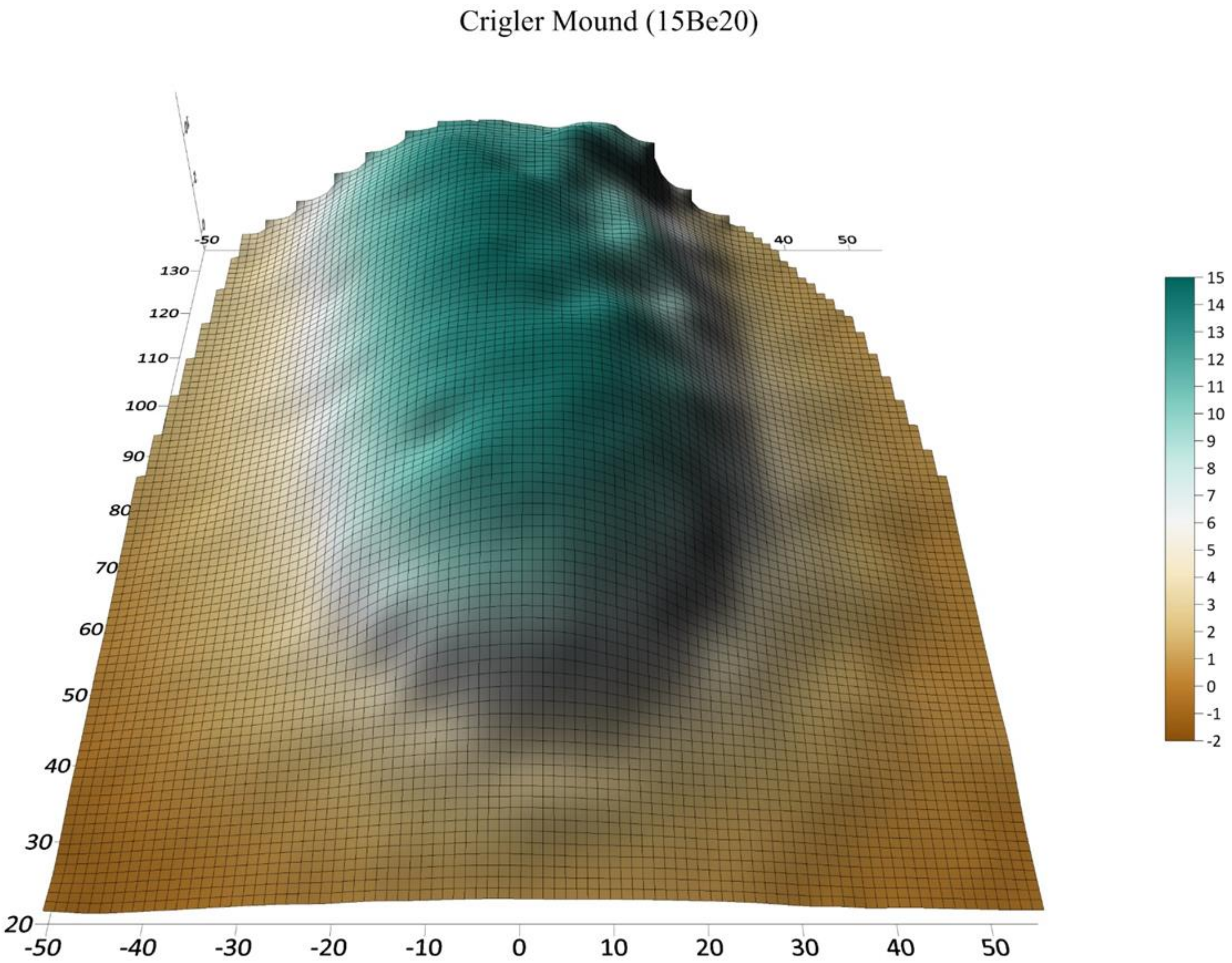


*Figure F.19***.** Crigler Mound Sequence – 19. Surface of the mound at the time of excavation.

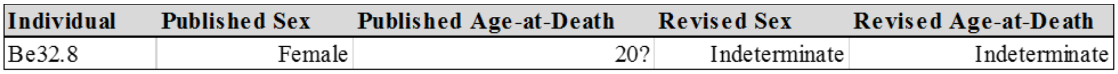
APPENDIX G

CONSTRUCTION SEQUENCE FOR THE HARTMAN MOUND (15BE32)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Hartman mound (15Be32) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

Table G.1

Demographic Characteristics of Interment Episode 1

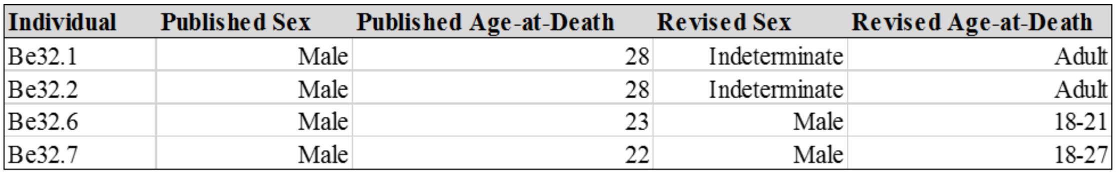


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be32.8	Female	20?	Indeterminate	Indeterminate

See Figure G.2

Table G.2

Demographic Characteristics of Interment Episode 2

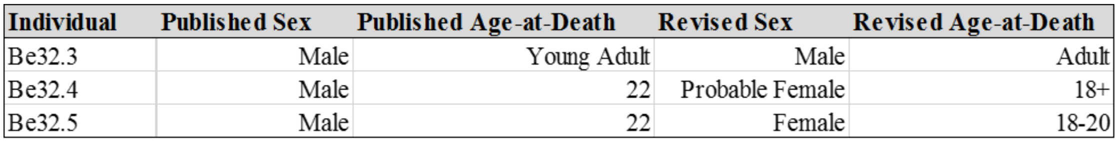


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be32.1	Male	28	Indeterminate	Adult
Be32.2	Male	28	Indeterminate	Adult
Be32.6	Male	23	Male	18-21
Be32.7	Male	22	Male	18-27

See Figures G.4 and G.5

Table G.3

Demographic Characteristics of Interment Episode 3



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Be32.3	Male	Young Adult	Male	Adult
Be32.4	Male	22	Probable Female	18+
Be32.5	Male	22	Female	18-20

See Figures G.7 and G.8

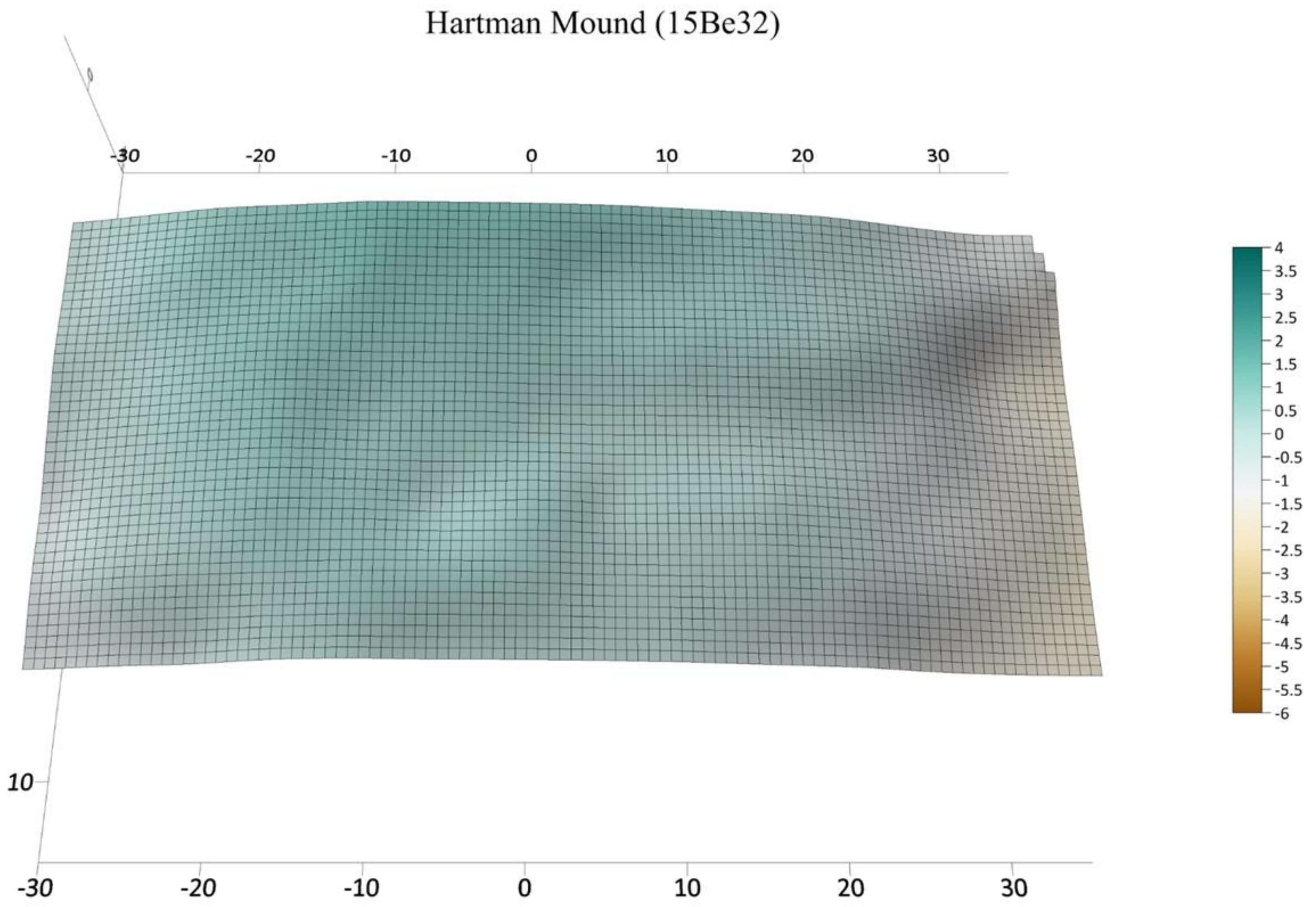


*Figure G.1***.** Hartman Mound Sequence – 1. Undisturbed clay base of the mound.

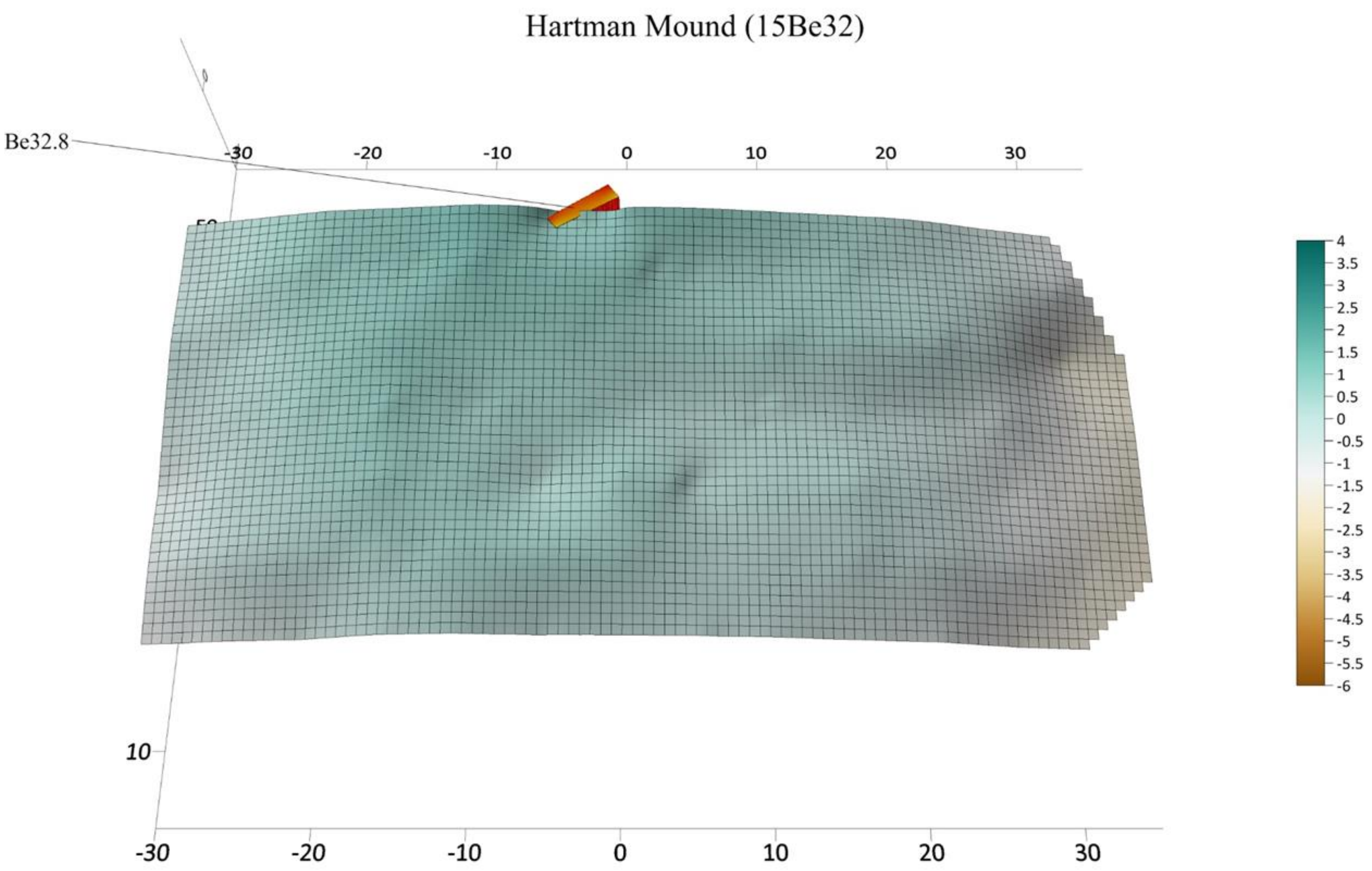


*Figure G.2***.** Hartman Mound Sequence – 2. Placement of individual Be32.8 in the first episode of interment.

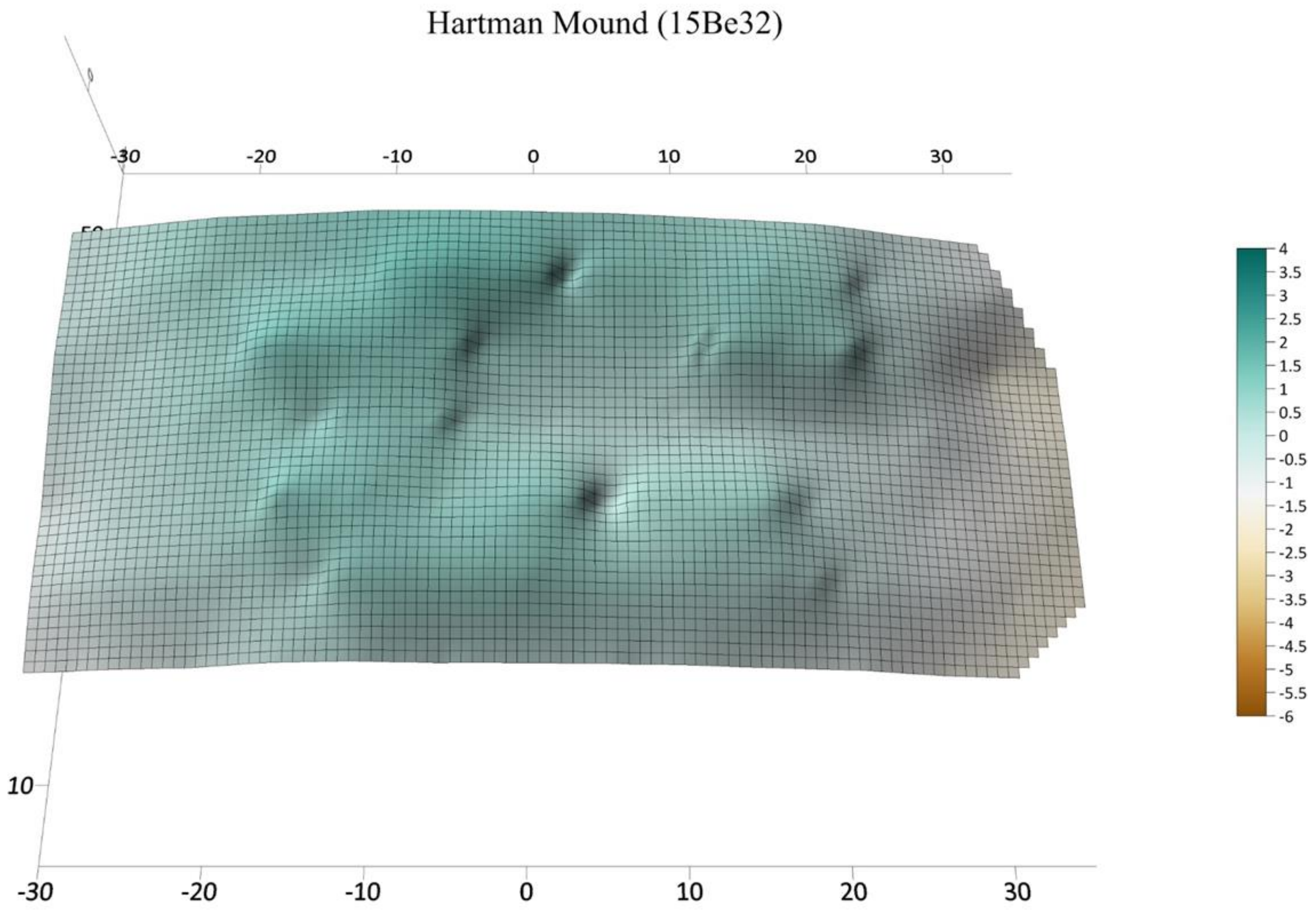


*Figure G.3***.** Hartman Mound Sequence – 3. Surface of ‘old humus’ (‘OH’) layer. The ring-like shape of this layer is likely an artifact of the excavation of the central grave (see Figure G.4).

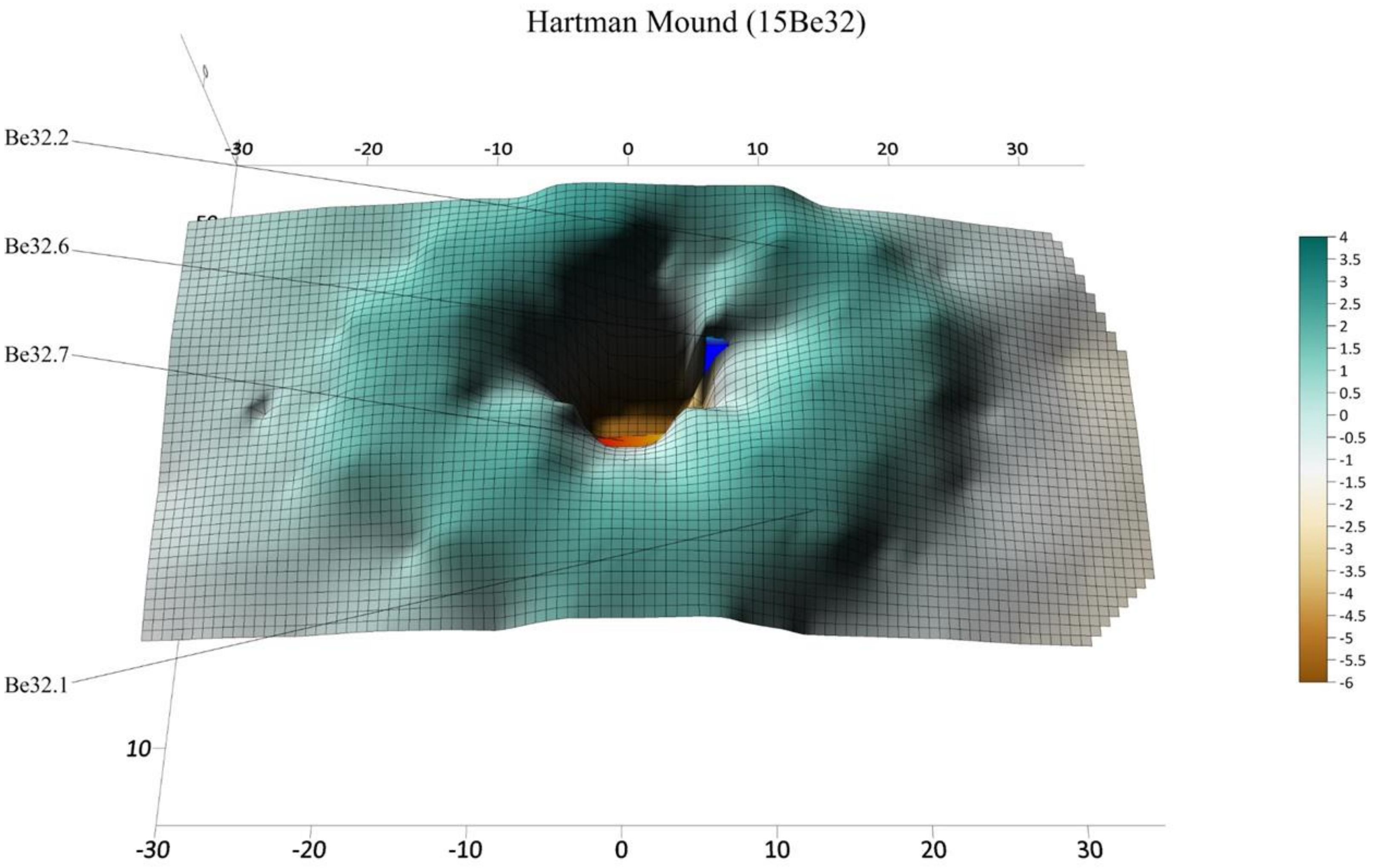


*Figure G.4***.** Hartman Mound Sequence – 4. Excavation of the central grave (for Be32.7) and concomitant construction of the surrounding earthen ring (in which individuals Be32.1, Be32.2, and Be32.6 were interred). This represents the second episode of interment. See also Figure G.5.

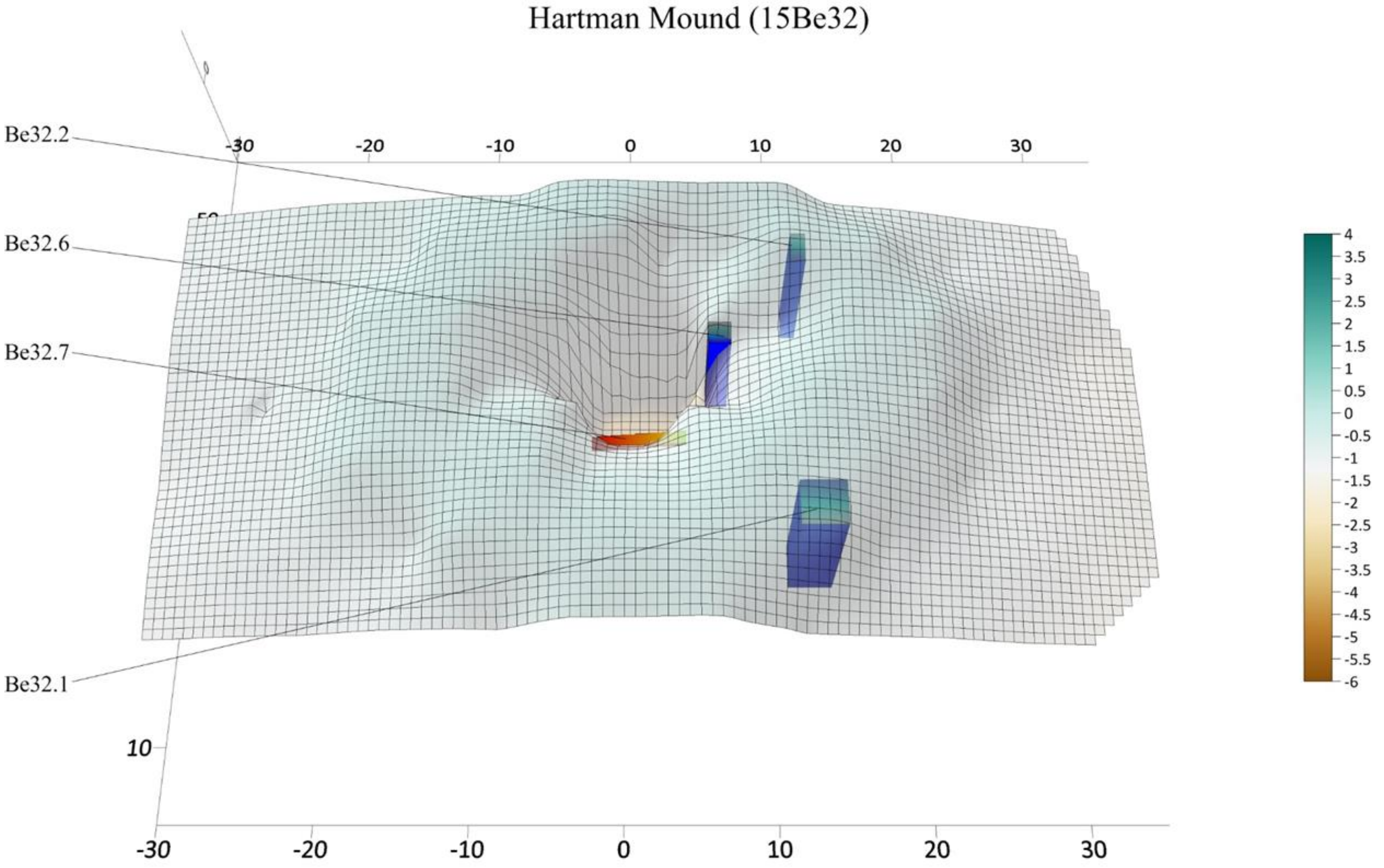


*Figure G.5***.** Hartman Mound Sequence – 5. The mound surface has been rendered transparent in order to better visualize the placement of Be32.7 at the bottom of the central grave as well as Be32.1, Be32.2, and Be32.6 within the raised earthen ring surrounding it.

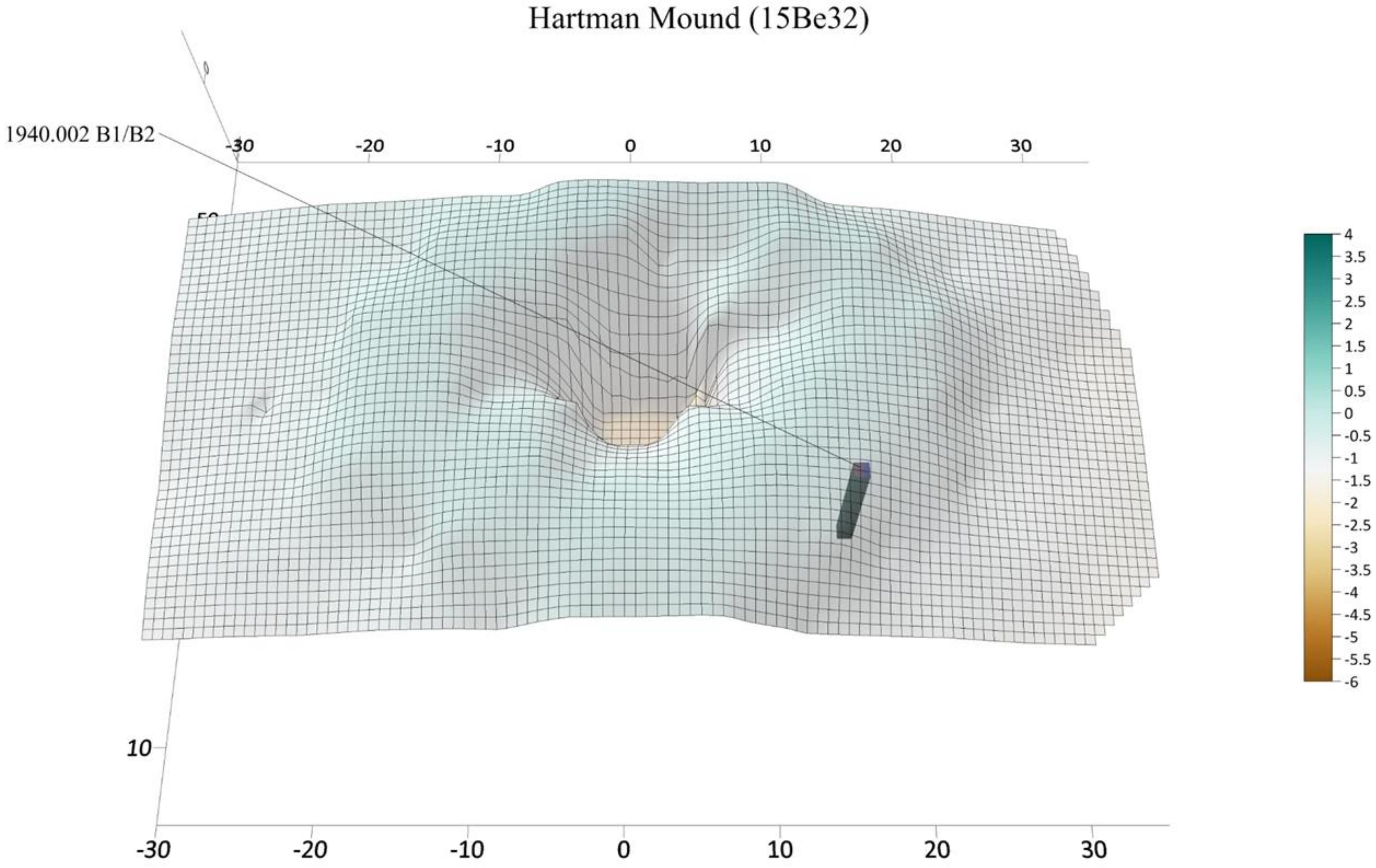


*Figure G.6***.** Hartman Mound Sequence – 6. Estimated location from which 1940.002 B1/B2, a sample submitted for radiocarbon dating, was recovered.

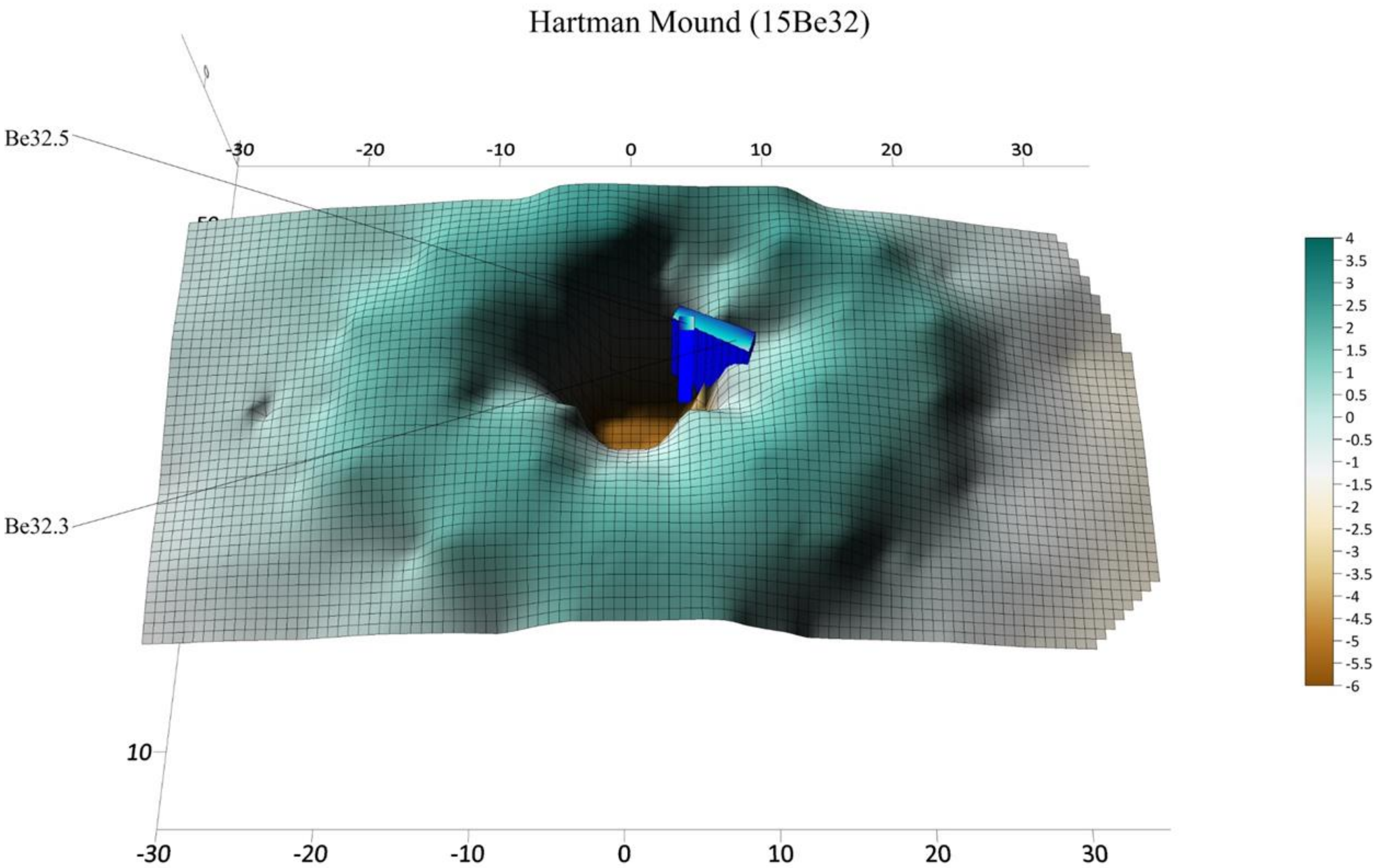


*Figure G.7***.** Hartman Mound Sequence – 7. Placement of individuals Be32.3 and Be32.5 within the fill of the central grave. In combination with Be32.4 (see Figure G.8), these three individuals represent the third episode of interment.

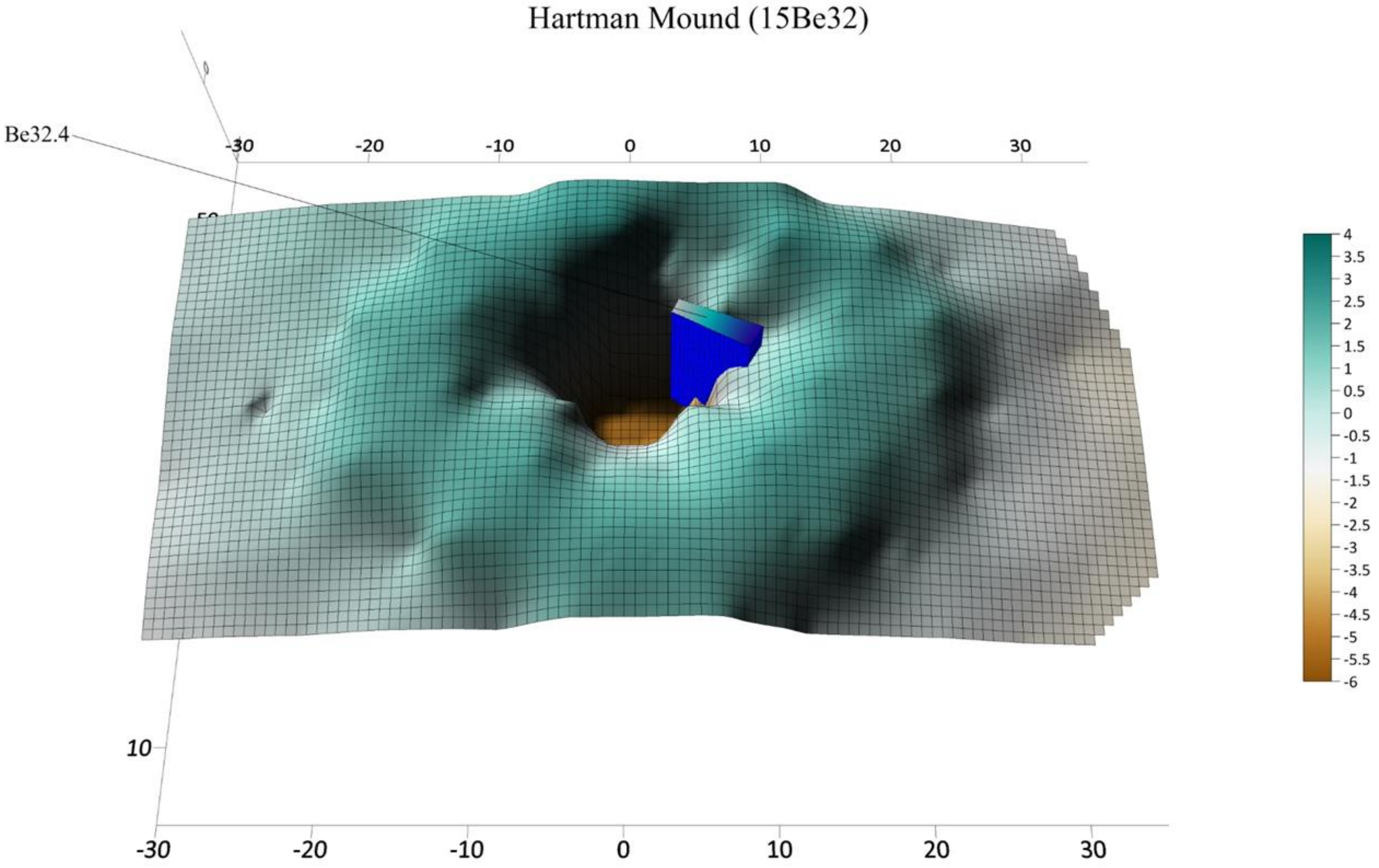


*Figure G.8***.** Hartman Mound Sequence – 8. Placement of individual Be32.4 in the fill of the central grave as part of the third episode of interment.

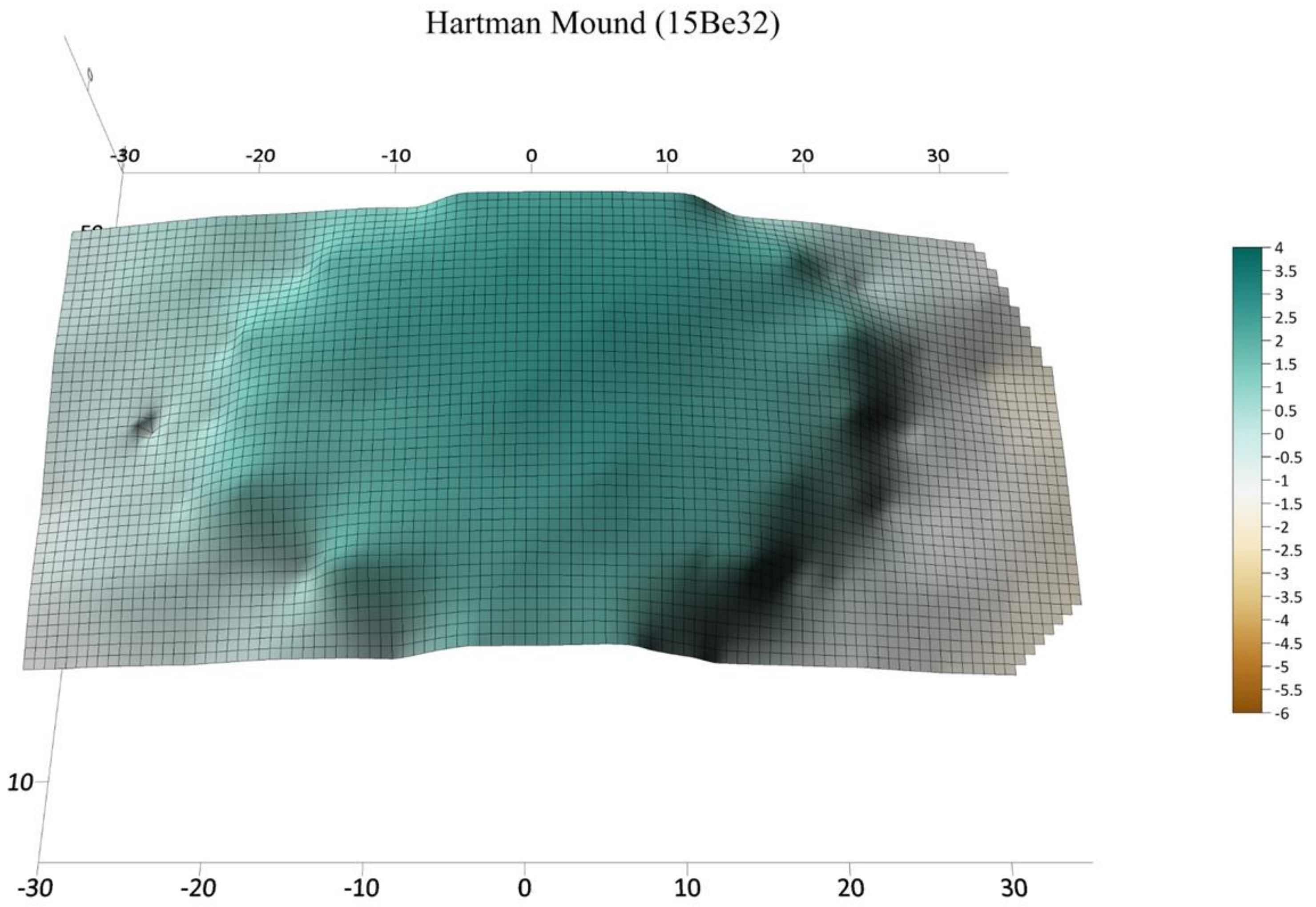


*Figure G.9***.** Hartman Mound Sequence – 9. The central grave was filled prior to the deposition of the remainder of the mound fill.

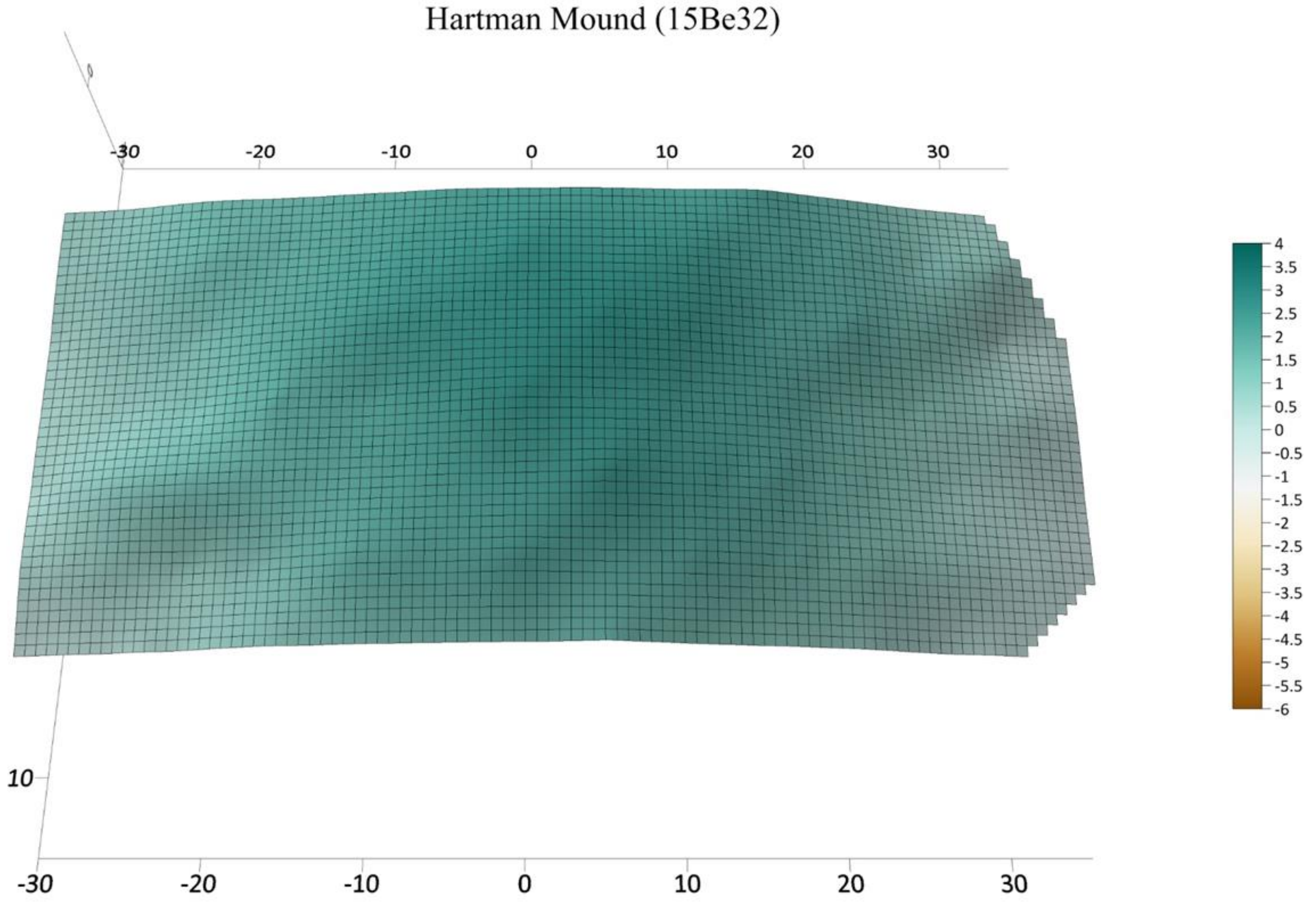


Figure G.10. Hartman Mound Sequence – 10. Mound surface after the deposit of a layer of earth over the filled-in central grave and earthen ring.

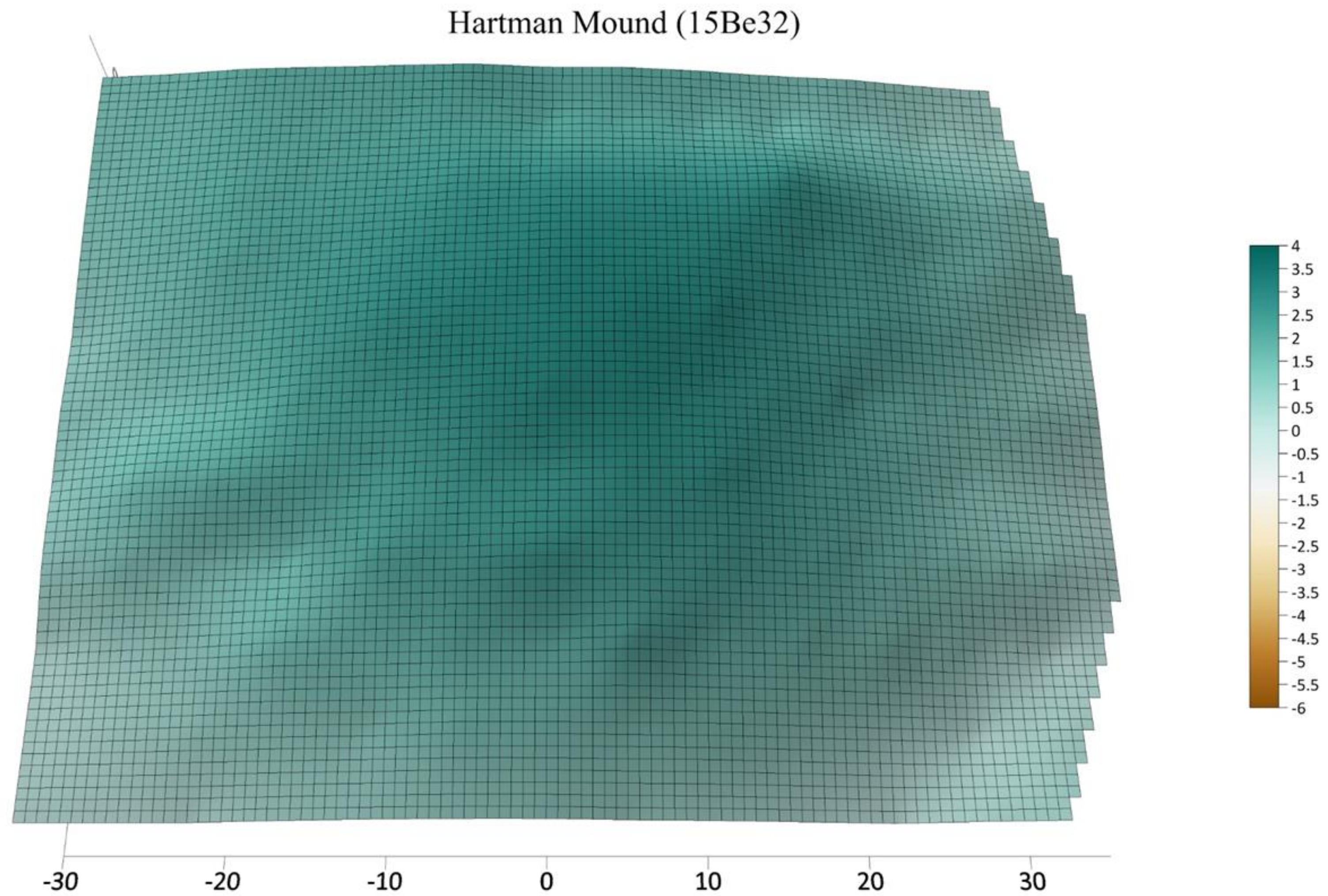


*Figure G.11***.** Hartman Mound Sequence – 11. Mound surface at the time of excavation.

APPENDIX H

CONSTRUCTION SEQUENCE FOR THE MORGAN STONE MOUND (15Bh15)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Morgan Stone mound (15Bh15) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

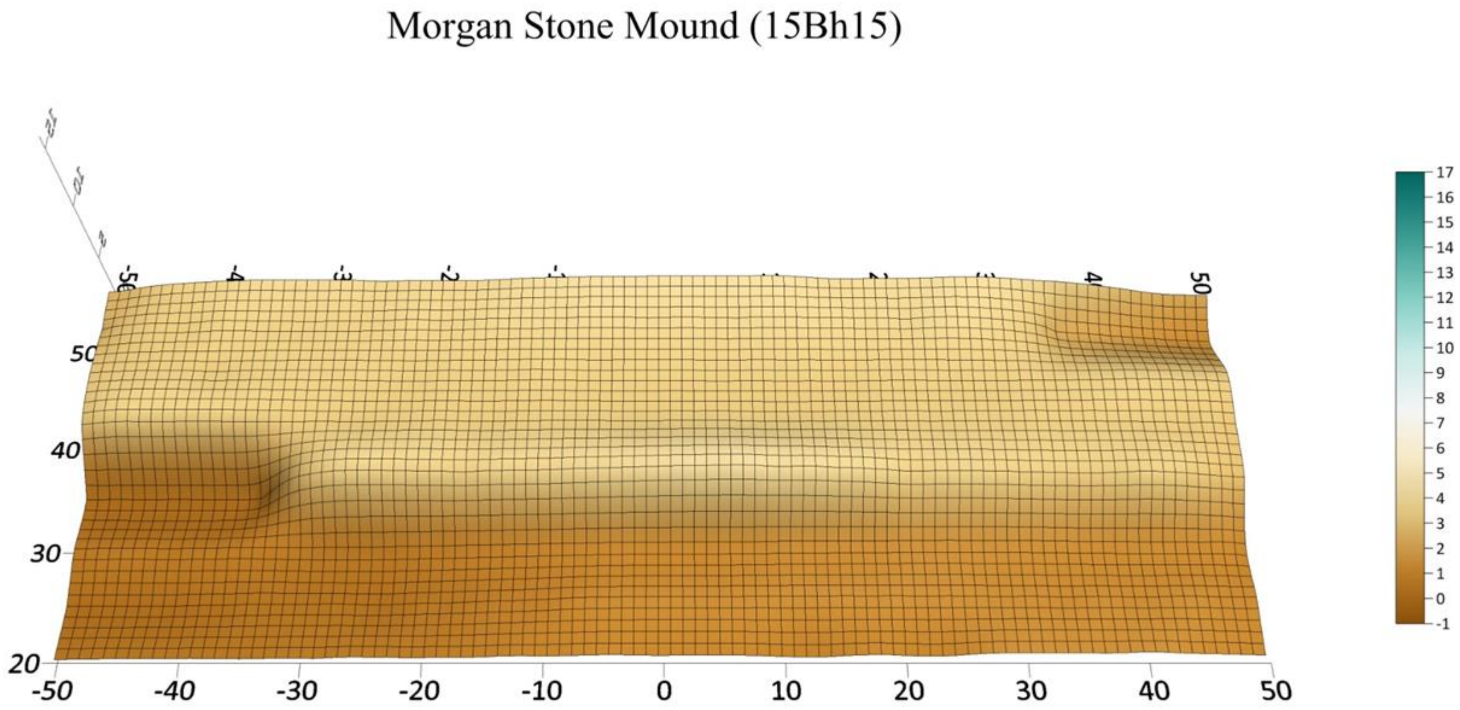


*Figure H.1***.** Morgan Stone Mound Sequence – 1. Basal extent of the excavation of the Morgan Stone mound.

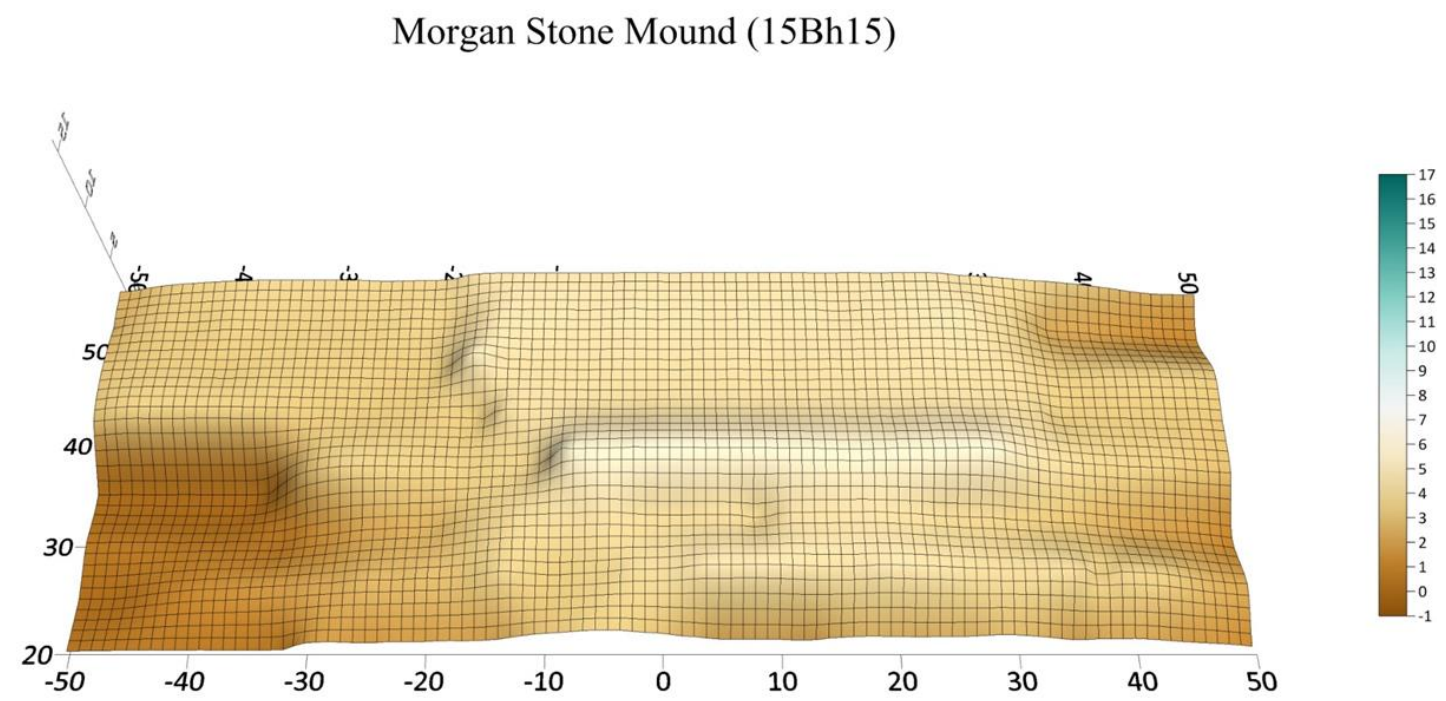


*Figure H.2***.** Morgan Stone Mound Sequence – 2. Clay base upon which the mound was built.

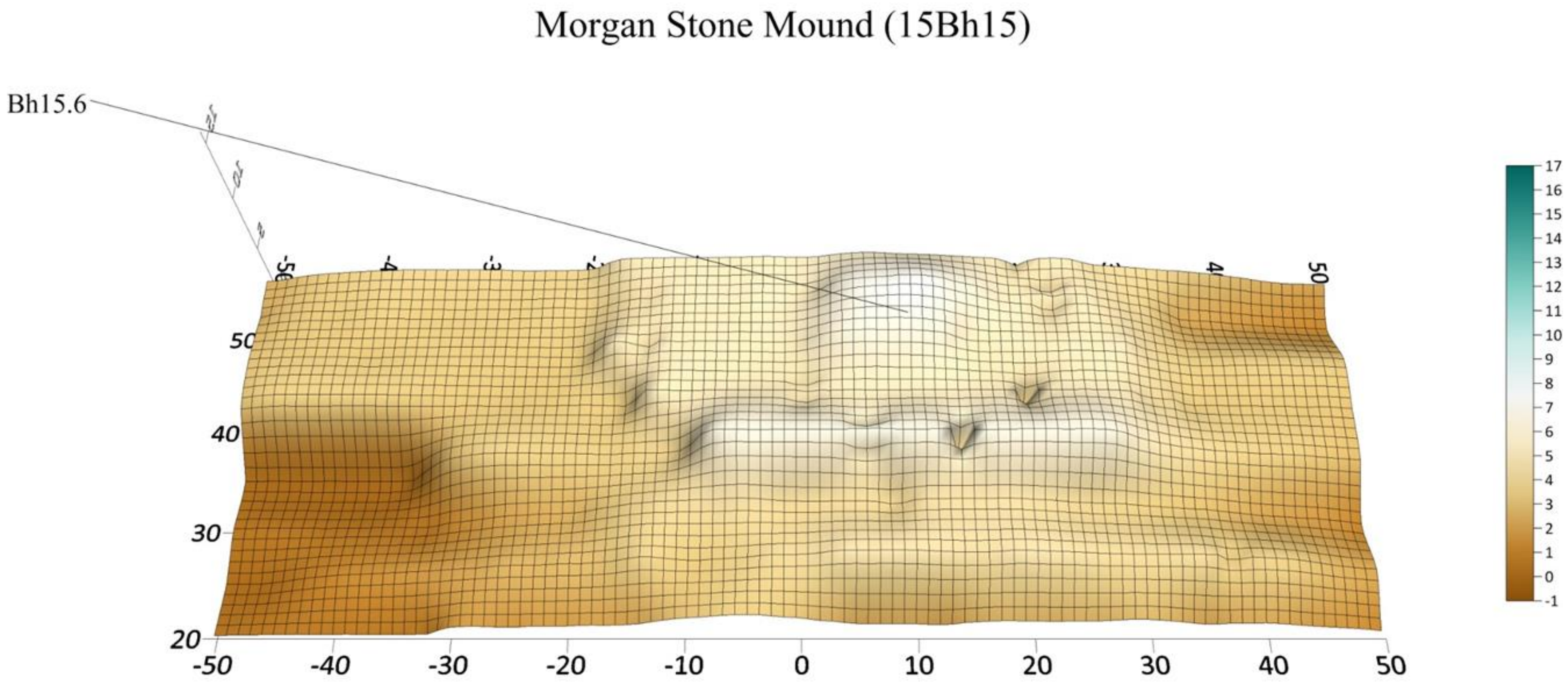


*Figure H.3***.** Morgan Stone Mound Sequence – 3. Ash dome constructed over the interment of Bh15.6 (see Figure H.4). Note also the post molds surrounding the ash dome and marking the location of the submound circular structure. This represents the first episode of interment.

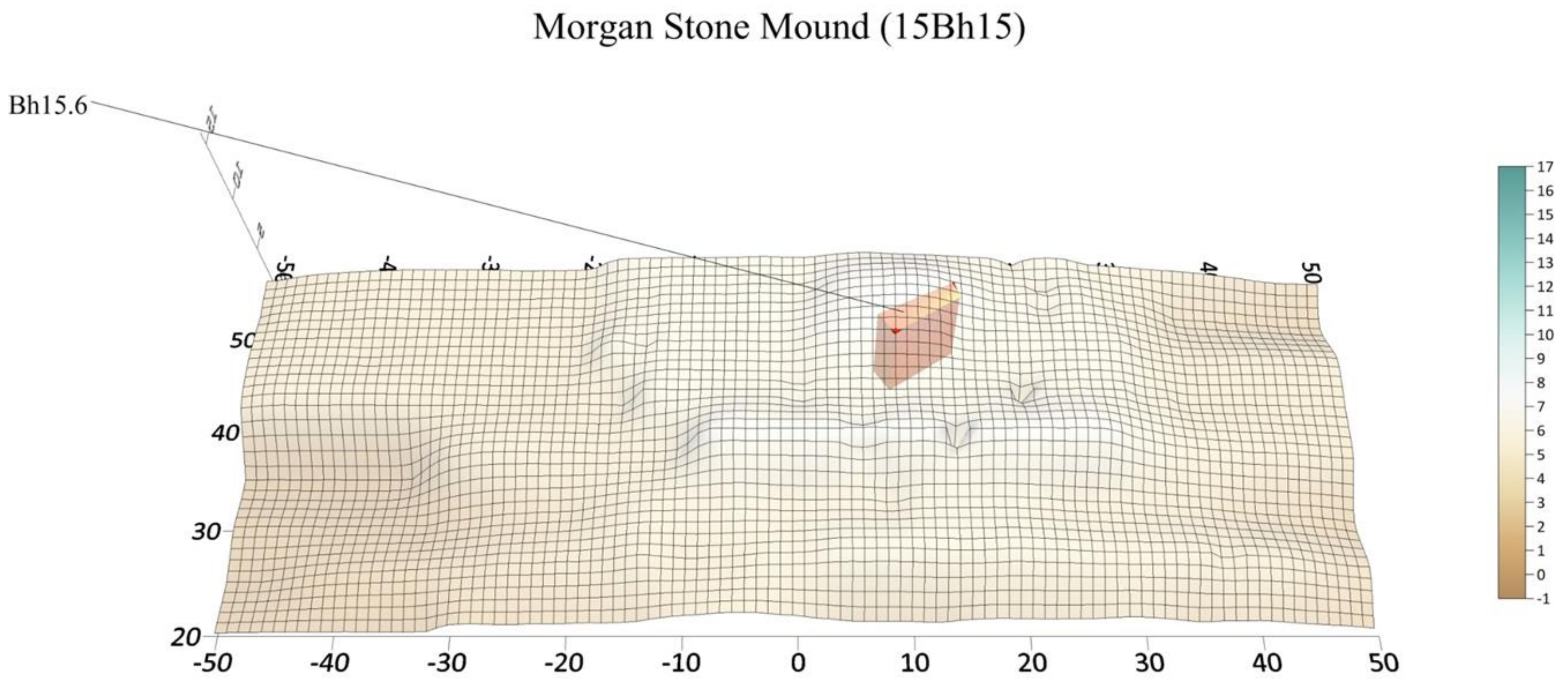
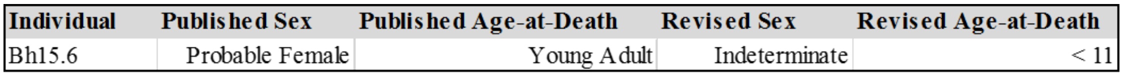


*Figure H.4***.** Morgan Stone Mound Sequence – 4. Ash mound rendered transparent in order to visualize the location of Bh15.6 within it.

Table H.1

Demographic Characteristics of Interment Episode 1

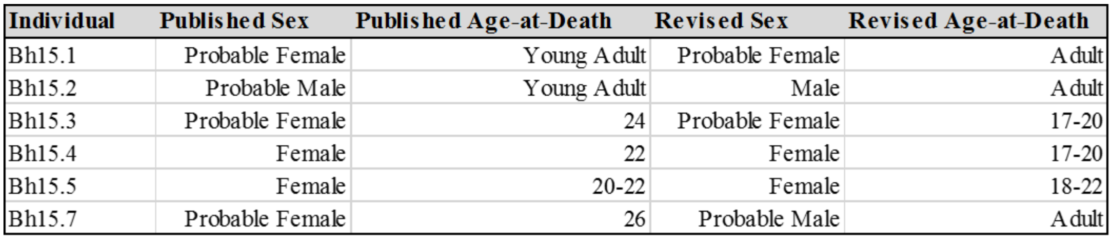


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Bh15.6	Probable Female	Young Adult	Indeterminate	< 11

See Figures H.3 and H.4

Table H.2

Demographic Characteristics of Interment Episode 2



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Bh15.1	Probable Female	Young Adult	Probable Female	Adult
Bh15.2	Probable Male	Young Adult	Male	Adult
Bh15.3	Probable Female	24	Probable Female	17-20
Bh15.4	Female	22	Female	17-20
Bh15.5	Female	20-22	Female	18-22
Bh15.7	Probable Female	26	Probable Male	Adult

See Figures H.6 and H.7

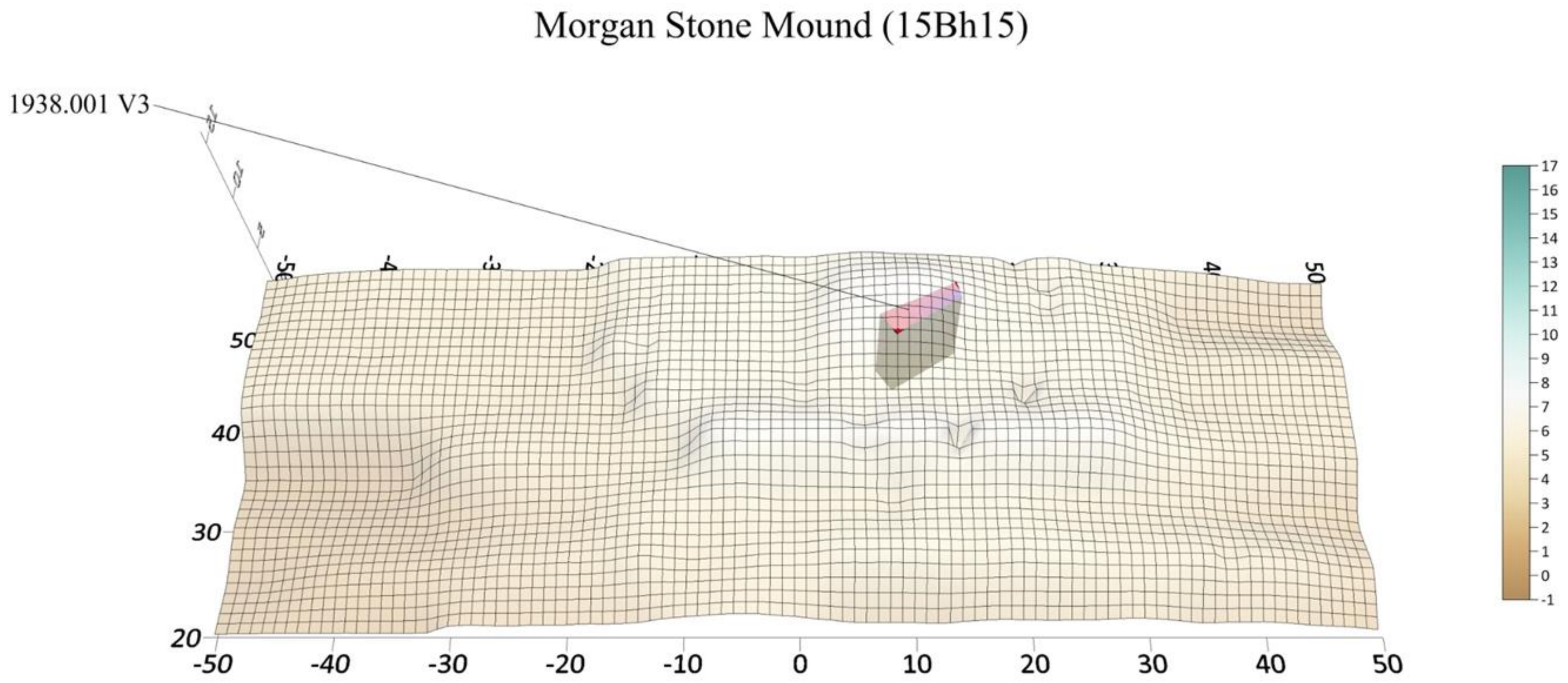


*Figure H.5***.** Morgan Stone Mound Sequence – 5. Location from which 1938.001 V3, a sample submitted for radiocarbon dating, was recovered.

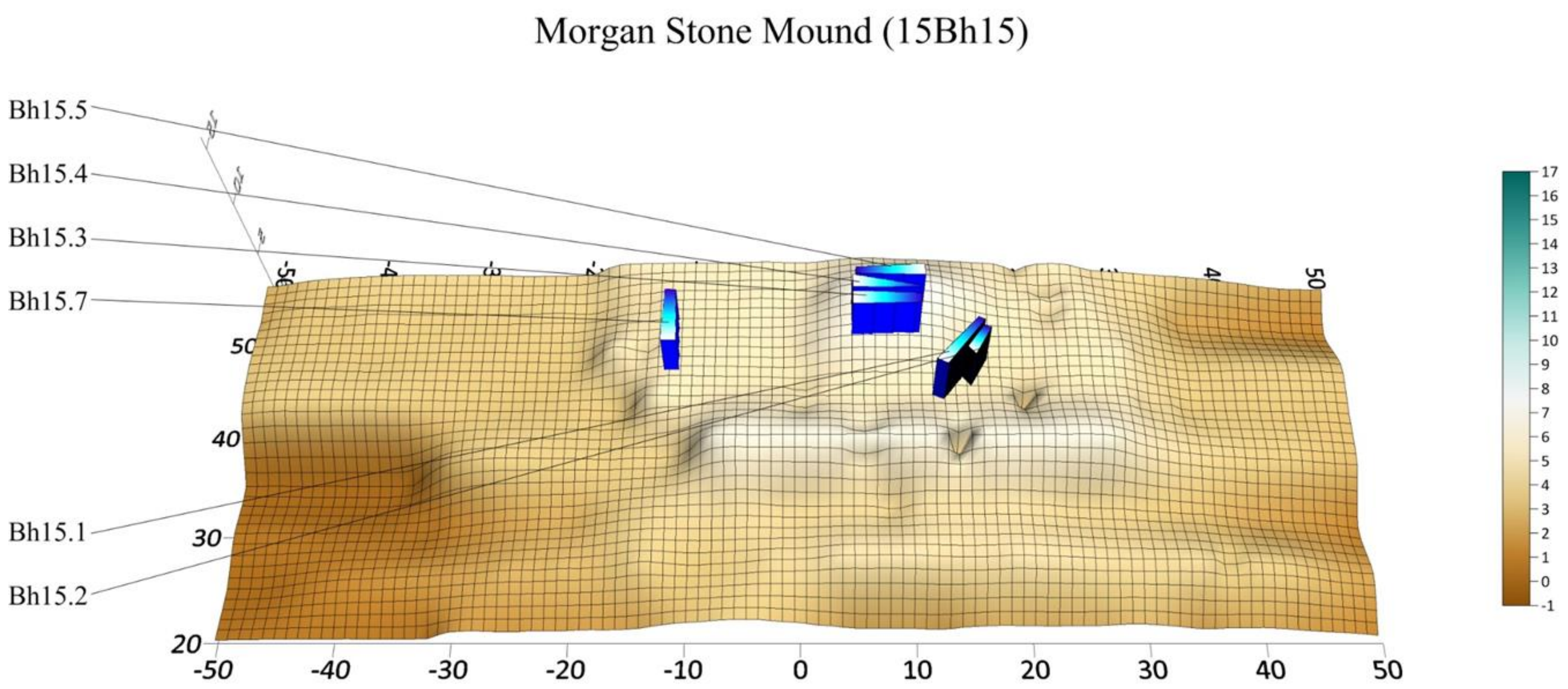


*Figure H.6***.** Morgan Stone Mound Sequence – 6. Placement of individuals Bh15.1, Bh15.2, Bh15.3, Bh15.4, Bh15.5, and Bh15.7 in the second episode of interment. These individuals were covered by the deposit of earth whose surface is depicted in Figure H.7.

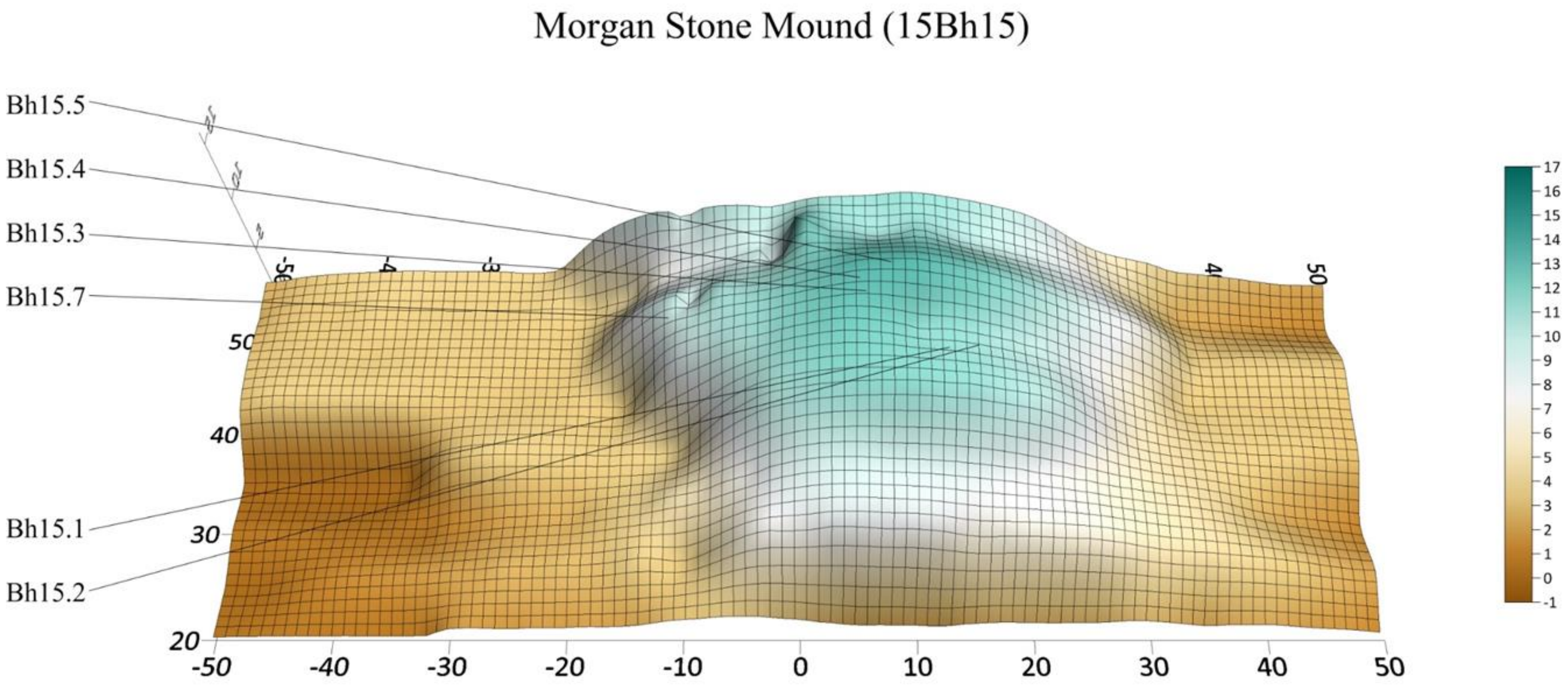


*Figure H.7***.** Morgan Stone Mound Sequence – 7. Mound surface after the deposition of earth covering the individuals in the second episode of interment.

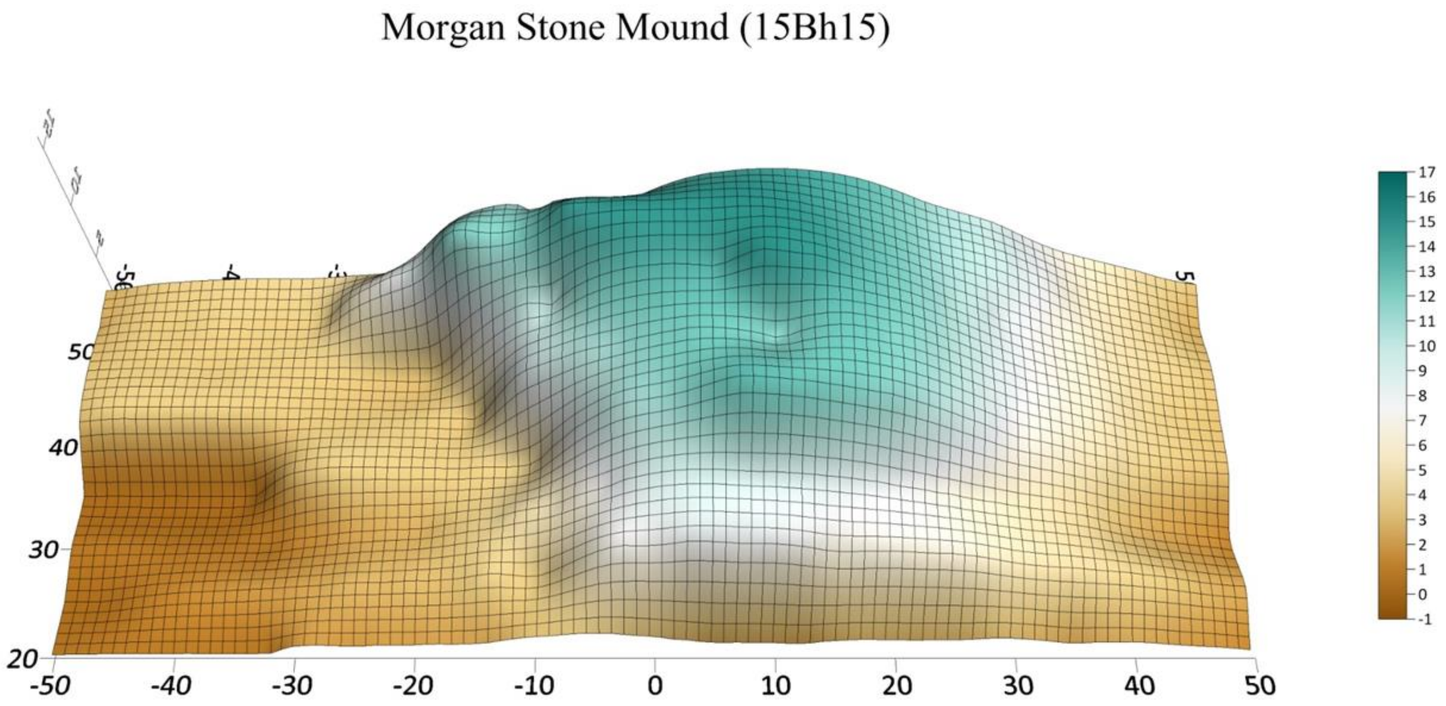


*Figure H.8***.** Morgan Stone Mound Sequence – 8. Mound surface after an additional deposit of earth, raising its overall elevation.

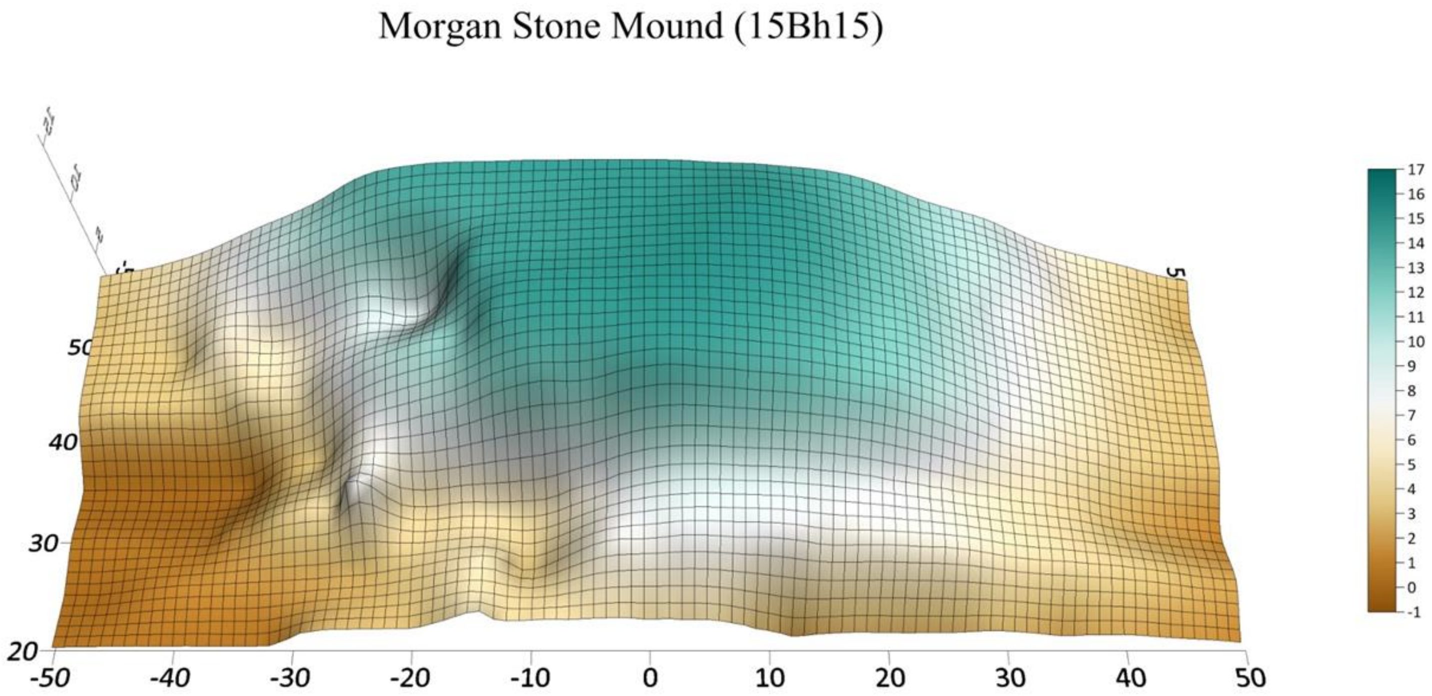


*Figure H.9***.** Morgan Stone Mound Sequence – 9. Mound surface after a deposit of earth that extended its western periphery. The inferior extent of a looter’s pit can be seen in the foreground (see also Figure H.11).

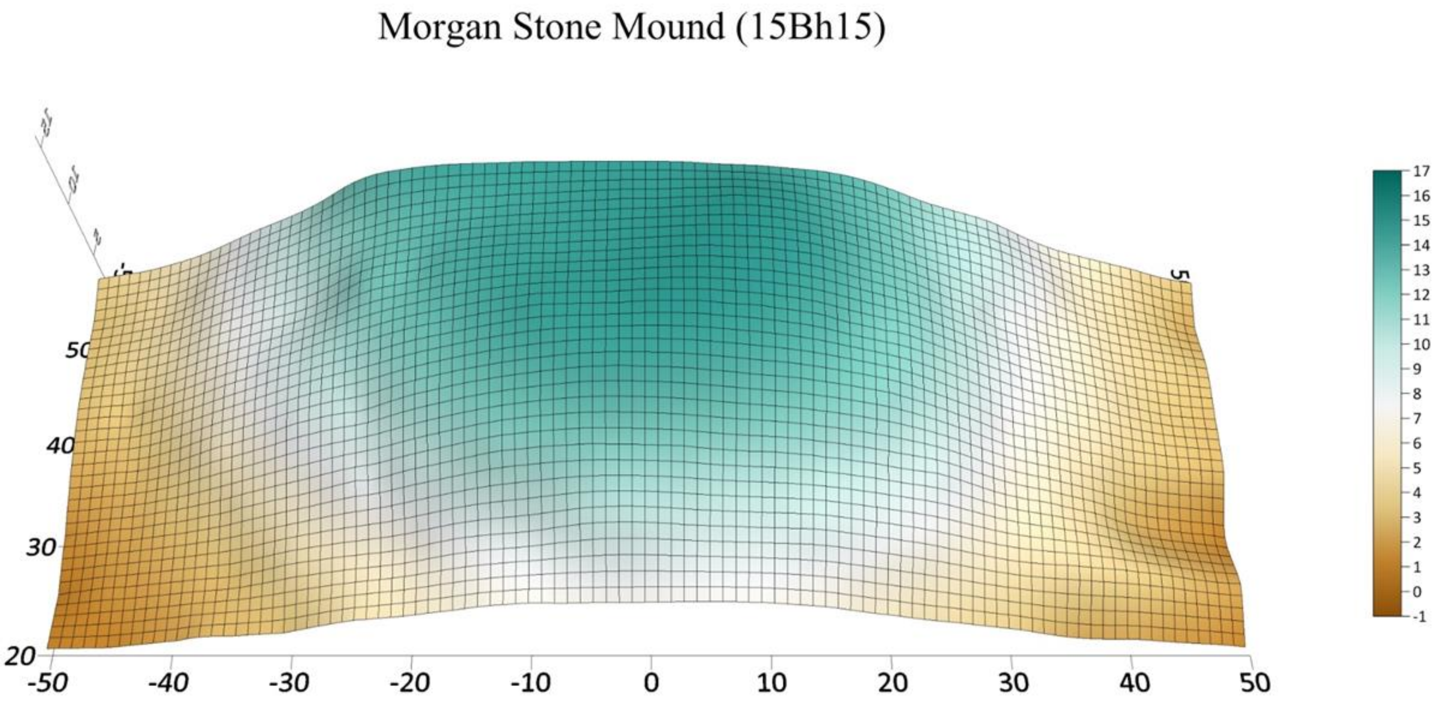


*Figure H.10***.** Morgan Stone Mound Sequence – 10. Estimated surface of mound at the time of it completion.

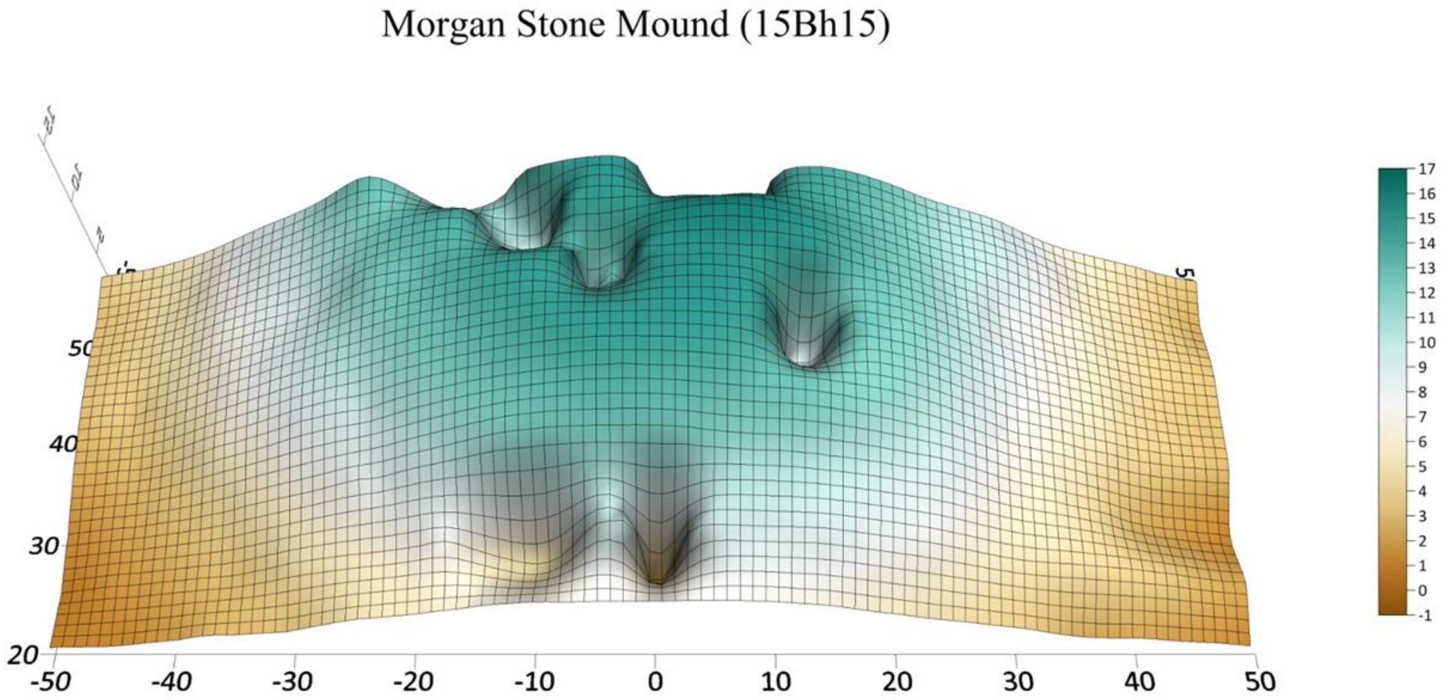


*Figure H.11***.** Morgan Stone Mound Sequence – 11. Historic looting pits excavated into the mound.

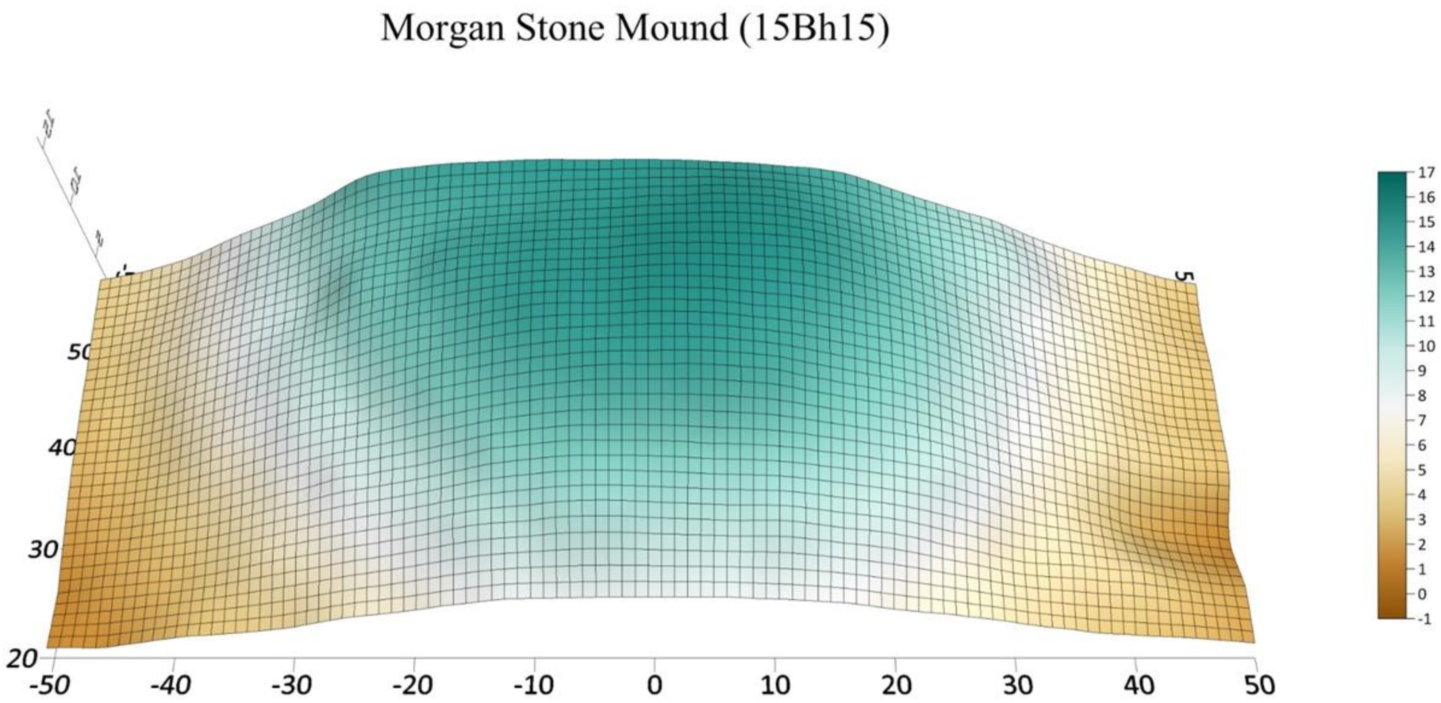


*Figure H.12***.** Morgan Stone Mound Sequence – 12. Surface of mound at the time of its excavation.

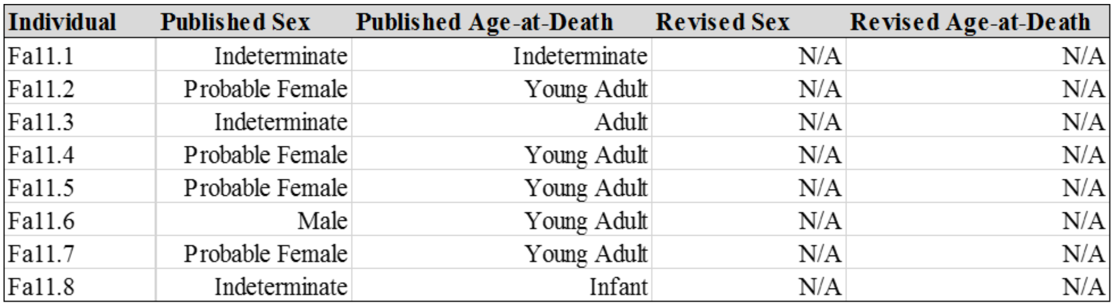
APPENDIX I

CONSTRUCTION SEQUENCE FOR THE DRAKE MOUND (15FA11)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Drake mound (15Fa11) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red.

Table I.1

Demographic Characteristics of Interment Episode 1



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Fa11.1	Indeterminate	Indeterminate	N/A	N/A
Fa11.2	Probable Female	Young Adult	N/A	N/A
Fa11.3	Indeterminate	Adult	N/A	N/A
Fa11.4	Probable Female	Young Adult	N/A	N/A
Fa11.5	Probable Female	Young Adult	N/A	N/A
Fa11.6	Male	Young Adult	N/A	N/A
Fa11.7	Probable Female	Young Adult	N/A	N/A
Fa11.8	Indeterminate	Infant	N/A	N/A

See Figure I.4

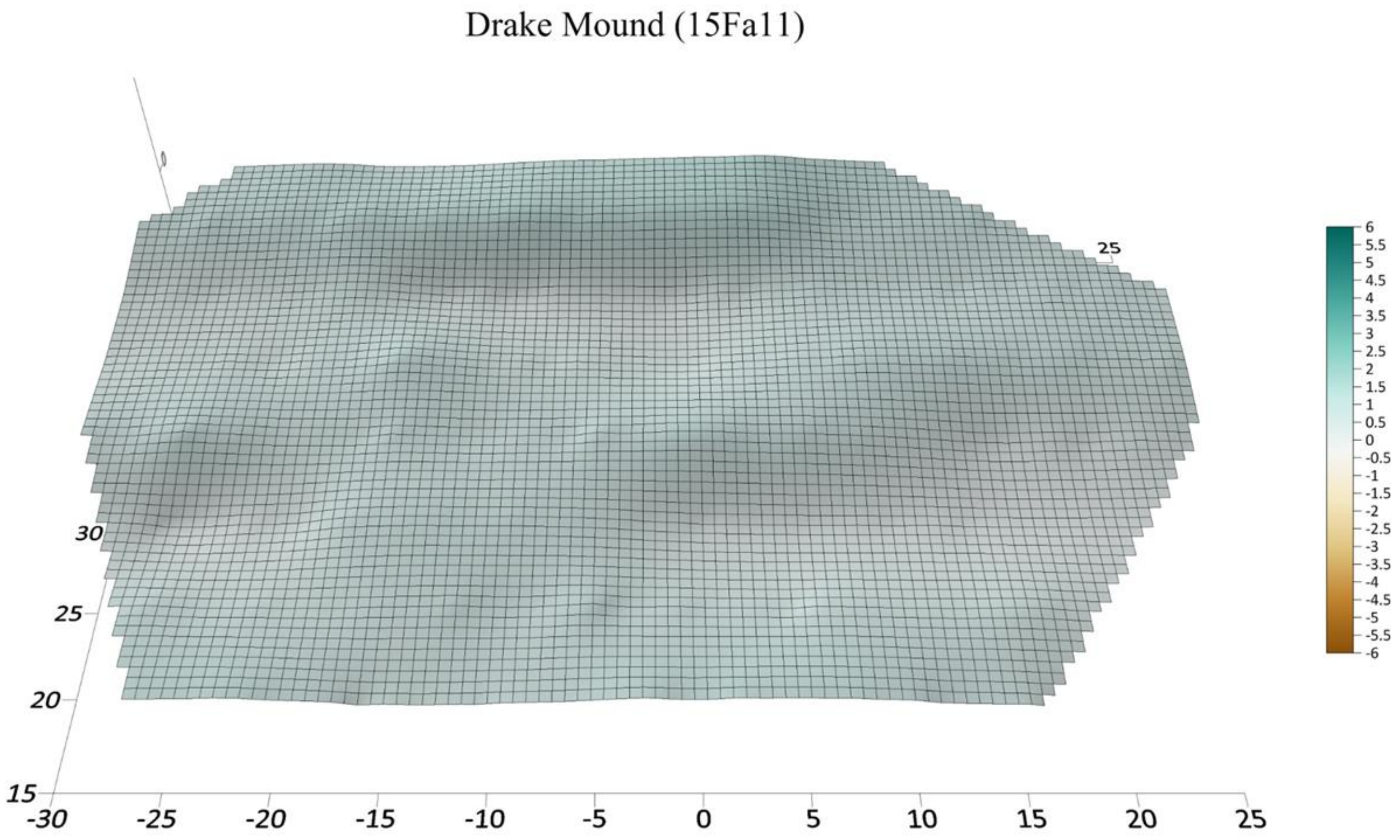
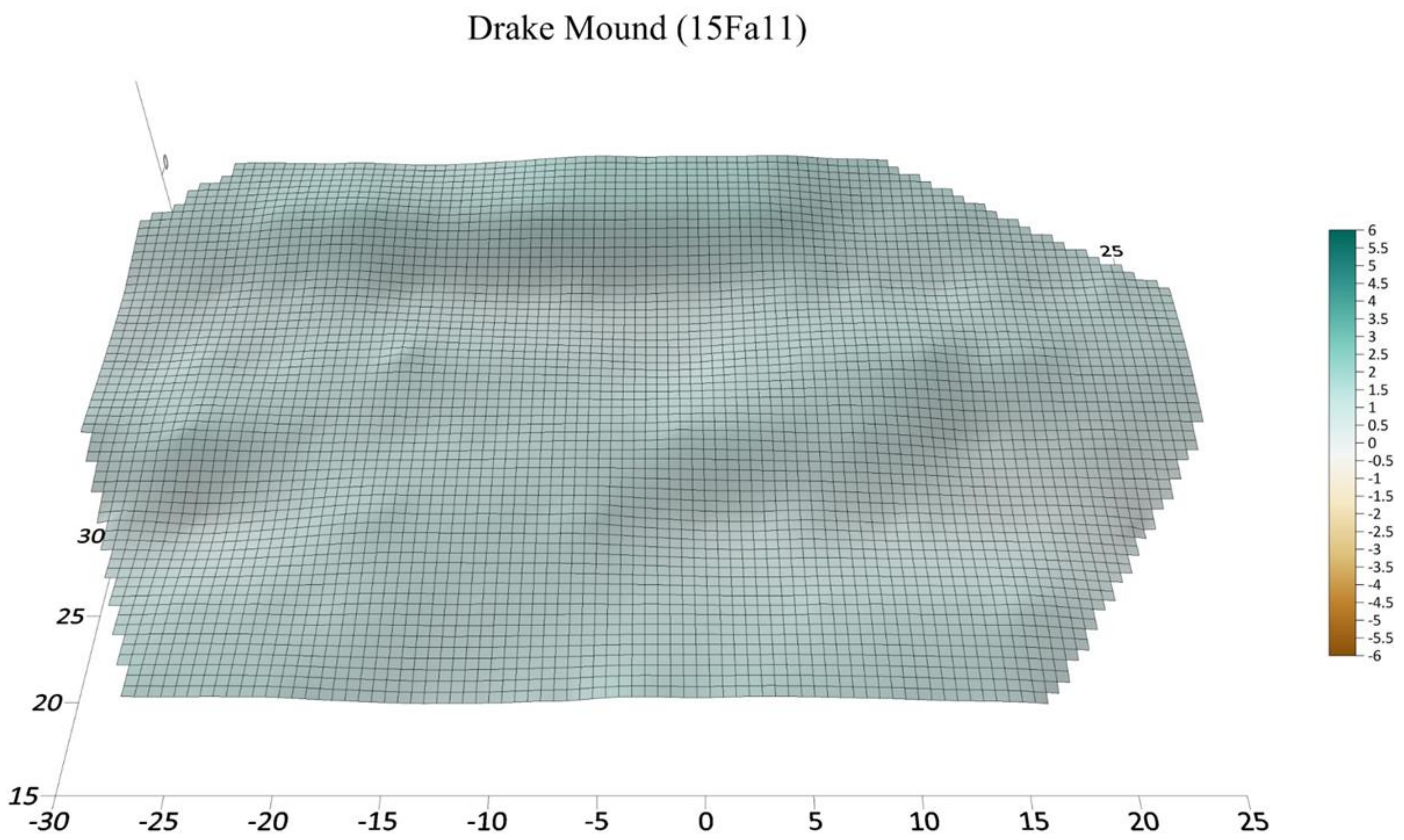

Drake Mound (15Fa11)

*Figure I.1***.** Drake Mound Sequence – 1. Undisturbed mound base.



Drake Mound (15Fa11)

*Figure I.2***.** Drake Mound Sequence – 2. Deposition of ‘old humus’ (‘OH’) layer.

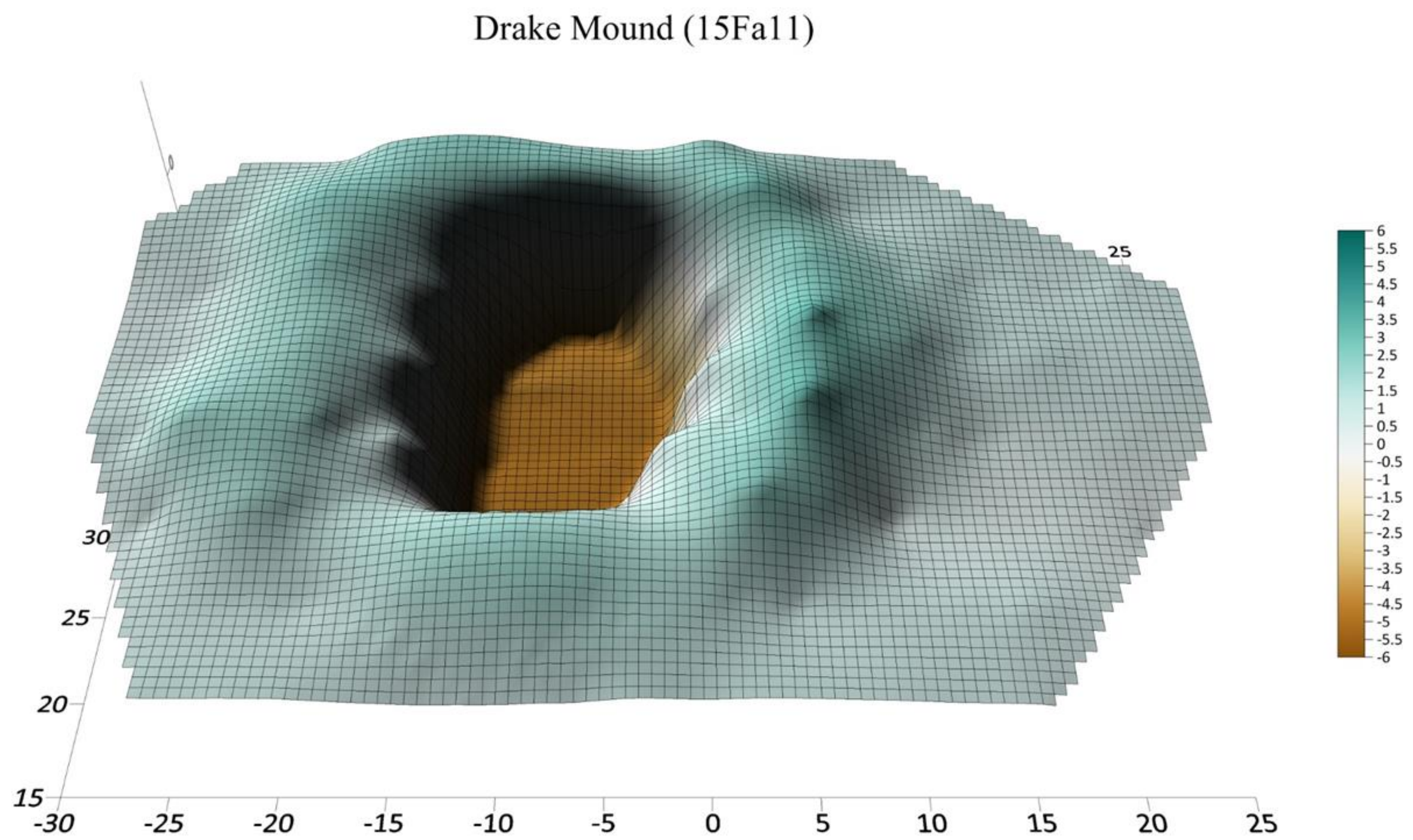


*Figure I.3***.** Drake Mound Sequence – 3. Excavation of the central pit and concomitant construction of the earthen embankment around it.

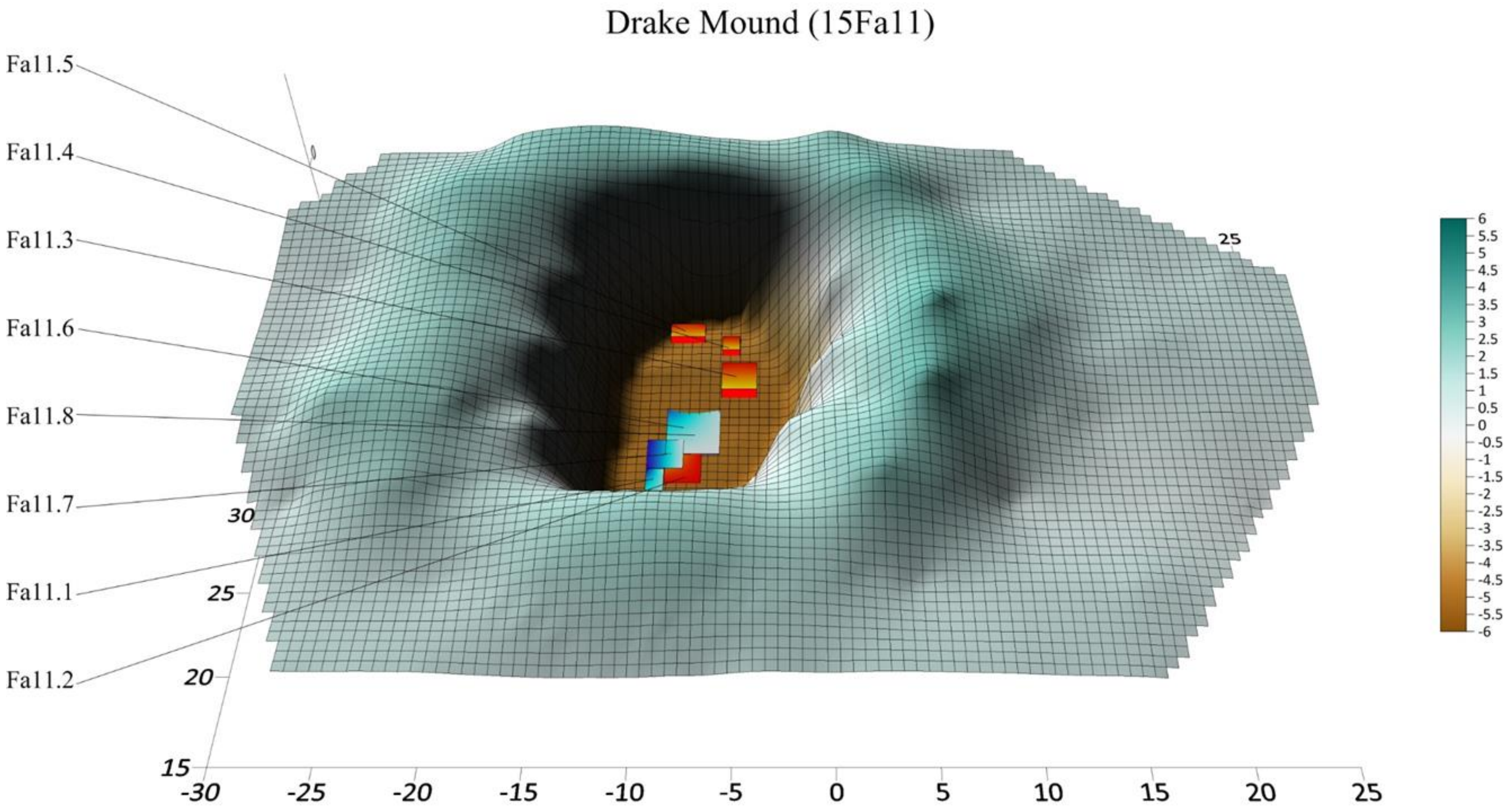


*Figure I.4***.** Drake Mound Sequence – 4. Placement of individuals Fa11.1, Fa11.2, Fa11.3, Fa11.4, Fa11.5, Fa11.6, Fa11.7, and Fa11.8 on the bottom of the central pit.

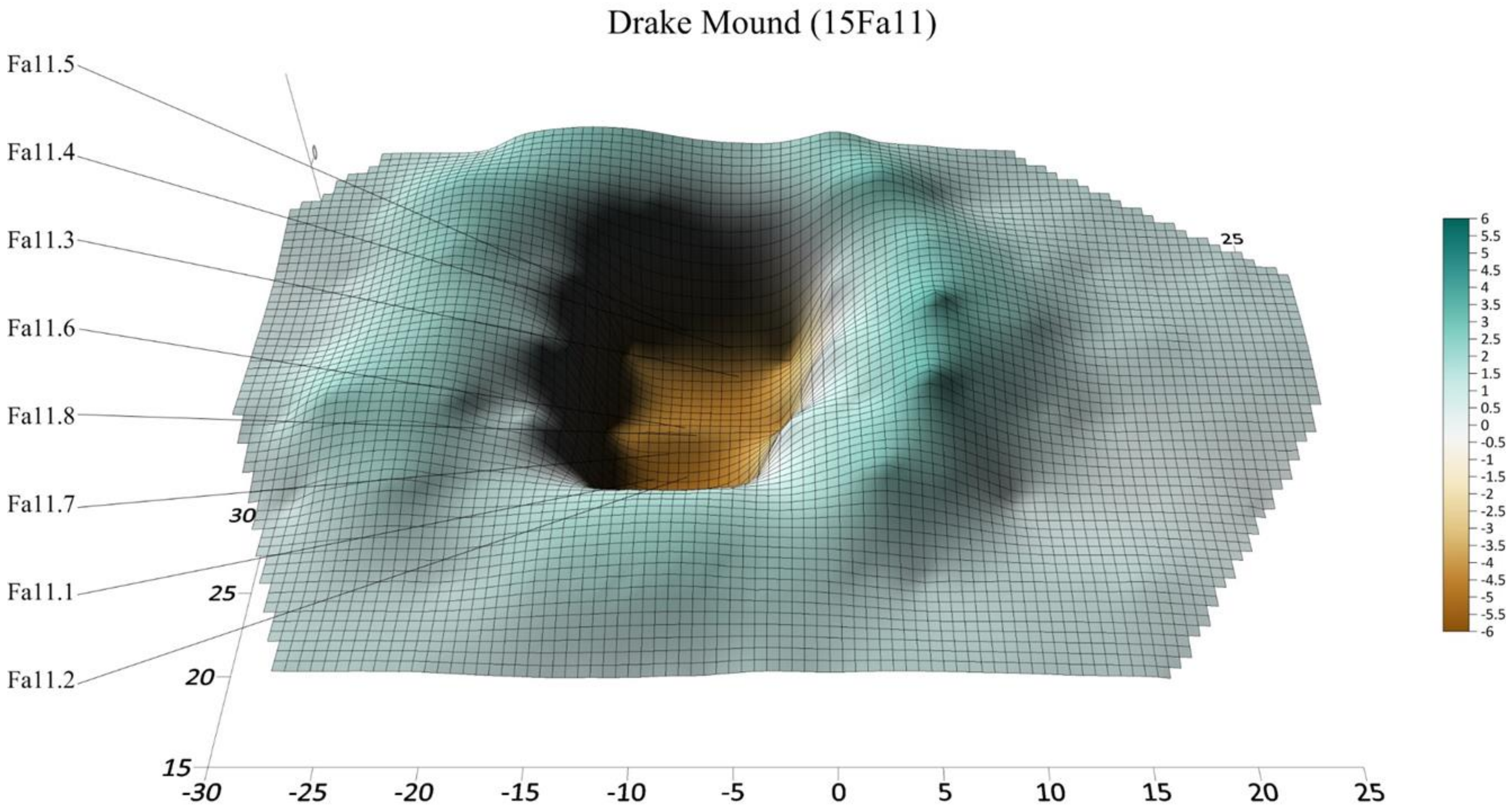


*Figure I.5***.** Drake Mound Sequence – 5. A thin layer of earth was placed over the interments at the bottom of the central pit.

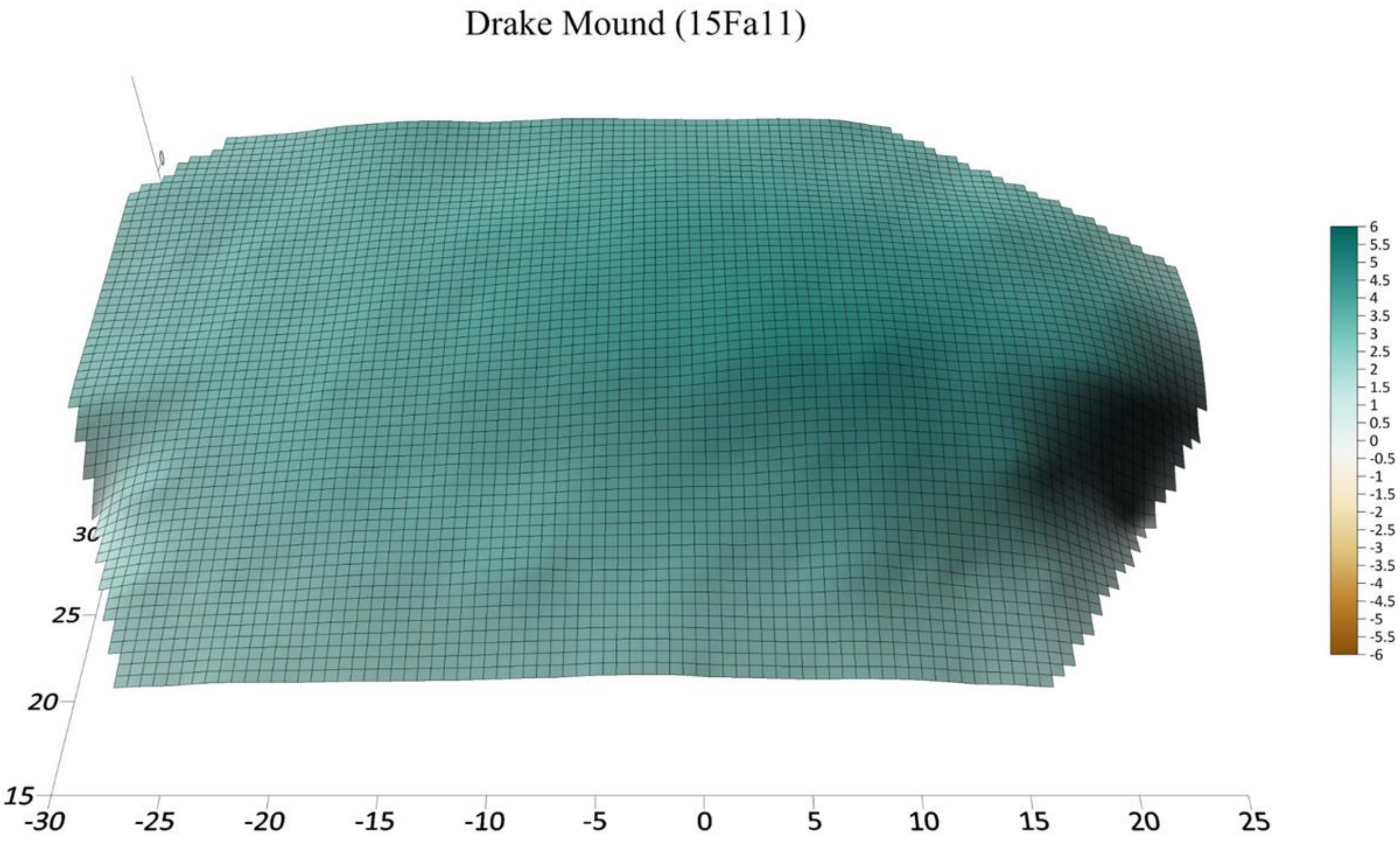


*Figure I.6***.** Drake Mound Sequence – 6. Surface of the mound at the time of excavation. The central pit and construction of the mound were apparently accomplished by the same episode of construction.

APPENDIX J

CONSTRUCTION SEQUENCE FOR THE FISHER SITE (15FA152)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Fisher site (15Fa152) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. Features considered by Webb to represent graves but which contained no skeletal remains are pictured in yellow.

Table J.1

Demographic Characteristics of Interment Episode 1

Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Fa152.4	Unrecorded	Unrecorded	N/A	N/A
Fa152.9	Unrecorded	Unrecorded	Indeterminate	> 14.5

See Figure J.2

Table J.2

Demographic Characteristics of Interment Episode 2 and Modified Human Bone

Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Fa152.1	Unrecorded	Unrecorded	Indeterminate	Indeterminate
Fa152.2	Indeterminate	Adult	Indeterminate	Adult
Fa152.3	Indeterminate	Indeterminate	N/A	N/A
Fa152.5	Unrecorded	Unrecorded	N/A	N/A
Fa152.6	Indeterminate	Indeterminate	N/A	N/A
Fa152.7	Indeterminate	Infant	Indeterminate	Infant
Fa152.8	Indeterminate	Infant	Indeterminate	2-5 months
Fa152.2a	Unrecorded	Unrecorded	Indeterminate	Adult
Fa152.2b	Unrecorded	Unrecorded	Indeterminate	Adult
Fa152.2c	Unrecorded	Unrecorded	Indeterminate	Adult
Fa152.2d	Unrecorded	Unrecorded	Indeterminate	Adult
Fa152.2e	Unrecorded	Unrecorded	Male	Adult
Fa152.2f	Unrecorded	Unrecorded	Male	Adult
Fa152.2g	Unrecorded	Unrecorded	Indeterminate	Adult
Fa152.2h	Unrecorded	Unrecorded	Male	Adult
Fa152.3a	Unrecorded	Unrecorded	N/A	N/A
Fa152.3b	Unrecorded	Unrecorded	Indeterminate	Indeterminate

See Figure J.3

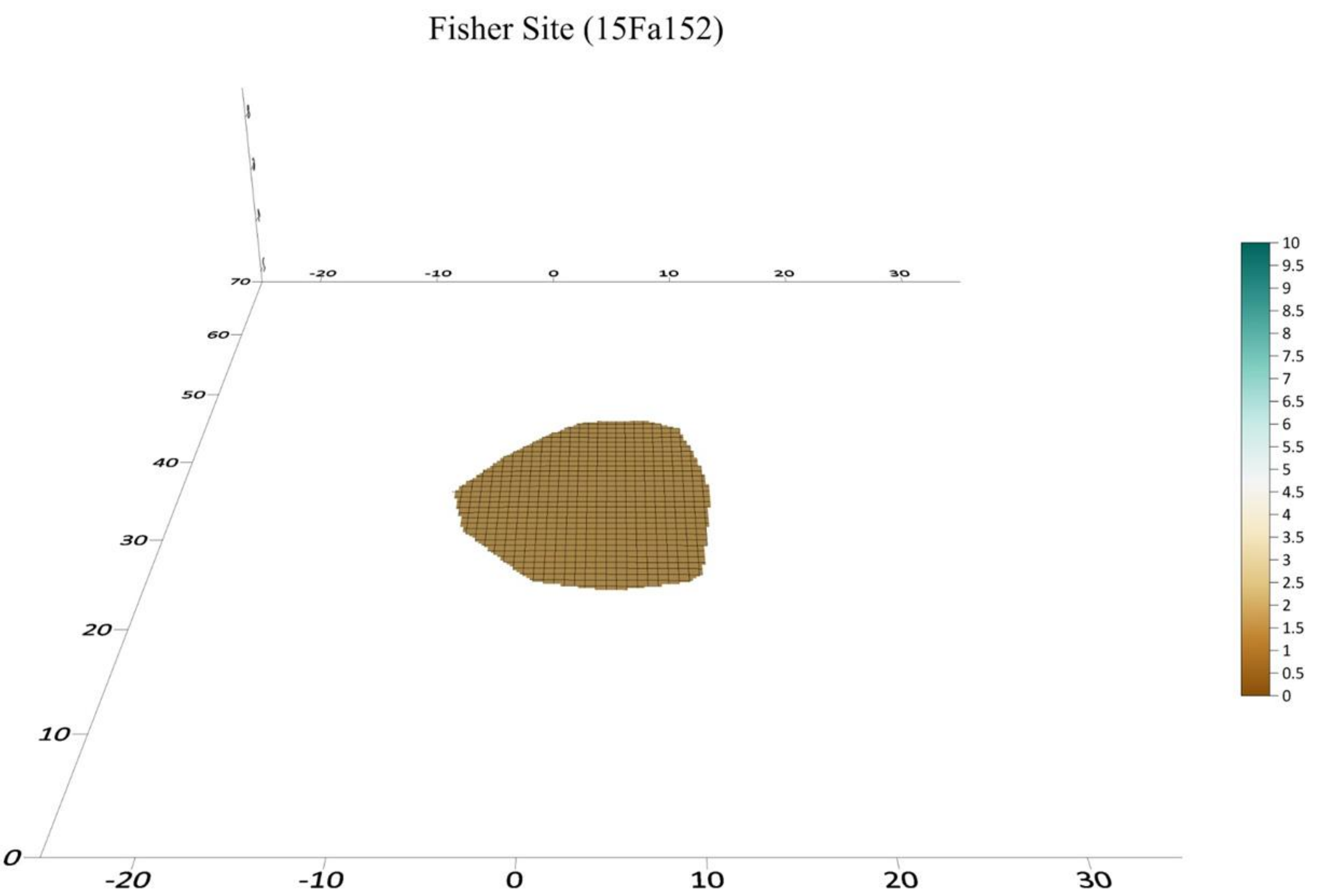


*Figure J.1***.** Fisher Site Sequence – 1. Horizontal extent of the ‘floor area’ designated by Webb and Haag (1947).

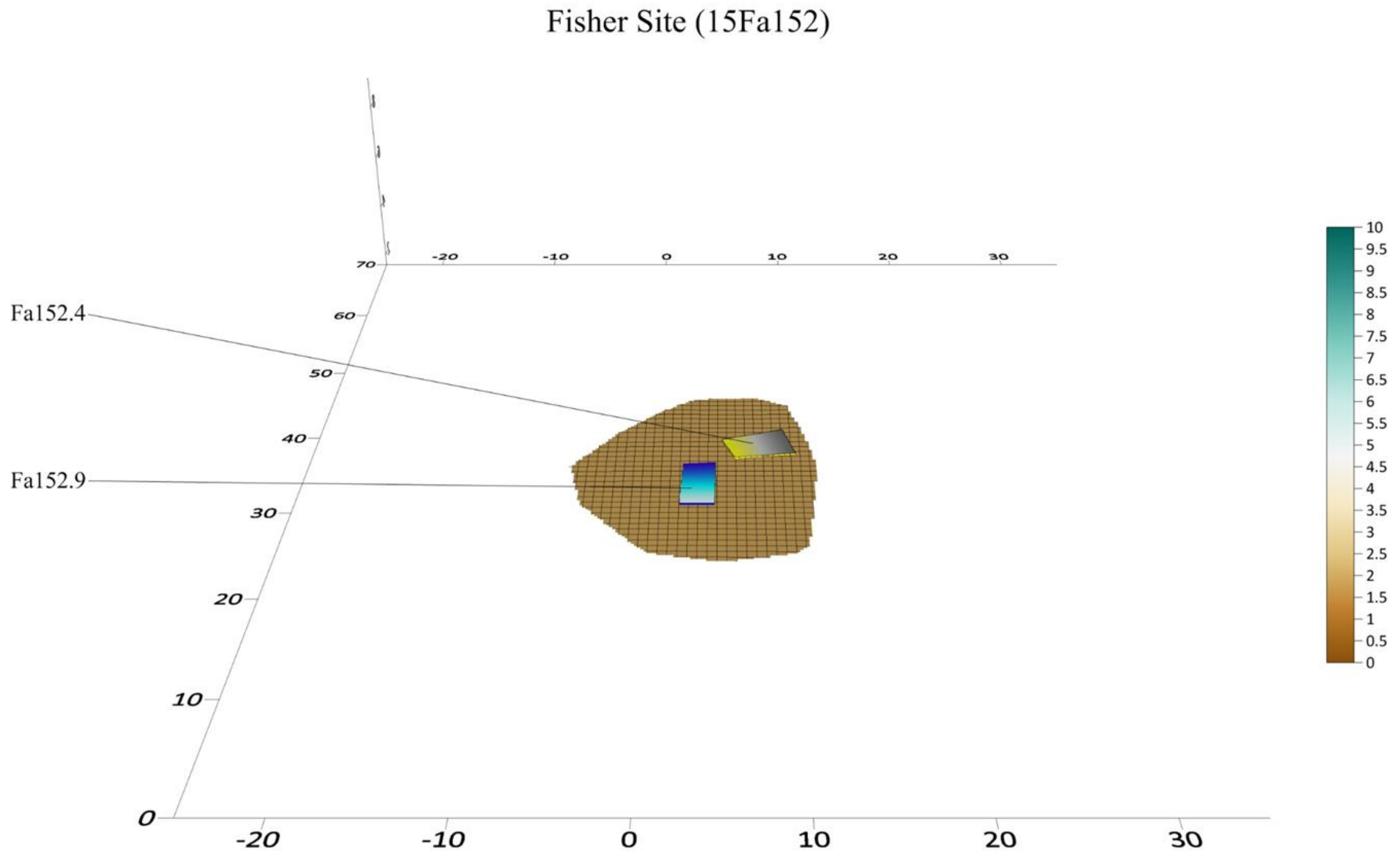


*Figure J.2***.** Fisher Site Sequence – 2. Placement of individual Fa152.9 and assumed burial Fa152.4 on floor area in first episode of interment.

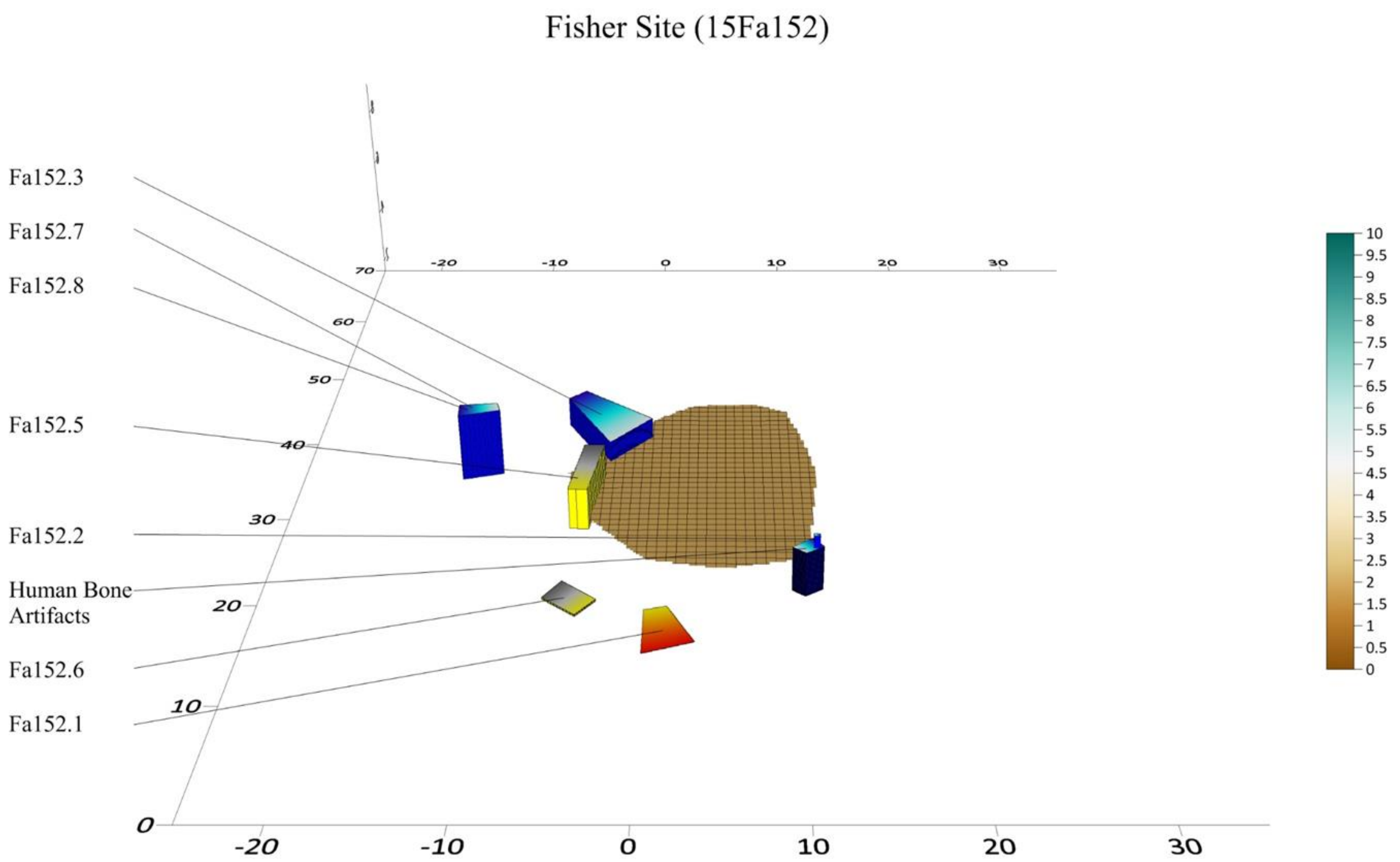


*Figure J.3***.** Fisher Site Sequence – 3. Placement of Fa152.1, Fa152.2, Fa152.3, Fa152.5, Fa152.6, Fa152.7, and Fa152.8 as well as modified human bone artifacts in the second episode of interment. These individuals were interred peripheral to the prepared floor and within the mound fill.

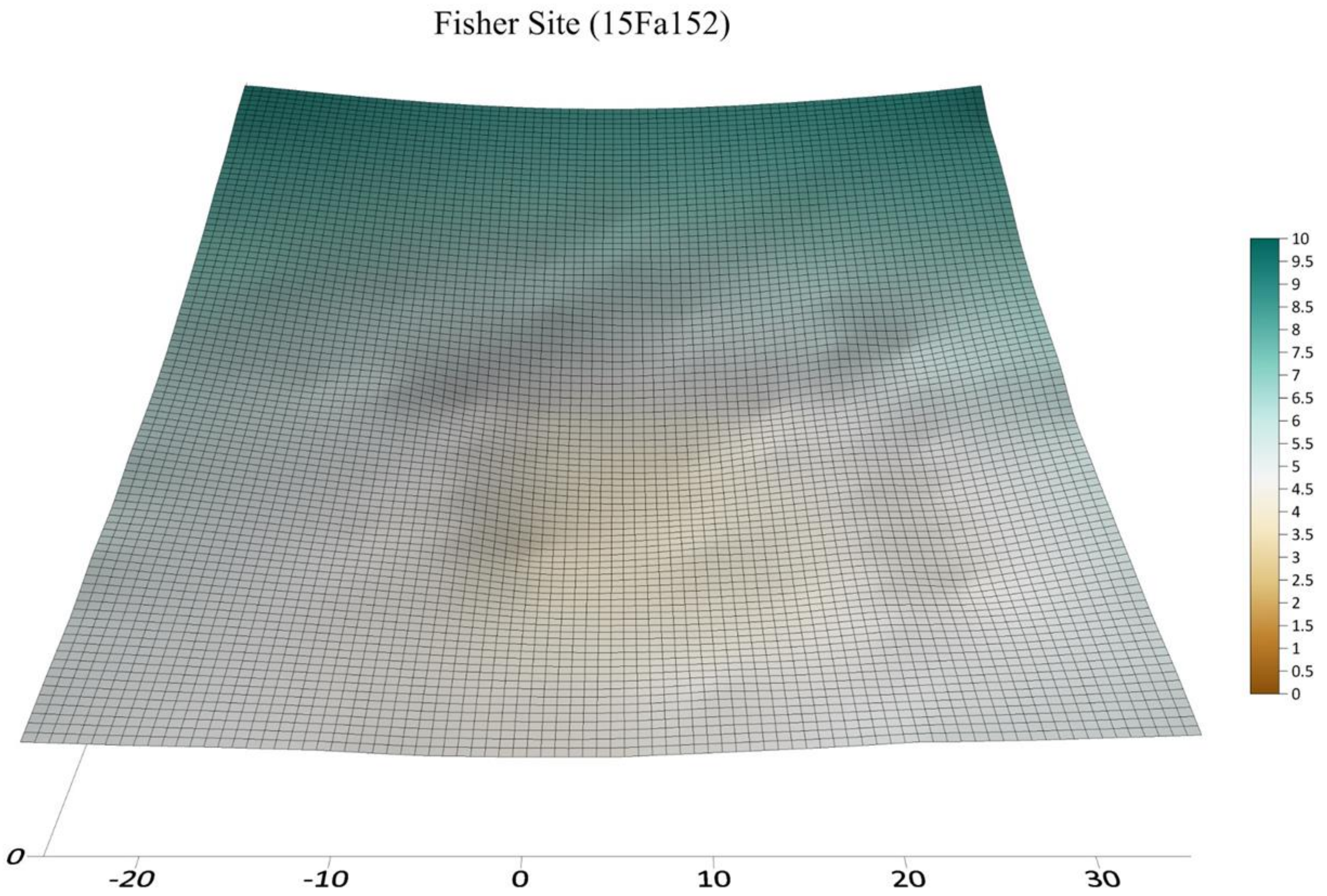


*Figure J.4***.** Fisher Site Sequence – 4. Surface of the Fisher site at the time of its excavation. Note central depression overlying the prepared floor and the interment of Fa152.9 (see Figure J.5). This likely represents a prior excavation known to have taken place in 1870.

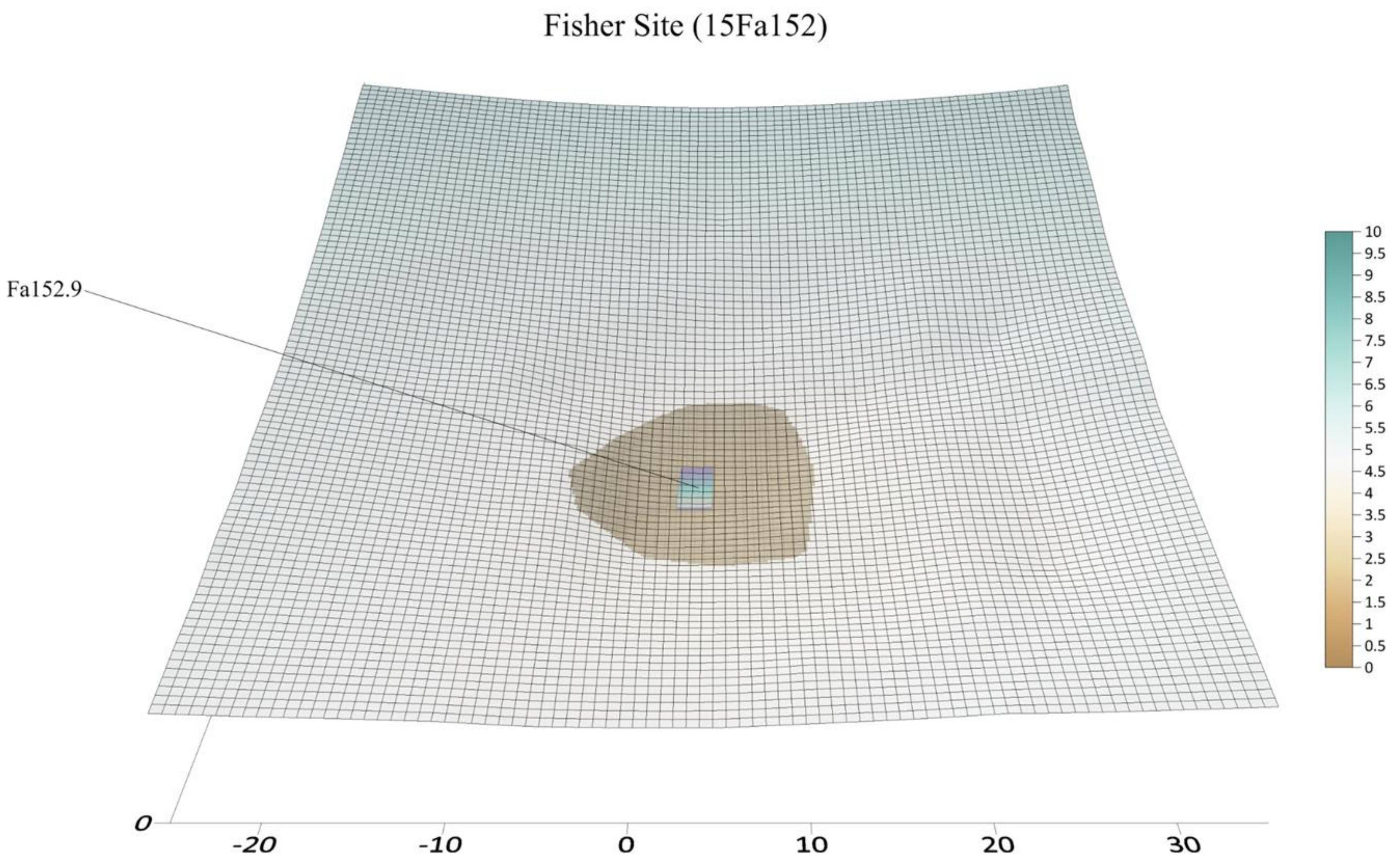


*Figure J.5***.** Fisher Site Sequence – 5. Surface of the site rendered transparent to illustrate relative positions of the depression on the site's surface and the location of Fa152.9 on the prepared floor.

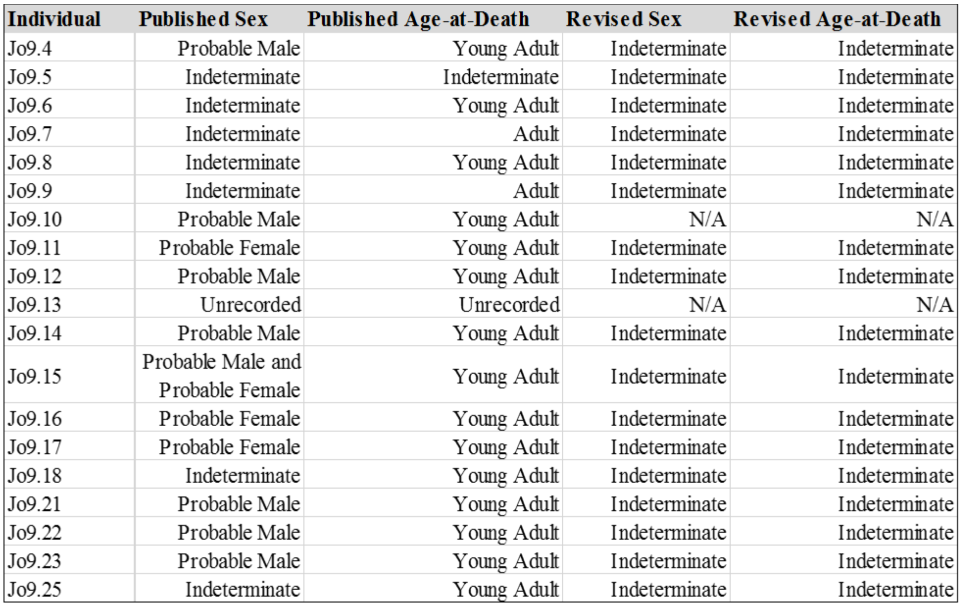
APPENDIX K

CONSTRUCTION SEQUENCE FOR THE C&O MOUND (15JO9)

The purpose of this appendix is to provide visual representations of the sequence of construction for the larger C & O mound (15Jo9) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. Features relevant to the mound contours but which did not contain skeletal remains are pictured in yellow.

Table K.1

Demographic Characteristics of Interment Episode 1

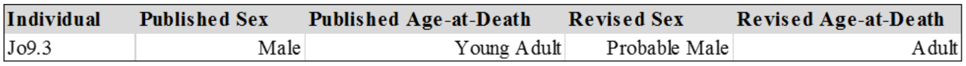


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Jo9.4	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.5	Indeterminate	Indeterminate	Indeterminate	Indeterminate
Jo9.6	Indeterminate	Young Adult	Indeterminate	Indeterminate
Jo9.7	Indeterminate	Adult	Indeterminate	Indeterminate
Jo9.8	Indeterminate	Young Adult	Indeterminate	Indeterminate
Jo9.9	Indeterminate	Adult	Indeterminate	Indeterminate
Jo9.10	Probable Male	Young Adult	N/A	N/A
Jo9.11	Probable Female	Young Adult	Indeterminate	Indeterminate
Jo9.12	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.13	Unrecorded	Unrecorded	N/A	N/A
Jo9.14	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.15	Probable Male and Probable Female	Young Adult	Indeterminate	Indeterminate
Jo9.16	Probable Female	Young Adult	Indeterminate	Indeterminate
Jo9.17	Probable Female	Young Adult	Indeterminate	Indeterminate
Jo9.18	Indeterminate	Young Adult	Indeterminate	Indeterminate
Jo9.21	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.22	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.23	Probable Male	Young Adult	Indeterminate	Indeterminate
Jo9.25	Indeterminate	Young Adult	Indeterminate	Indeterminate

See Figures K.2 and K.3

Table K.2

Demographic Characteristics of Interment Episode 2



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Jo9.3	Male	Young Adult	Probable Male	Adult

See Figures K.4 through K.6

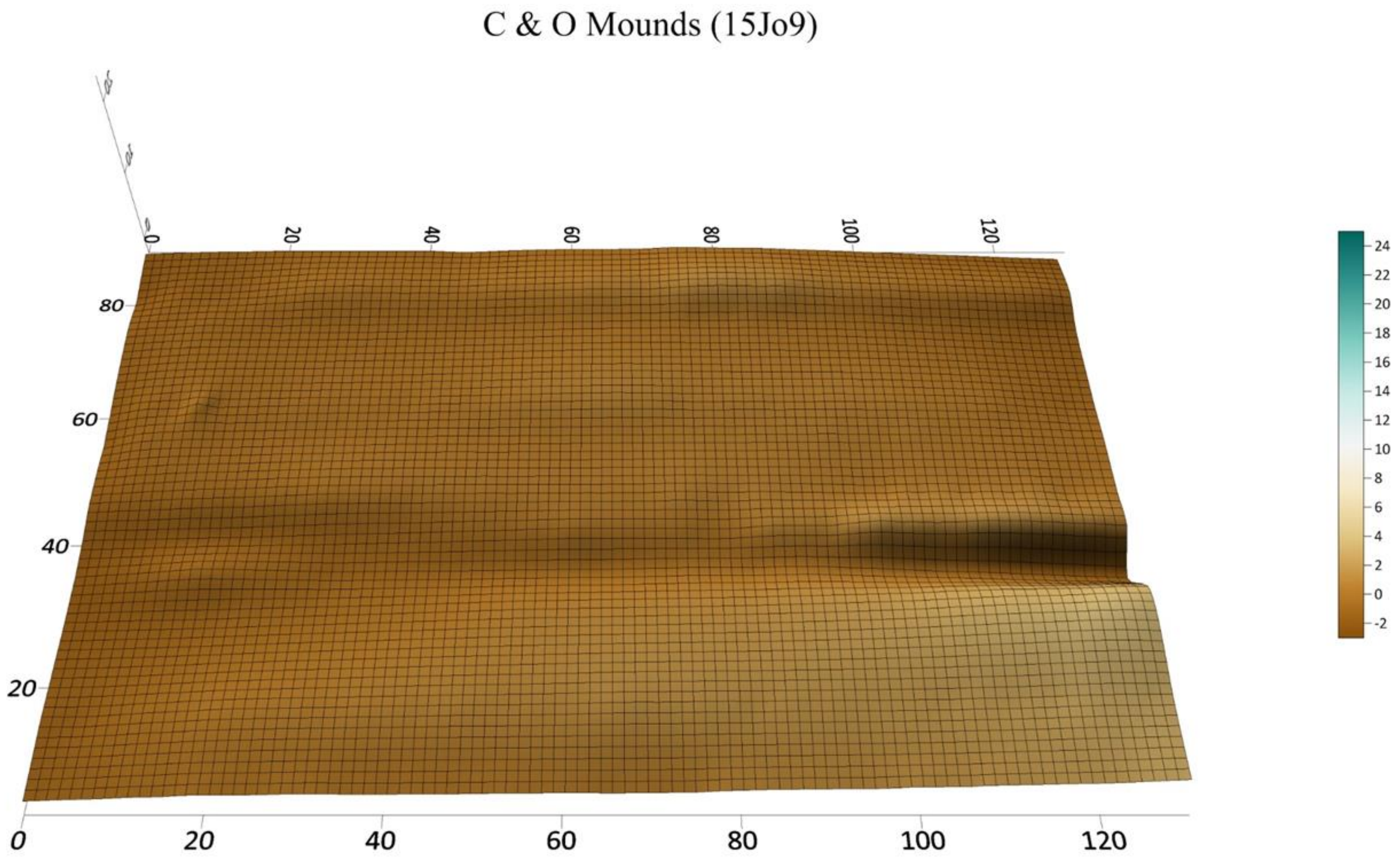


*Figure K.1***.** C & O Mound Sequence – 1. Hardpan underlying the mound. Note the trough at the 35 foot profile. This offset continues through all stratigraphic layers and appears to result from an error in the original profile map.

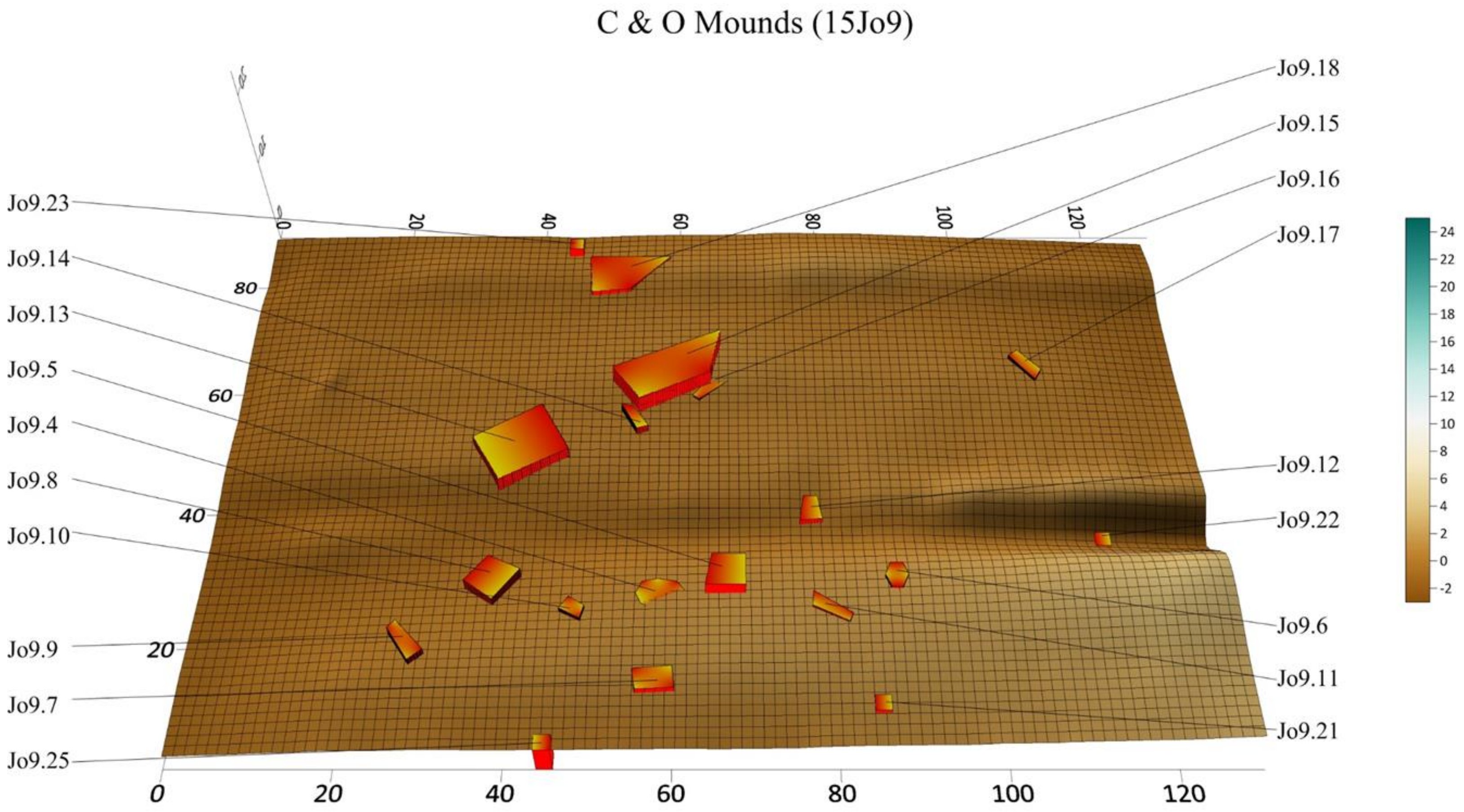


*Figure K.2***.** C & O Mound Sequence – 2. Placement of cremations in first interment episode. It was not possible to discern from the available information whether these pre-date the deposition of the ‘old humus’ (‘OH’) layer (see Figure K.3), were excavated through it, or represent a combination of the two. As such, they are treated as a single interment episode.

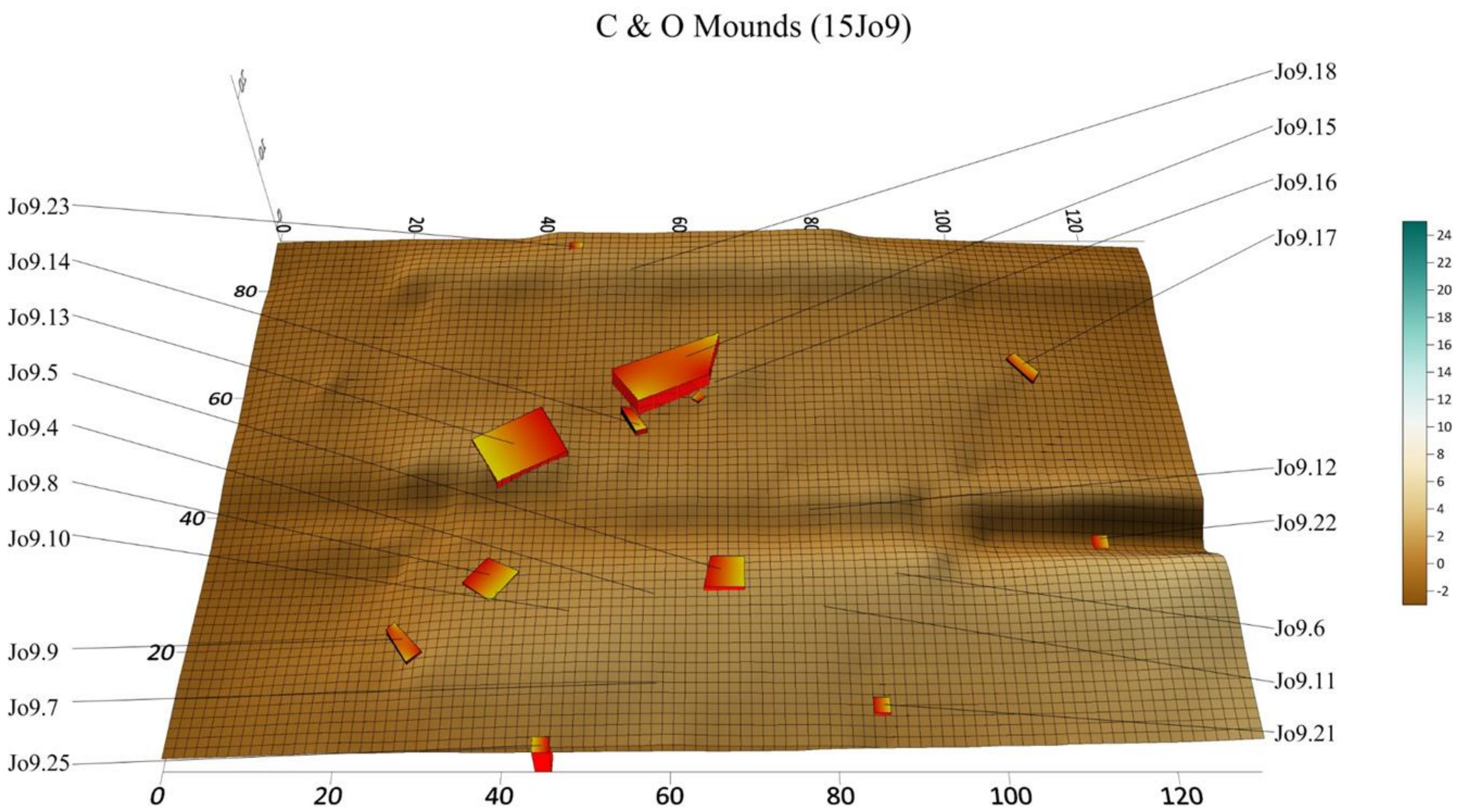

C & O Mounds (15Jo9)

*Figure K.3***.** C & O Mound Sequence – 3. Deposit of the OH layer. It is likely that this layer is anthropogenic given the midden materials noted by Webb (1942).

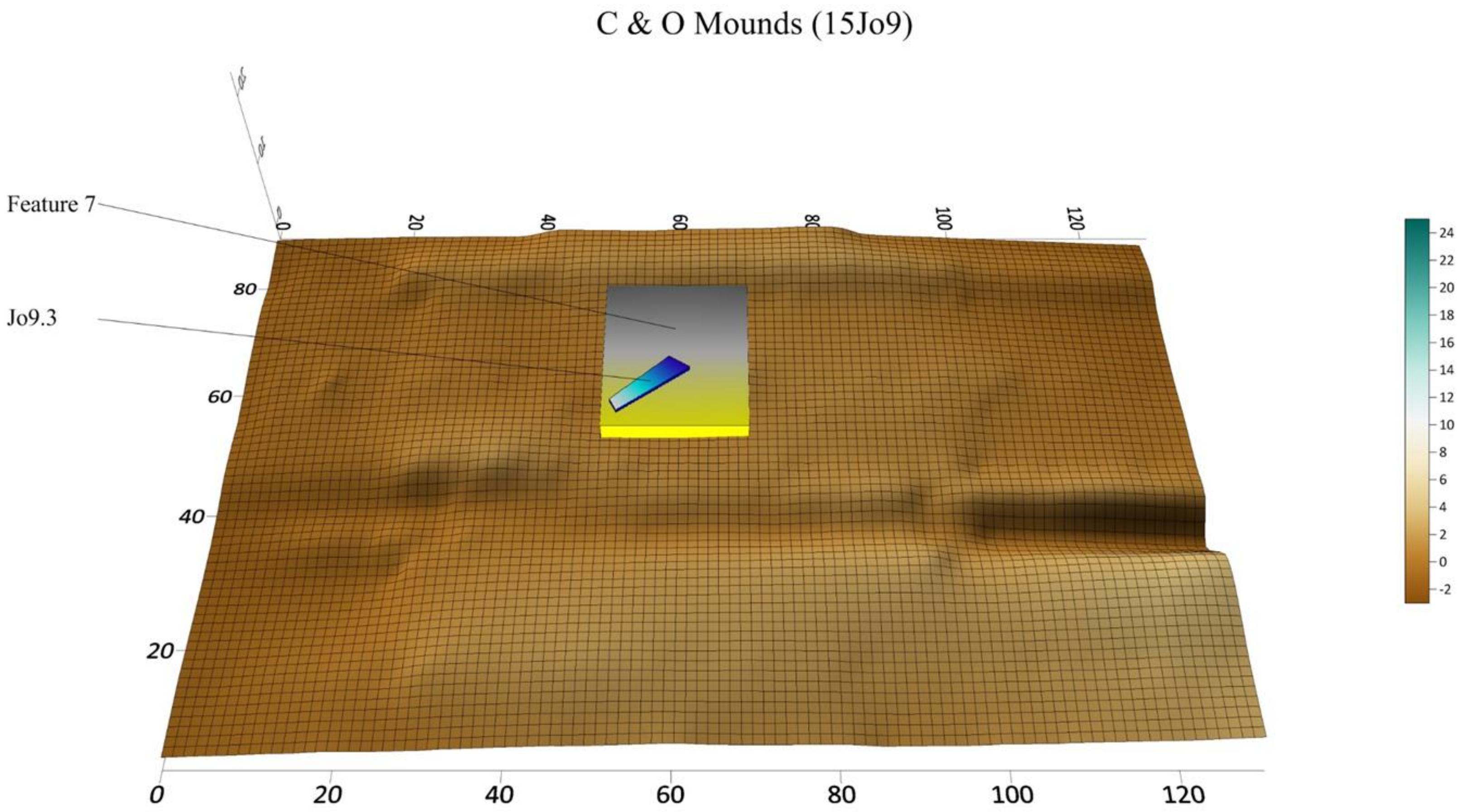


*Figure K.4***.** C & O Mound Sequence – 4. Position of Feature 7 (a log tomb) with the placement of Jo9.3 in its own tomb above it. This individual represents the second episode of interment.

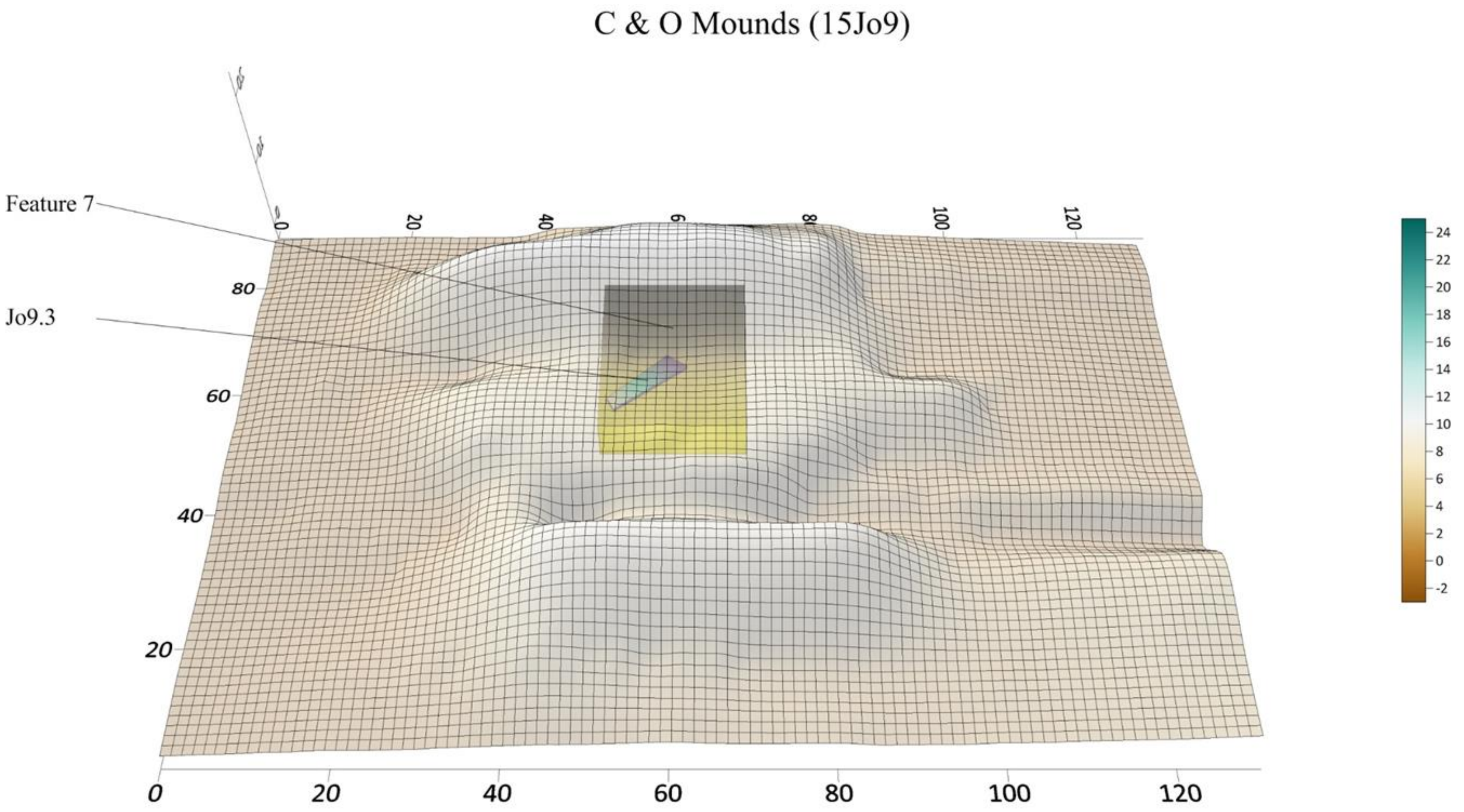


*Figure K.5***.** C & O Mound Sequence – 5. Initial phase of mound construction, apparently built to cover Feature 7 and the tomb containing Jo9.3. Surface has been rendered transparent in order to better visualize the placement of these features within the fill.

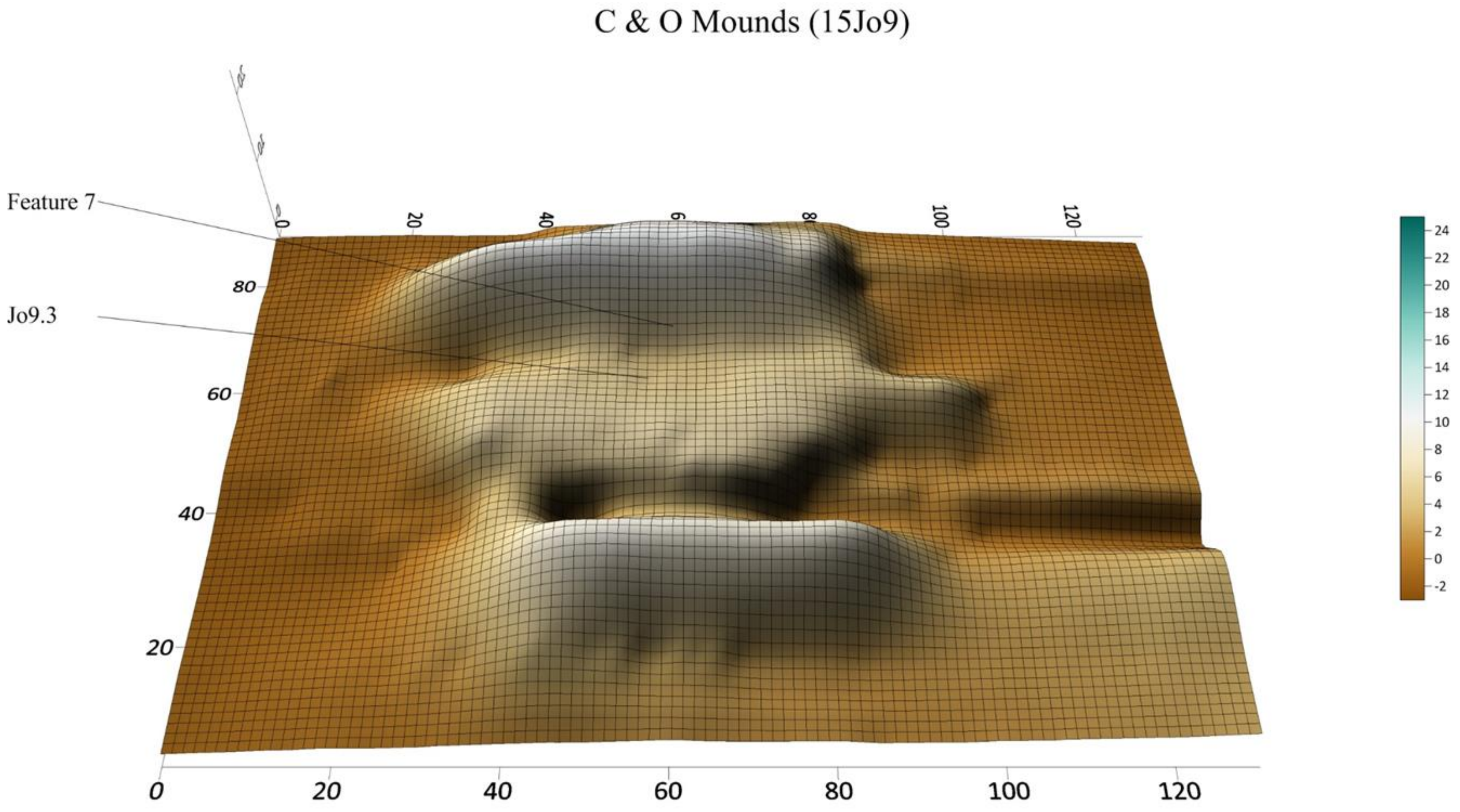


*Figure K.6***.** C & O Mound Sequence – 6. Surface after initial phase of mound construction.

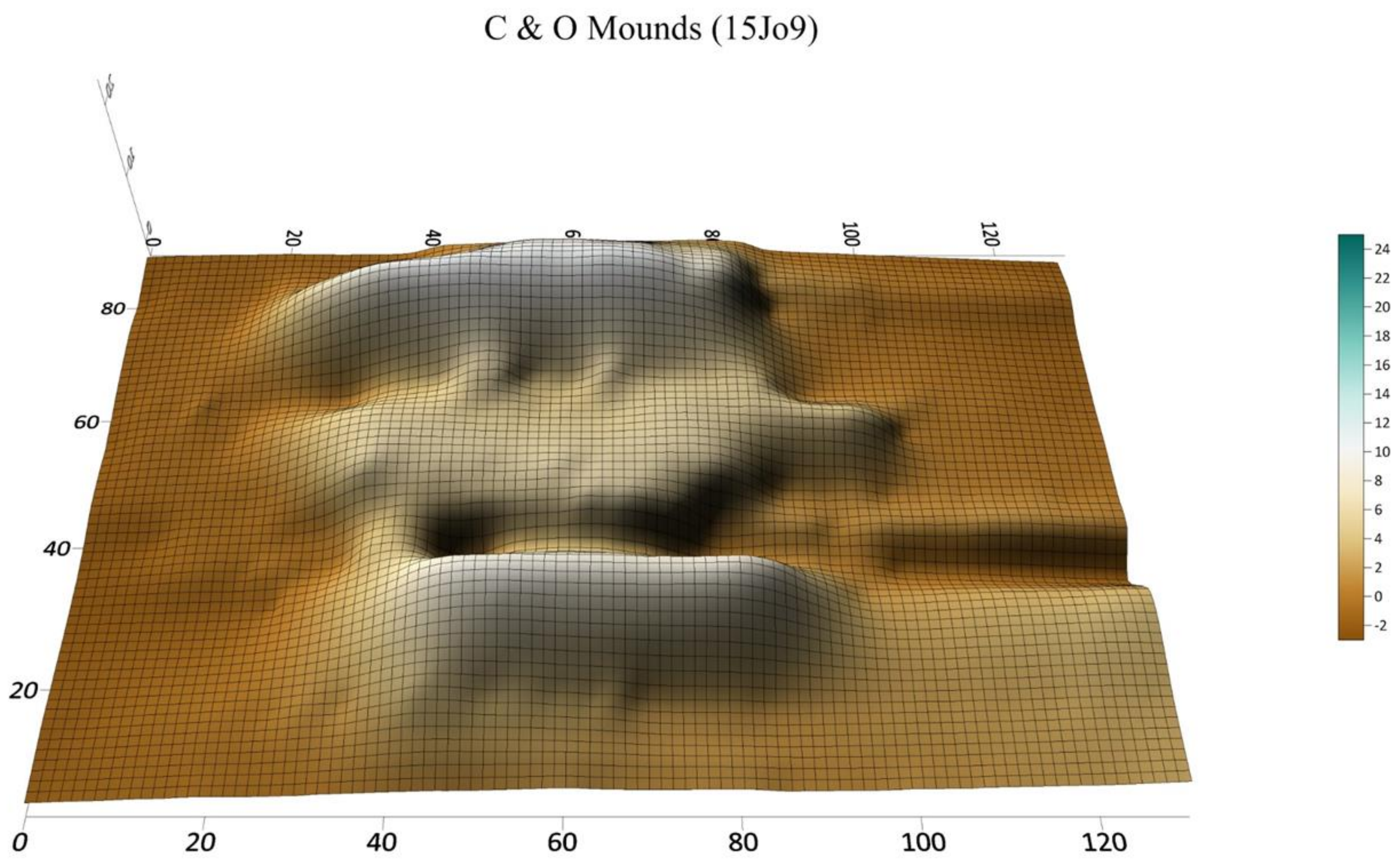
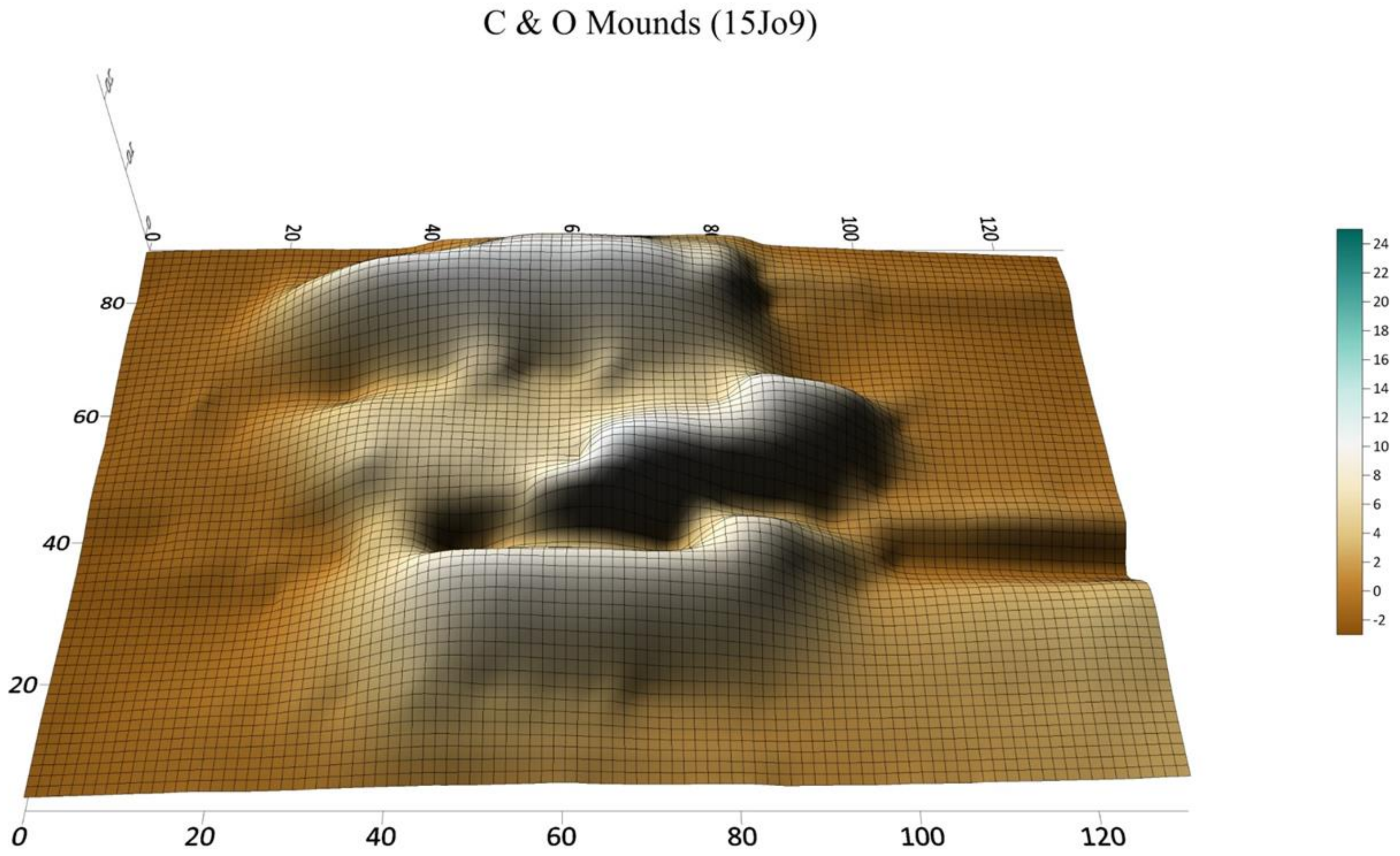


*Figure K.7***.** C & O Mound Sequence – 7. Surface is modified by the deposition of small amounts of earth on the level platform in the middle of the mound.



C & O Mounds (15Jo9)

*Figure K.8***.** C & O Mound Sequence – 8. Surface after the construction of an embankment on the eastern half of the middle section of the mound.

Table K.3

Demographic Characteristics of Interment Episode 3

Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Jo9.1	Probable Male	14-16	Indeterminate	12-18
Jo9.2	Probable Female	Adult	Indeterminate	Indeterminate

See Figures K.9 and K.10

Table K.4

Demographic Characteristics of Interment Episode 4

Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Jo9.19	Unrecorded	Young Adult	N/A	N/A

See Figures K.11 and K.12

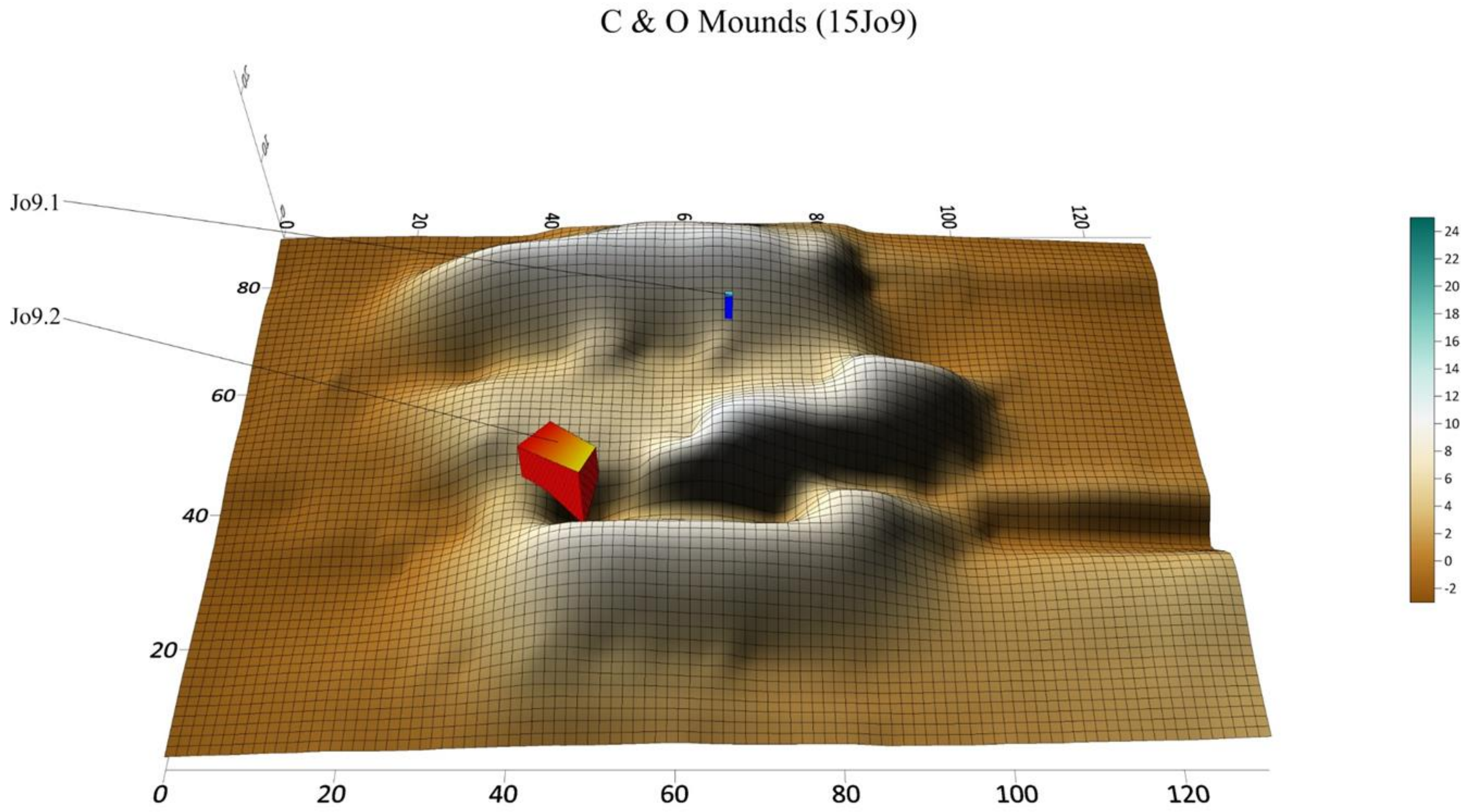


*Figure K.9***.** C & O Mound Sequence – 9. Placement of individuals Jo9.1 and Jo9.2 within the second interment episode.

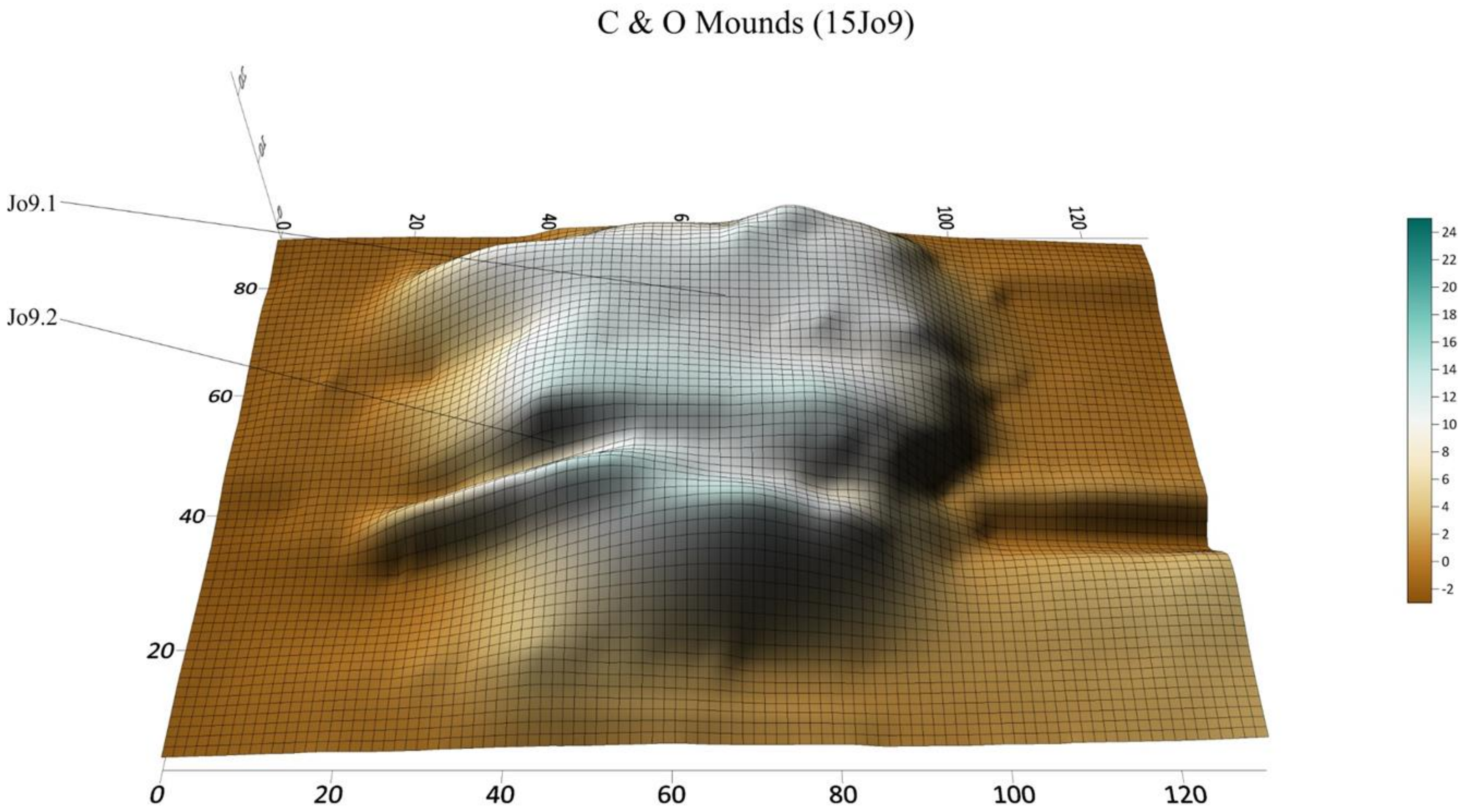


*Figure K.10***.** C & O Mound Sequence – 10. Mound surface after deposit of earth covering the second interment episode. Note the flattened superior aspect, filling in the prior cavity between the northern and southern margins of the mound.

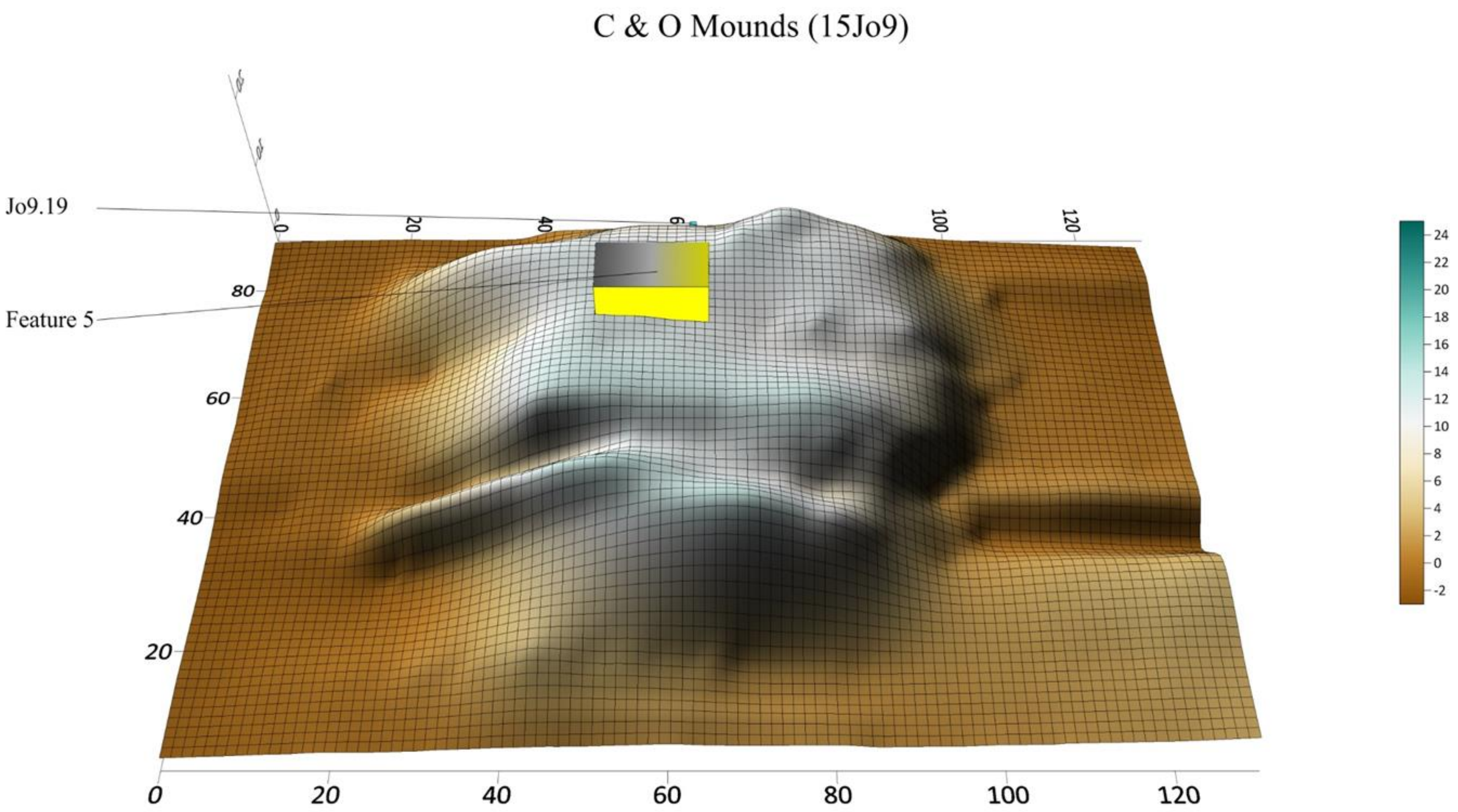


*Figure K.11***.** C & O Mound Sequence – 11. Placement of Feature 5 (a log tomb) and Jo9.19 in the fourth interment episode.

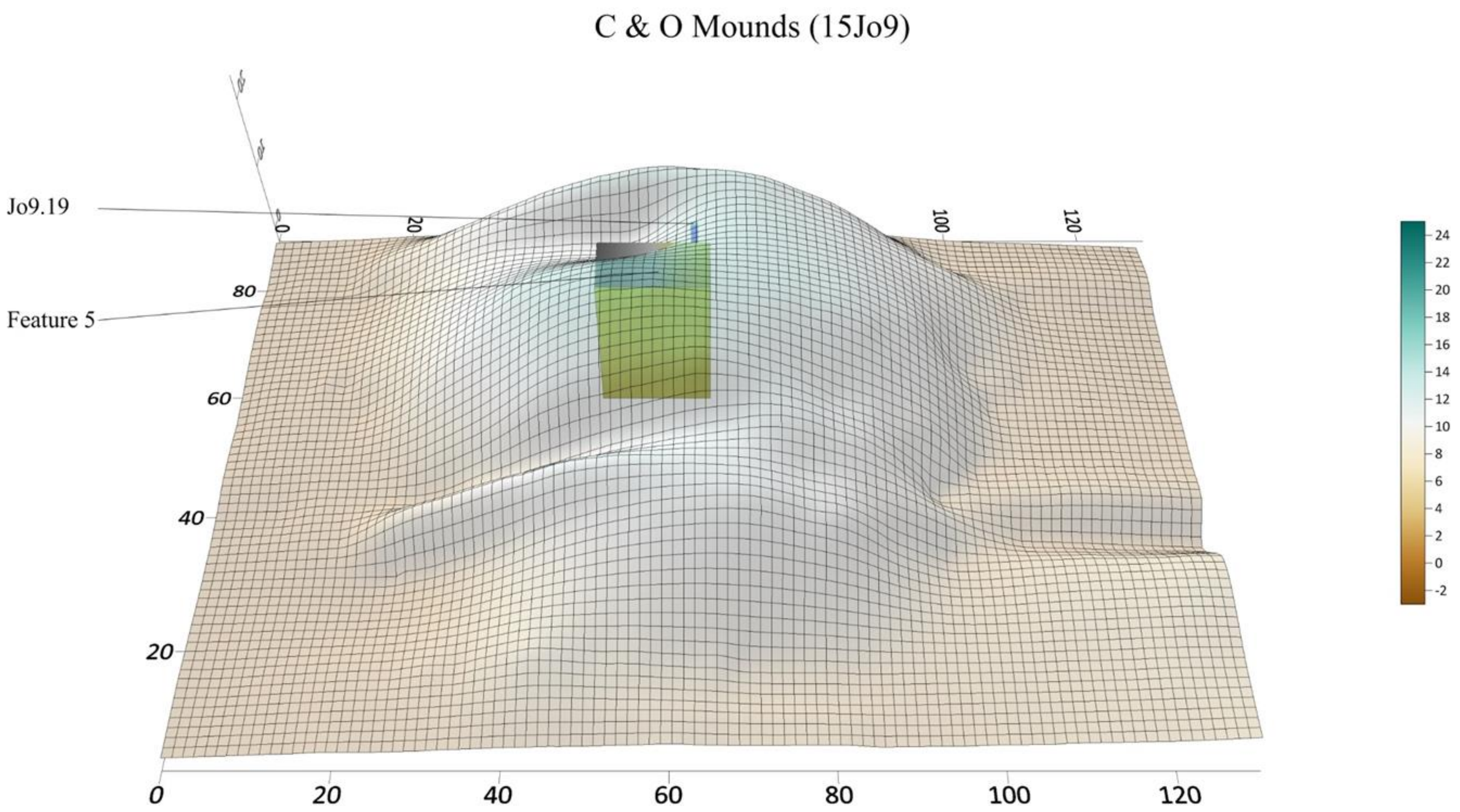


*Figure K.12***.** C & O Mound Sequence – 12. The layer of mound fill covering Feature 5 and Jo9.19 has been rendered transparent in order to better visualize their locations within the mound.

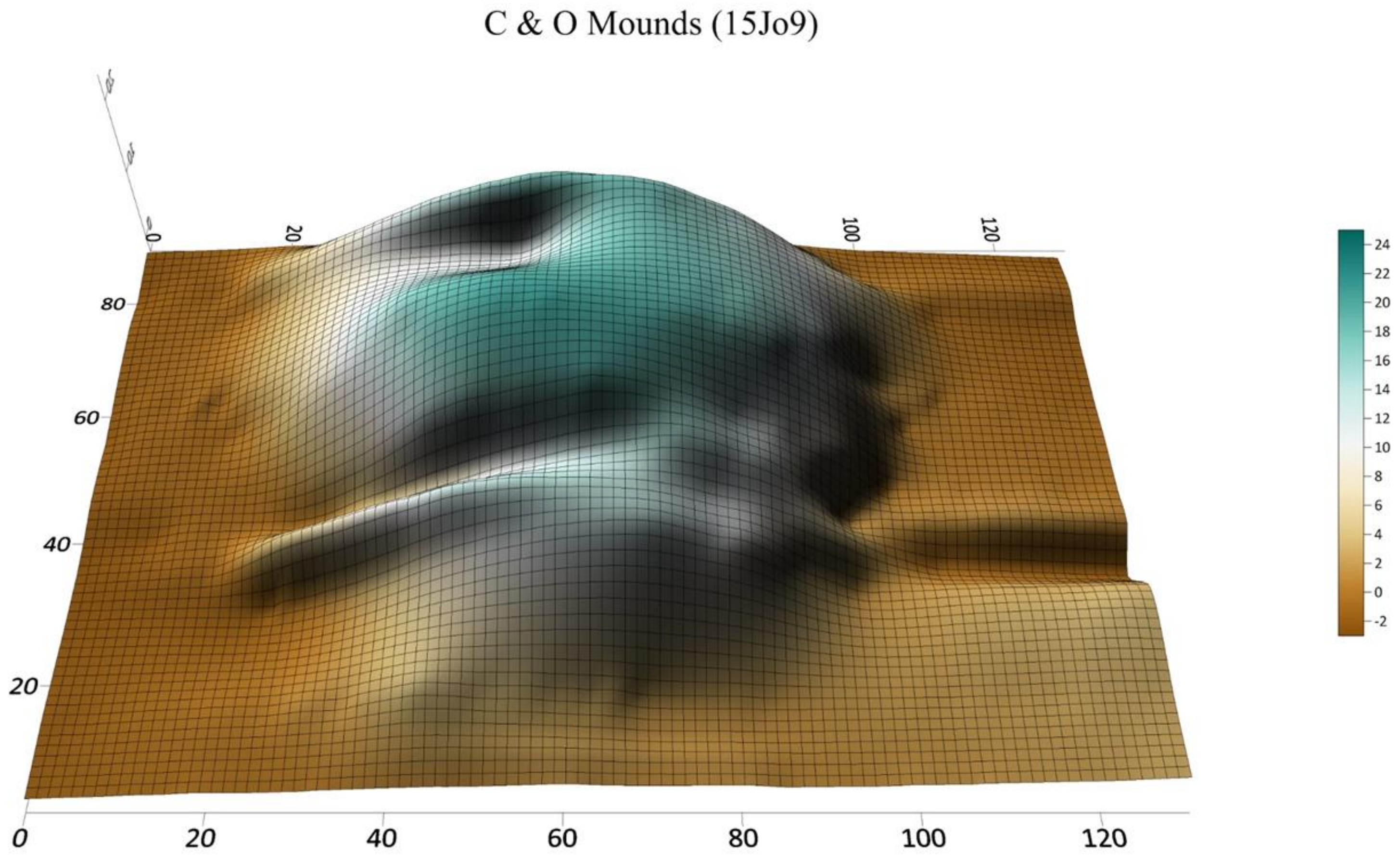


*Figure K.13***.** C & O Mound Sequence – 13. Mound surface after placement of the earth layer covering the fourth interment episode. Note the depression near the northern margin marking the partial collapse of the underlying Feature 5.

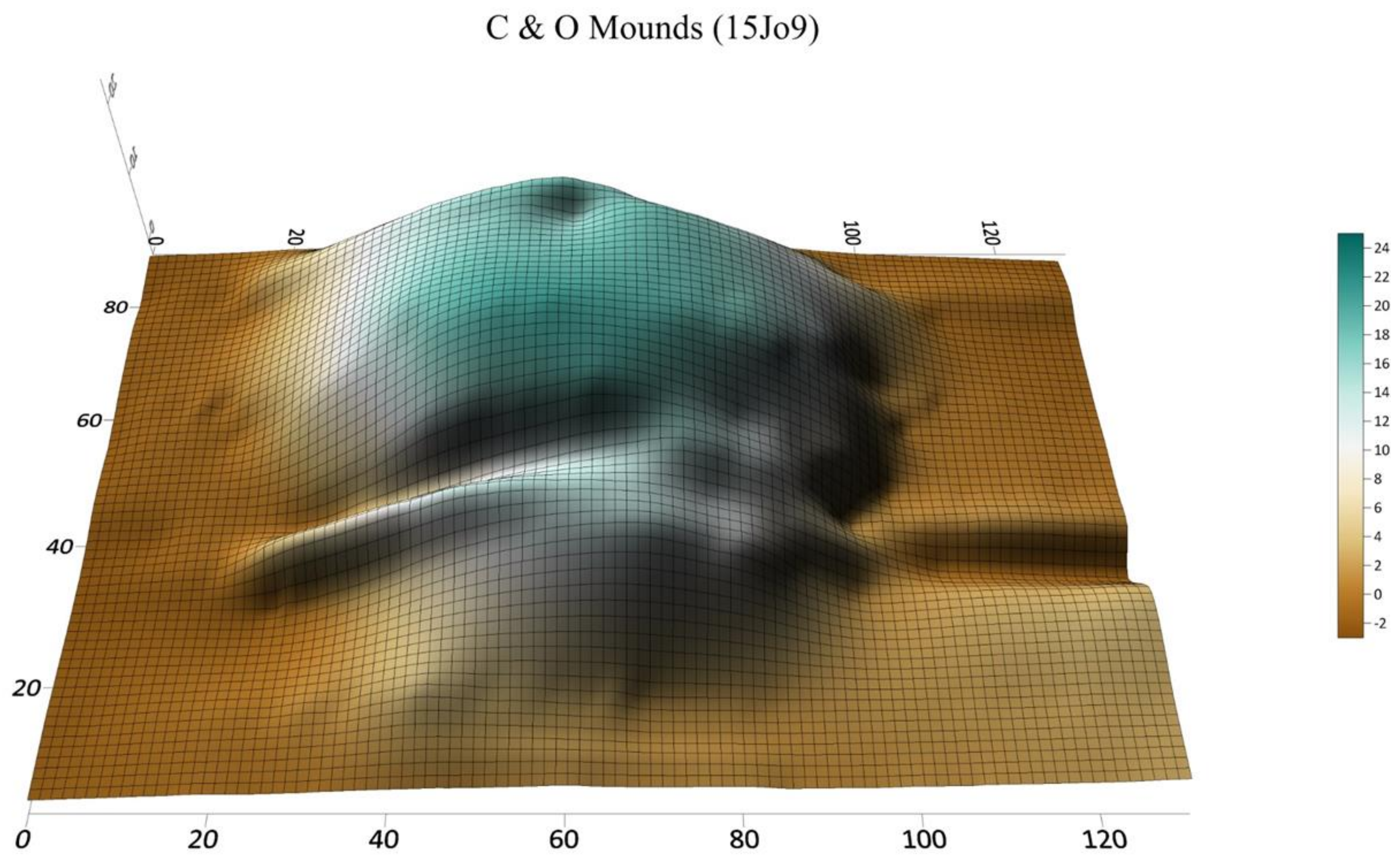


Figure K.14. C & O Mound Sequence – 14. Mound surface after the placement of earth to fill in the depression resulting from the partial collapse of Feature 5, smoothing the overall contours of the mound.

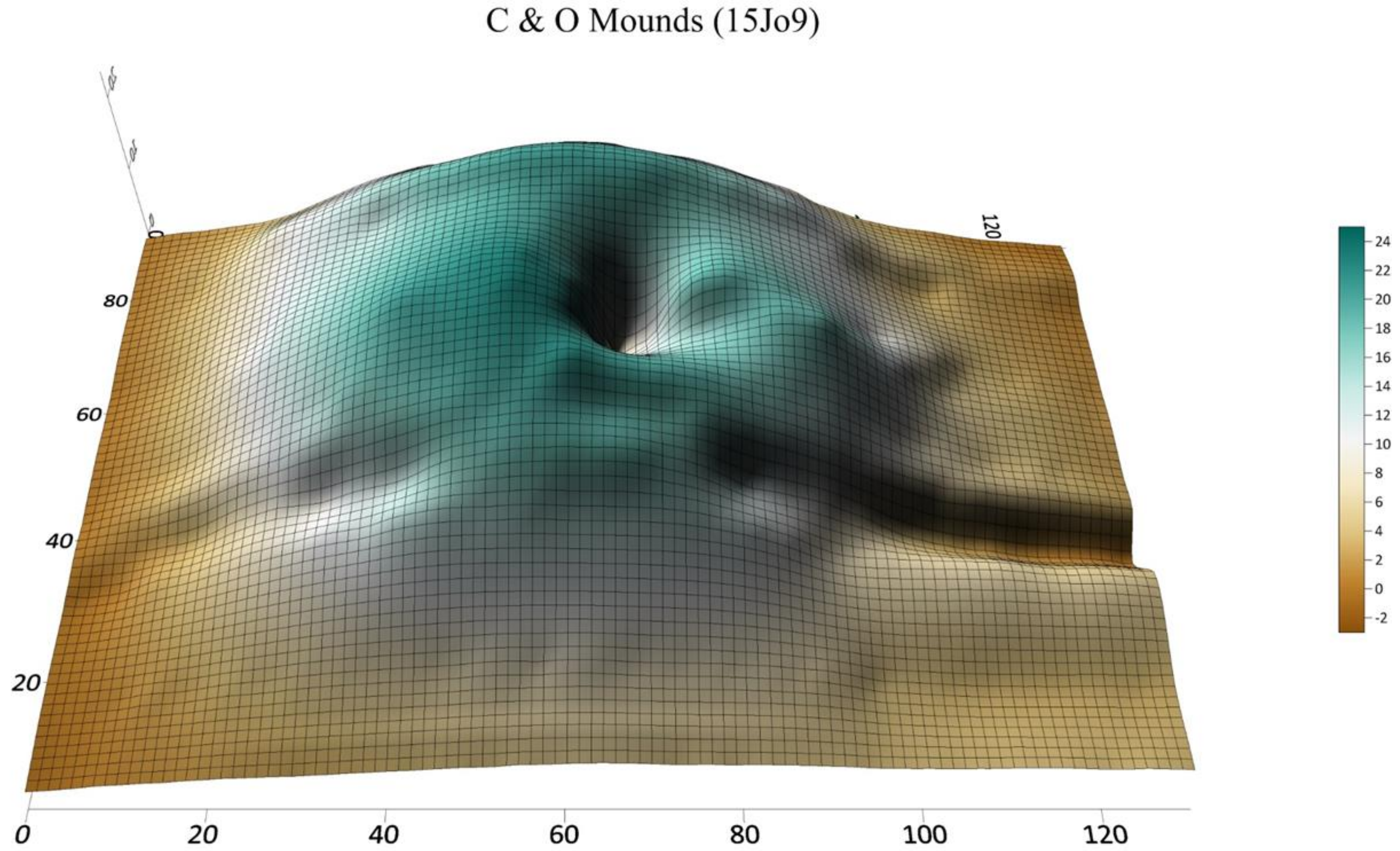


*Figure K.15***.** C & O Mound Sequence – 15. Subsurface layer of mound exhibiting large looter’s pit near the apex.

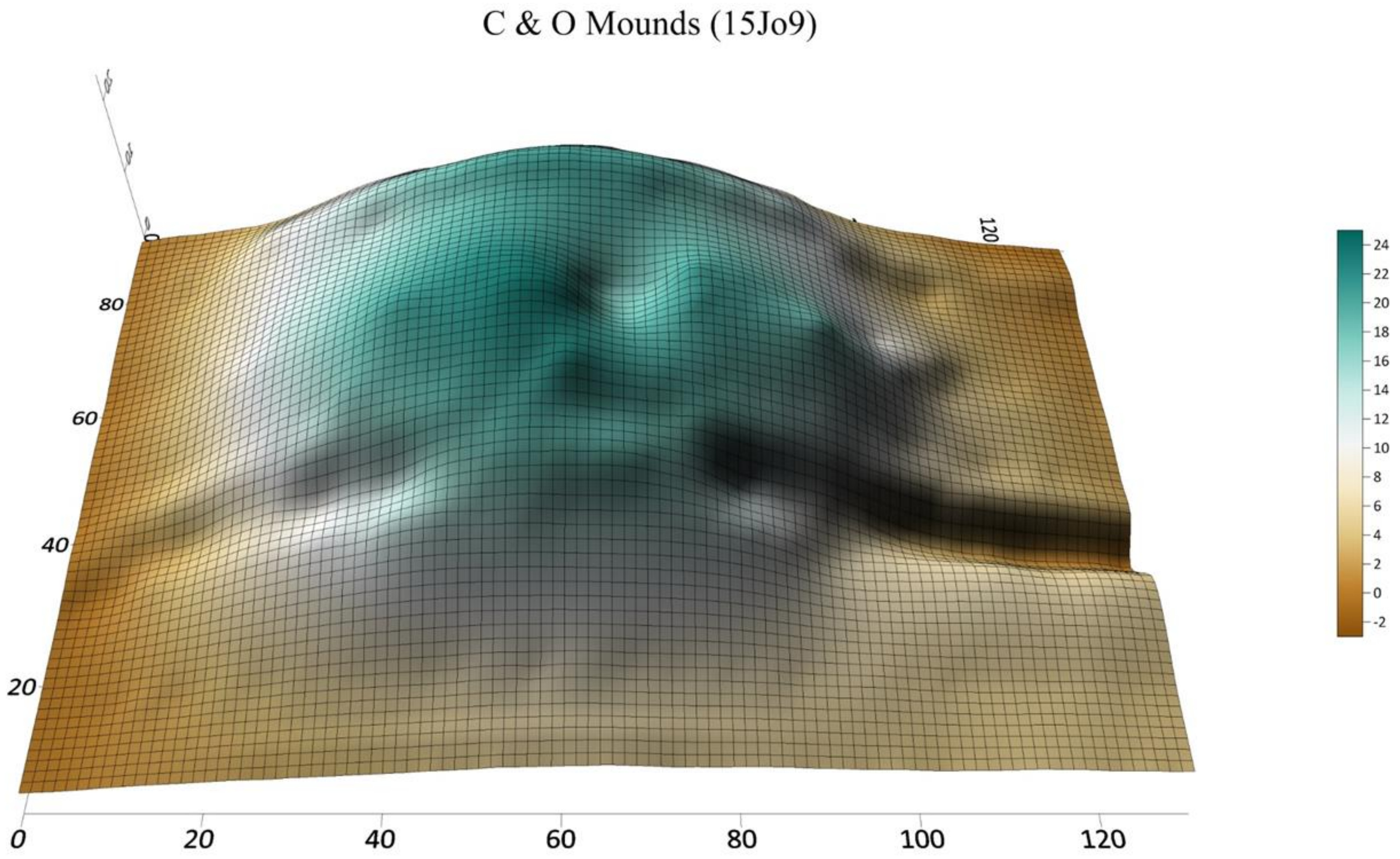


*Figure K.16***.** C & O Mound Sequence – 16. Surface of the mound at the time of its excavation.

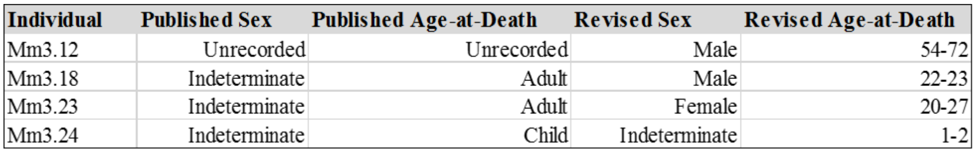
APPENDIX L

CONSTRUCTION SEQUENCE FOR THE RICKETTS SITE (15MM3)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Ricketts site (15Mm3) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red.

Table L.1

Demographic Characteristics of Interment Episode 1

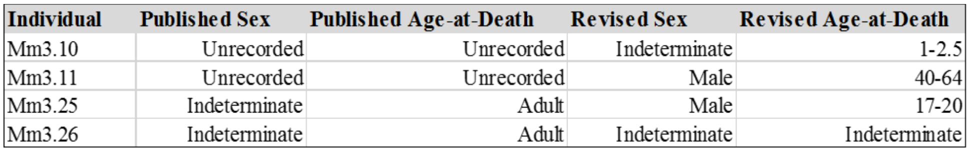


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm3.12	Unrecorded	Unrecorded	Male	54-72
Mm3.18	Indeterminate	Adult	Male	22-23
Mm3.23	Indeterminate	Adult	Female	20-27
Mm3.24	Indeterminate	Child	Indeterminate	1-2

See Figures L.1 and L.2

Table L.2

Demographic Characteristics of Interment Episode 2

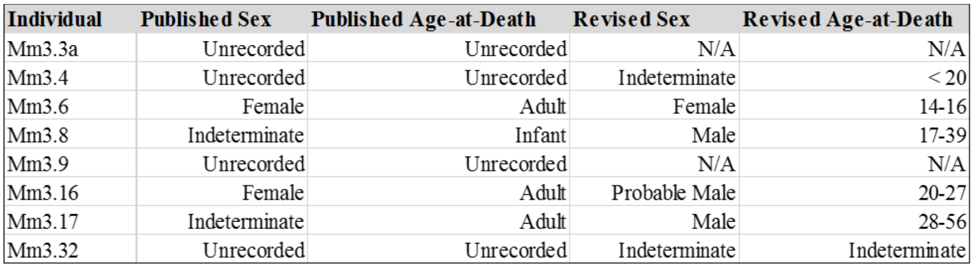


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm3.10	Unrecorded	Unrecorded	Indeterminate	1-2.5
Mm3.11	Unrecorded	Unrecorded	Male	40-64
Mm3.25	Indeterminate	Adult	Male	17-20
Mm3.26	Indeterminate	Adult	Indeterminate	Indeterminate

See Figures L.3 and L.4

Table L.3

Demographic Characteristics of Interment Episode 3



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm3.3a	Unrecorded	Unrecorded	N/A	N/A
Mm3.4	Unrecorded	Unrecorded	Indeterminate	< 20
Mm3.6	Female	Adult	Female	14-16
Mm3.8	Indeterminate	Infant	Male	17-39
Mm3.9	Unrecorded	Unrecorded	N/A	N/A
Mm3.16	Female	Adult	Probable Male	20-27
Mm3.17	Indeterminate	Adult	Male	28-56
Mm3.32	Unrecorded	Unrecorded	Indeterminate	Indeterminate

See Figures L.5 and L.6

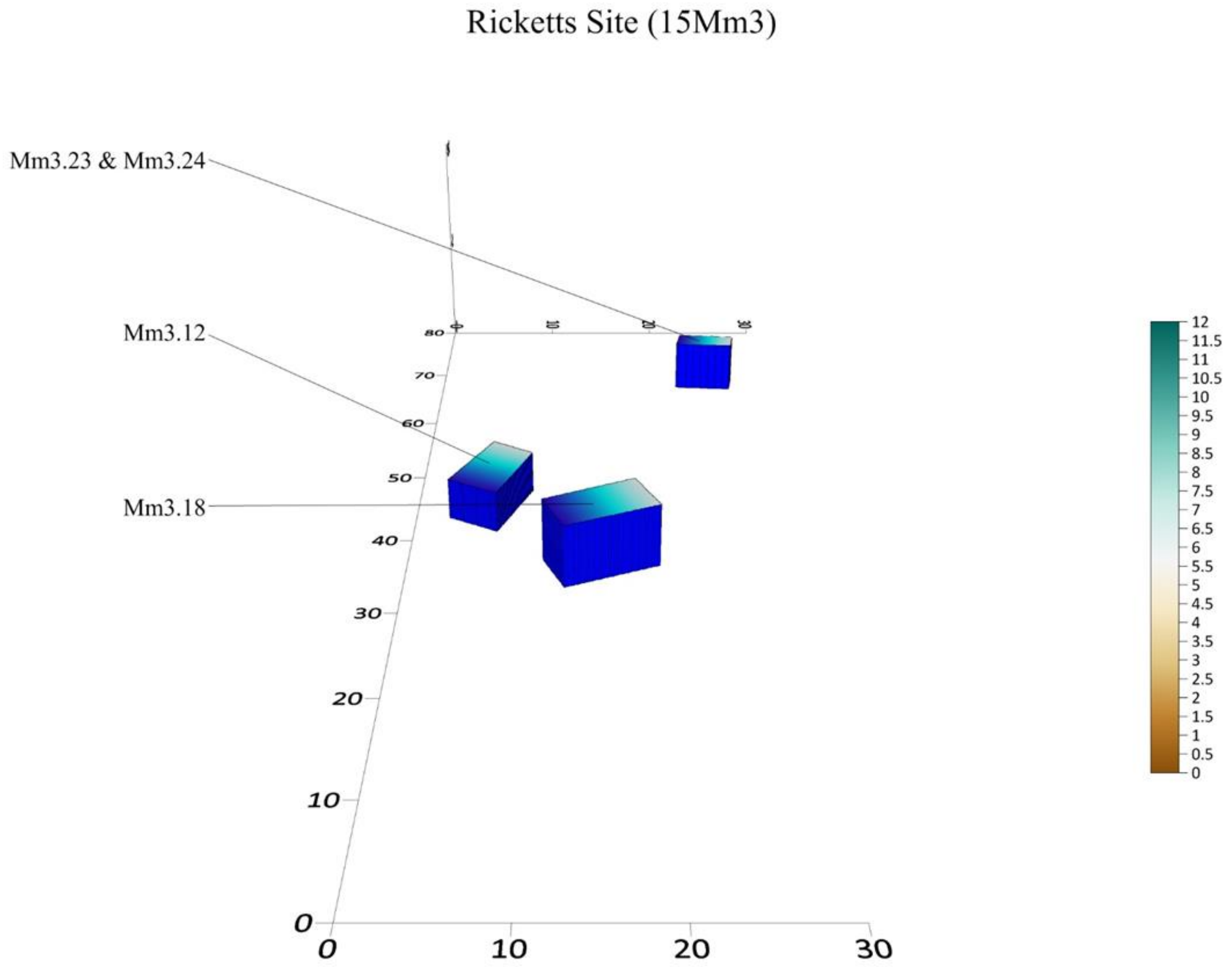


*Figure L.1***.** Ricketts Site Sequence – 1. Placement of individuals Mm3.12, Mm3.18, Mm3.23, and Mm3.24 in the first episode of interment. See also Figure L.2.

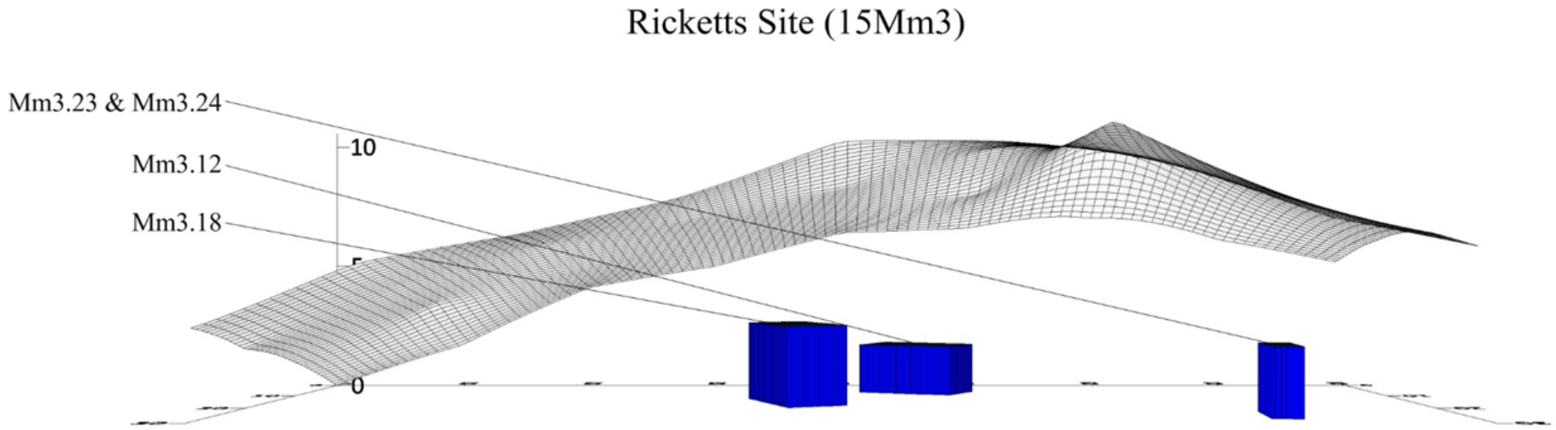


Figure L.2. Ricketts Site Sequence – 2. Alternative view of placement of individuals within the first interment episode. Mound surface is shown to facilitate visualization of interments relative to mound contours.

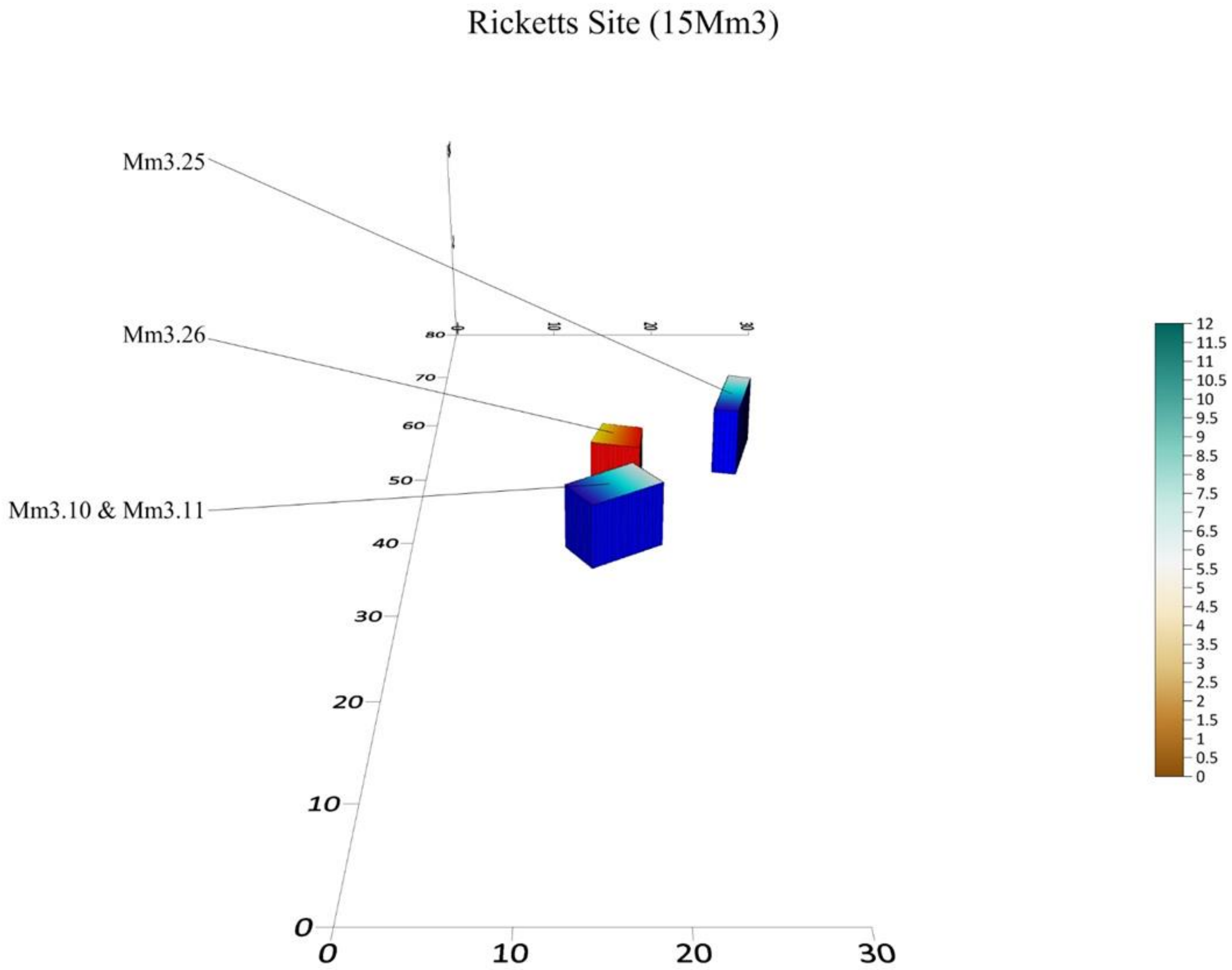


*Figure L.3***.** Ricketts Site Sequence – 3. Placement of individuals Mm3.10, Mm3.11, Mm3.25, and Mm3.26 in the second episode of interment. See also Figure L.4.

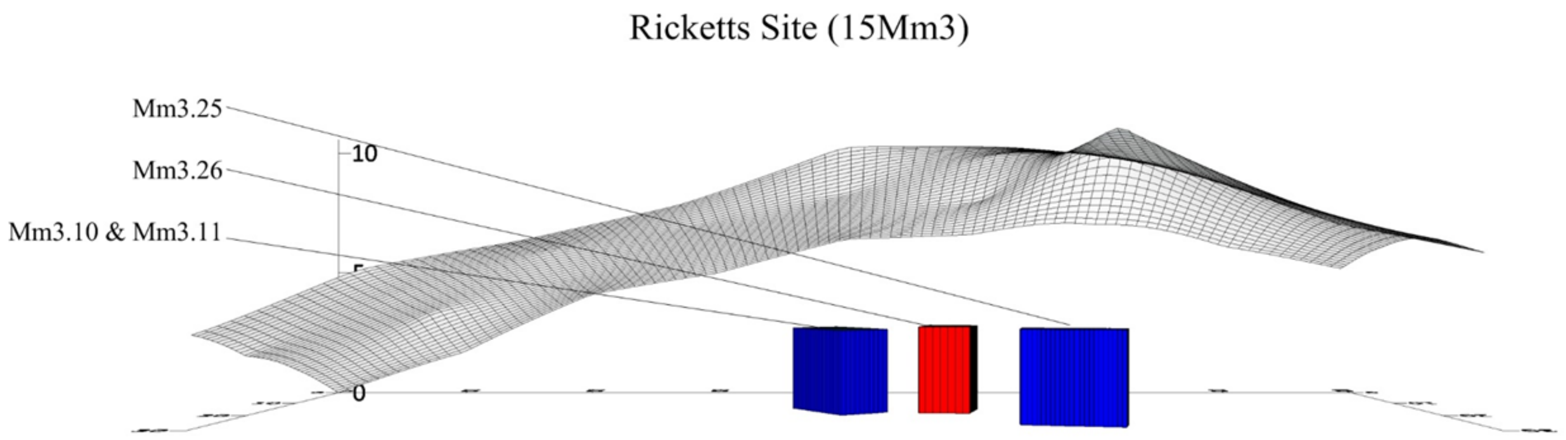


*Figure L.4***.** Ricketts Site Sequence – 4. Alternative view of placement of individuals within the second interment episode. Mound surface is shown to facilitate visualization of interments relative to mound contours.

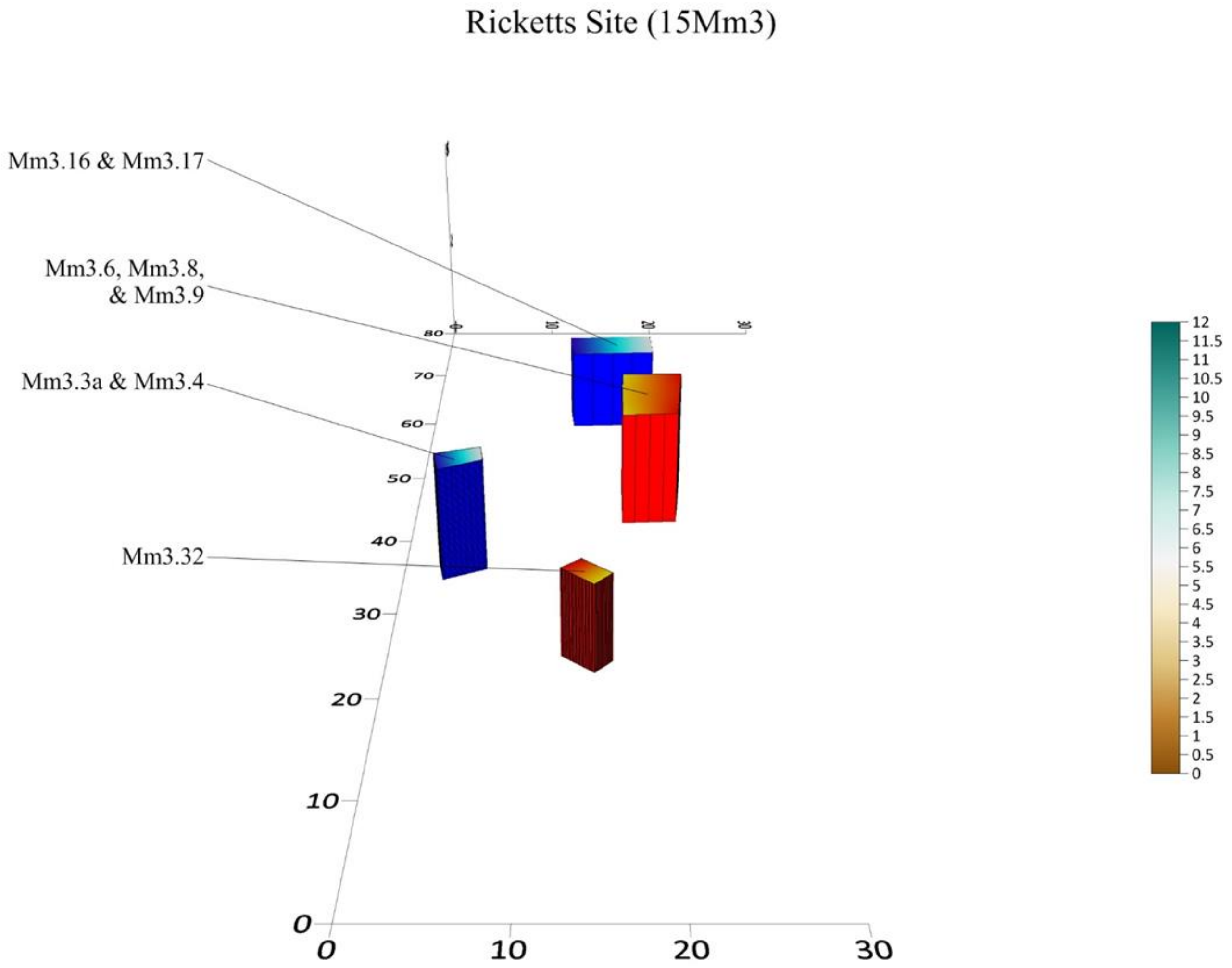


*Figure L.5***.** Ricketts Site Sequence – 5. Placement of individuals Mm3.3a, Mm3.4, Mm3.6, Mm3.8, Mm3.9, Mm3.16, Mm3.17, and Mm3.32 in the third episode of interment. See also Figure L.6.

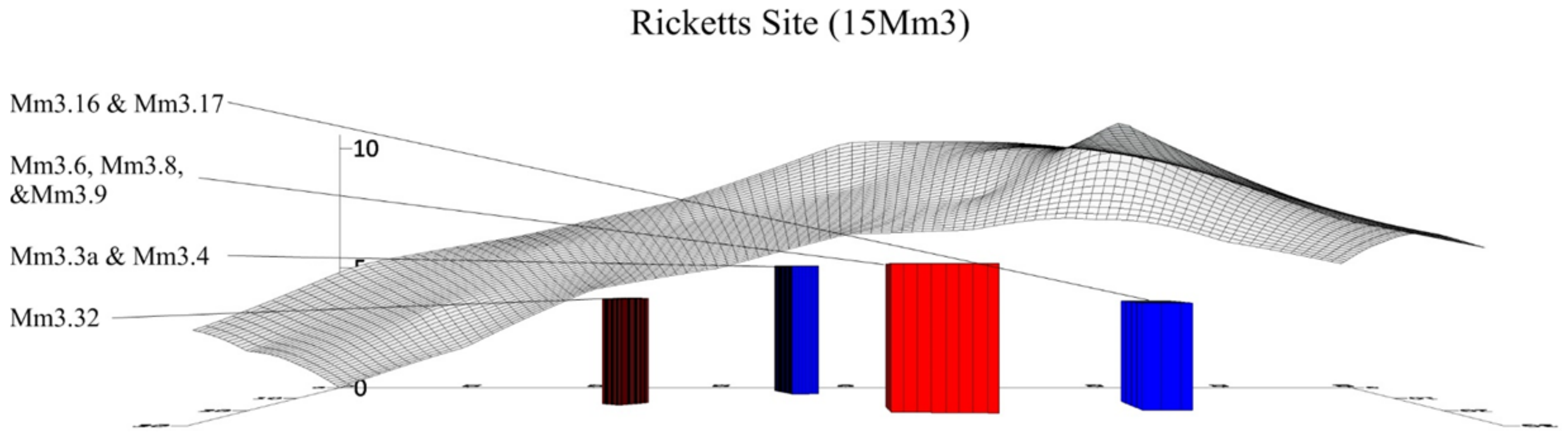
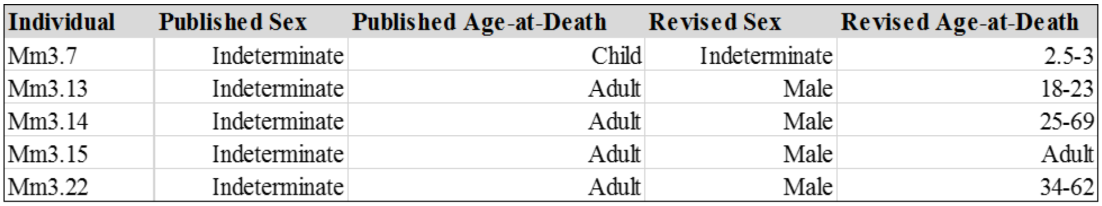


*Figure L.6***.** Ricketts Site Sequence – 6. Alternative view of placement of individuals within the third interment episode. Mound surface is shown to facilitate visualization of interments relative to mound contours.

Table L.4

Demographic Characteristics of Interment Episode 4

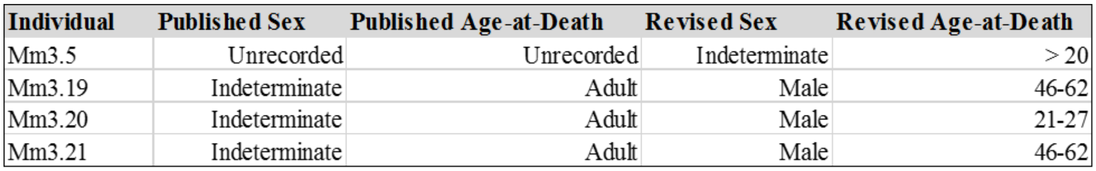


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm3.7	Indeterminate	Child	Indeterminate	2.5-3
Mm3.13	Indeterminate	Adult	Male	18-23
Mm3.14	Indeterminate	Adult	Male	25-69
Mm3.15	Indeterminate	Adult	Male	Adult
Mm3.22	Indeterminate	Adult	Male	34-62

See Figures L.7 and L.8

Table L.5

Demographic Characteristics of Interment Episode 5



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm3.5	Unrecorded	Unrecorded	Indeterminate	> 20
Mm3.19	Indeterminate	Adult	Male	46-62
Mm3.20	Indeterminate	Adult	Male	21-27
Mm3.21	Indeterminate	Adult	Male	46-62

See Figures L.9 and L.10

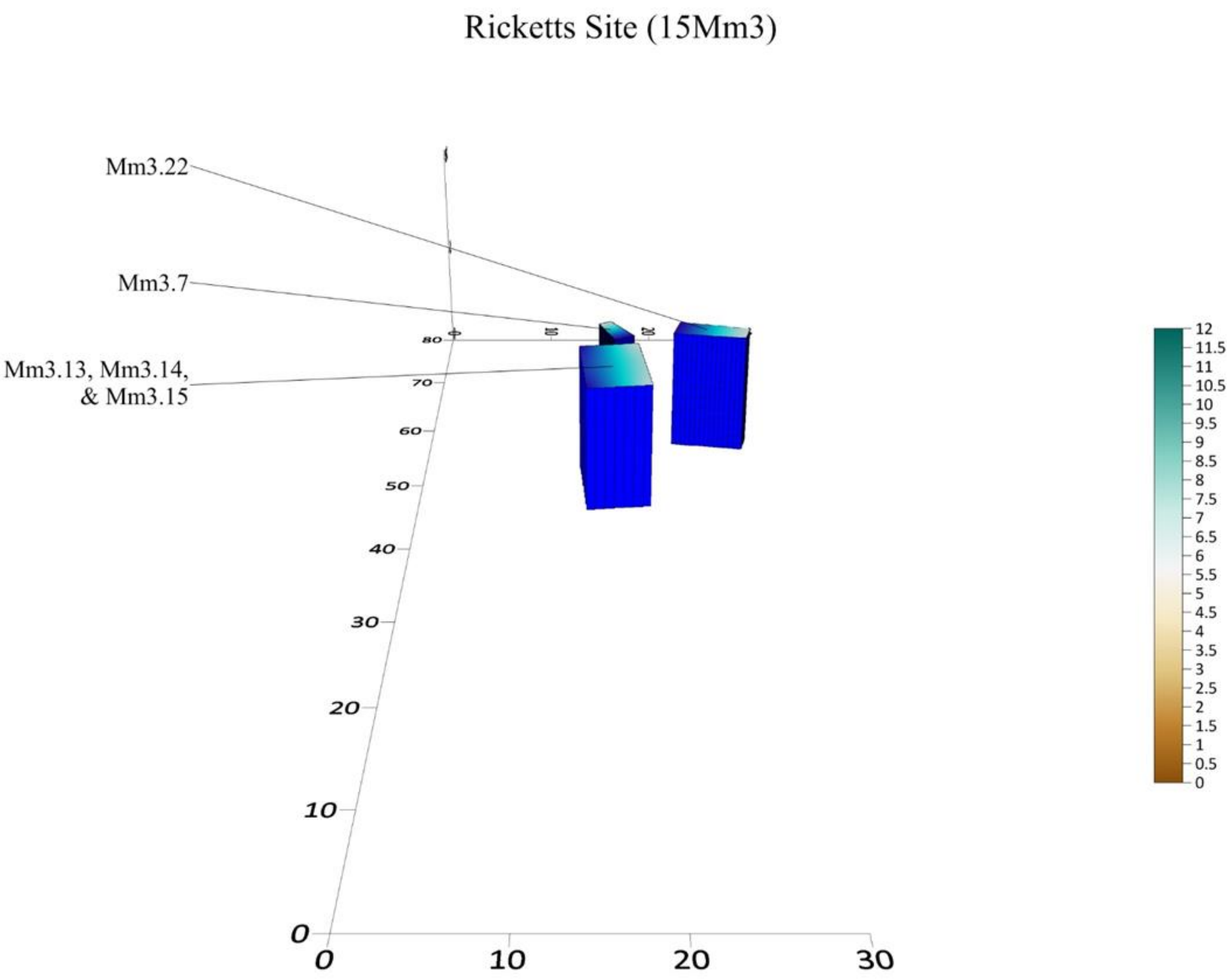


*Figure L.7***.** Ricketts Site Sequence – 7. Placement of individuals Mm3.7, Mm3.13, Mm3.14, Mm3.15, and Mm3.22 in the fourth episode of interment. See also Figure L.8.

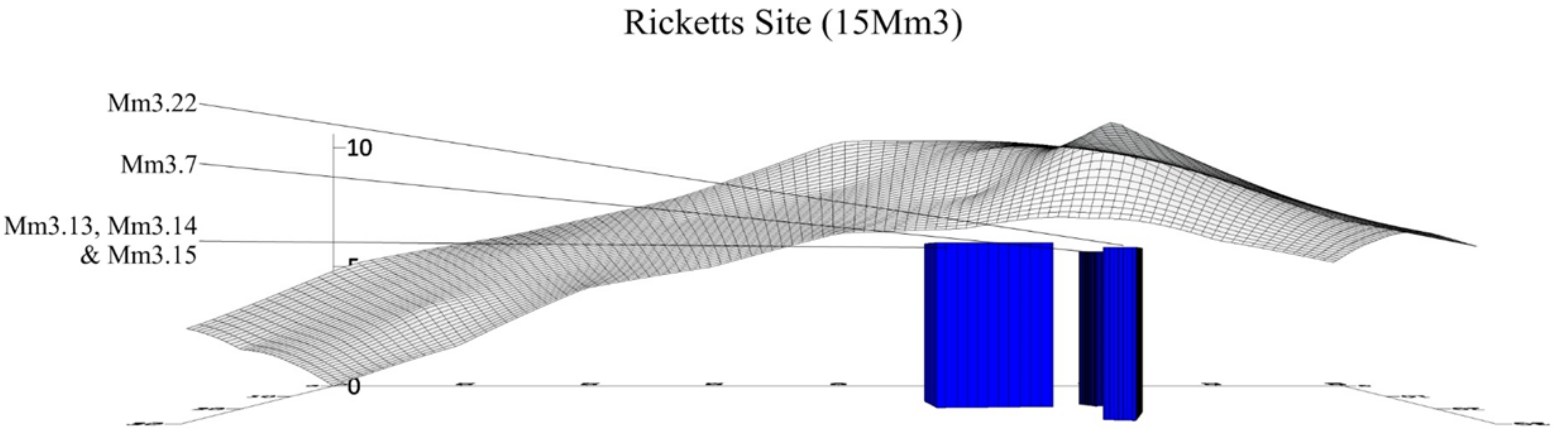


*Figure L.8***.** Ricketts Site Sequence – 8. Alternative view of placement of individuals within the fourth interment episode. Mound surface is shown to facilitate visualization of interments relative to mound contours.

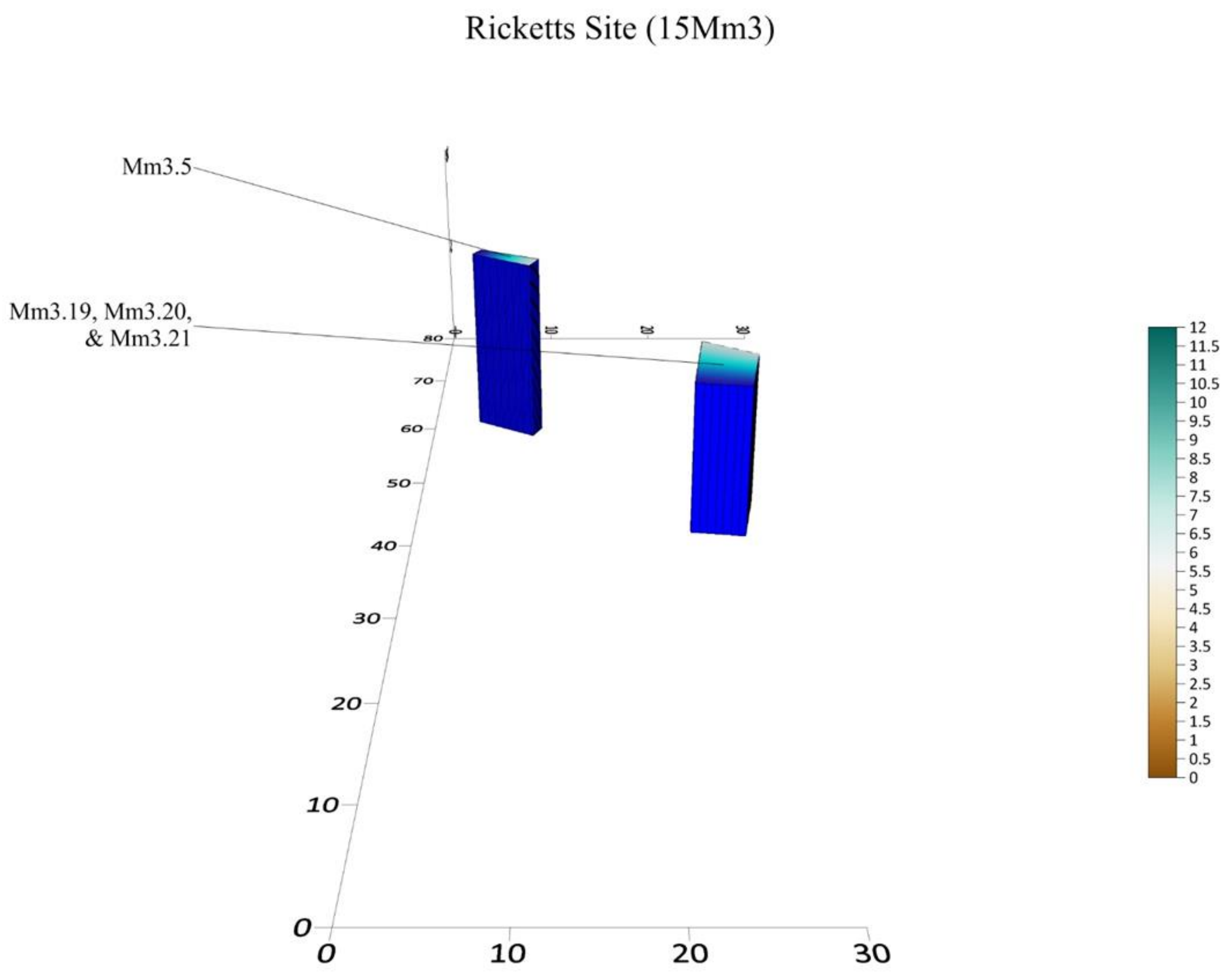


*Figure L.9***.** Ricketts Site Sequence – 9. Placement of individuals Mm3.5, Mm3.19, Mm3.20, and Mm3.21 in the fifth episode of interment. See also Figure L.10.

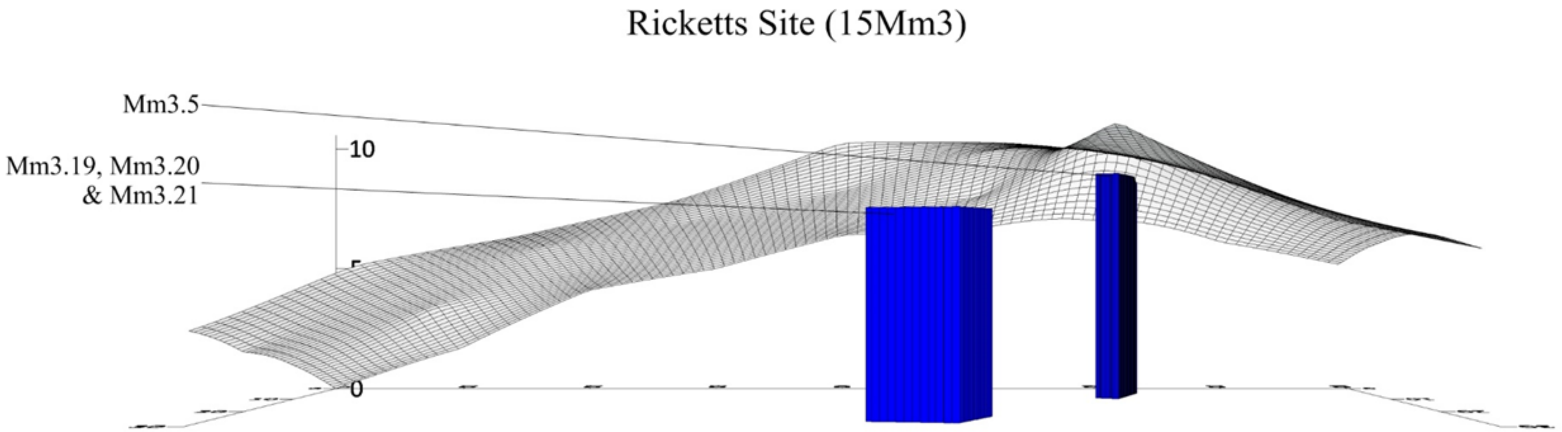


*Figure L.10***.** Ricketts Site Sequence – 10. Alternative view of placement of individuals within the fifth interment episode. Mound surface is shown to facilitate visualization of interments relative to mound contours.

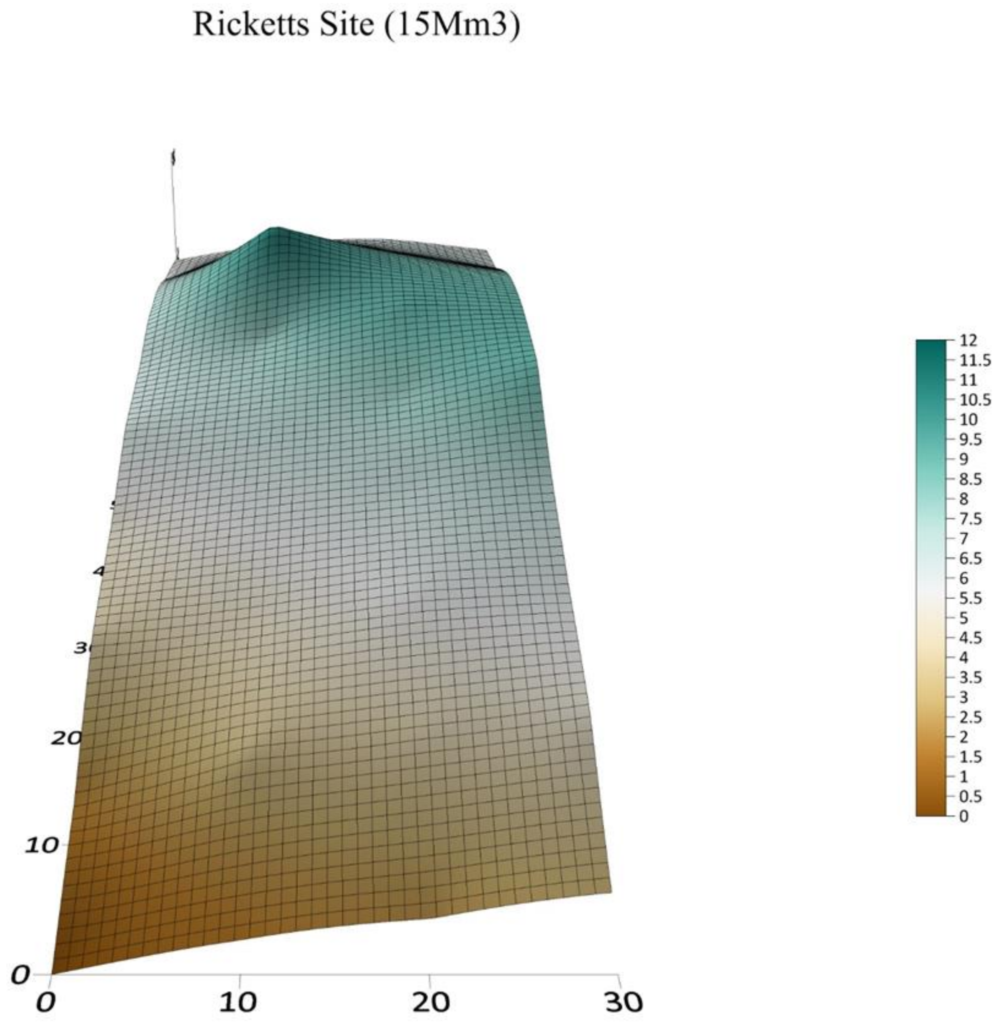


*Figure L.11***.** Ricketts Site Sequence – 11. Mound surface at the time of the 1939 excavation.

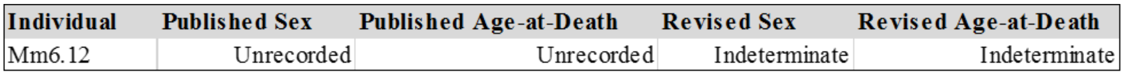
APPENDIX M

CONSTRUCTION SEQUENCE FOR THE WRIGHT MOUND (15MM6)

The purpose of this appendix is to provide visual representations of the sequence of construction for the larger Wright mound (15Mm6) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red. The locations from which samples submitted for radiocarbon dating are estimated to have been derived are also indicated where appropriate.

Table M.1

Demographic Characteristics of Interment Episode 1

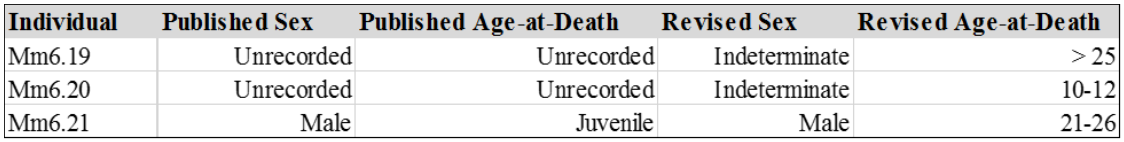


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.12	Unrecorded	Unrecorded	Indeterminate	Indeterminate

See Figures M.2, M.3, and M.11

Table M.2

Demographic Characteristics of Interment Episode 2

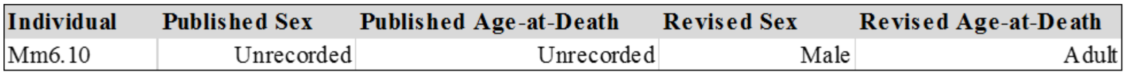


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.19	Unrecorded	Unrecorded	Indeterminate	> 25
Mm6.20	Unrecorded	Unrecorded	Indeterminate	10-12
Mm6.21	Male	Juvenile	Male	21-26

See Figures M.4 and M.11

Table M.3

Demographic Characteristics of Interment Episode 3



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.10	Unrecorded	Unrecorded	Male	Adult

See Figures M.9 through M.11

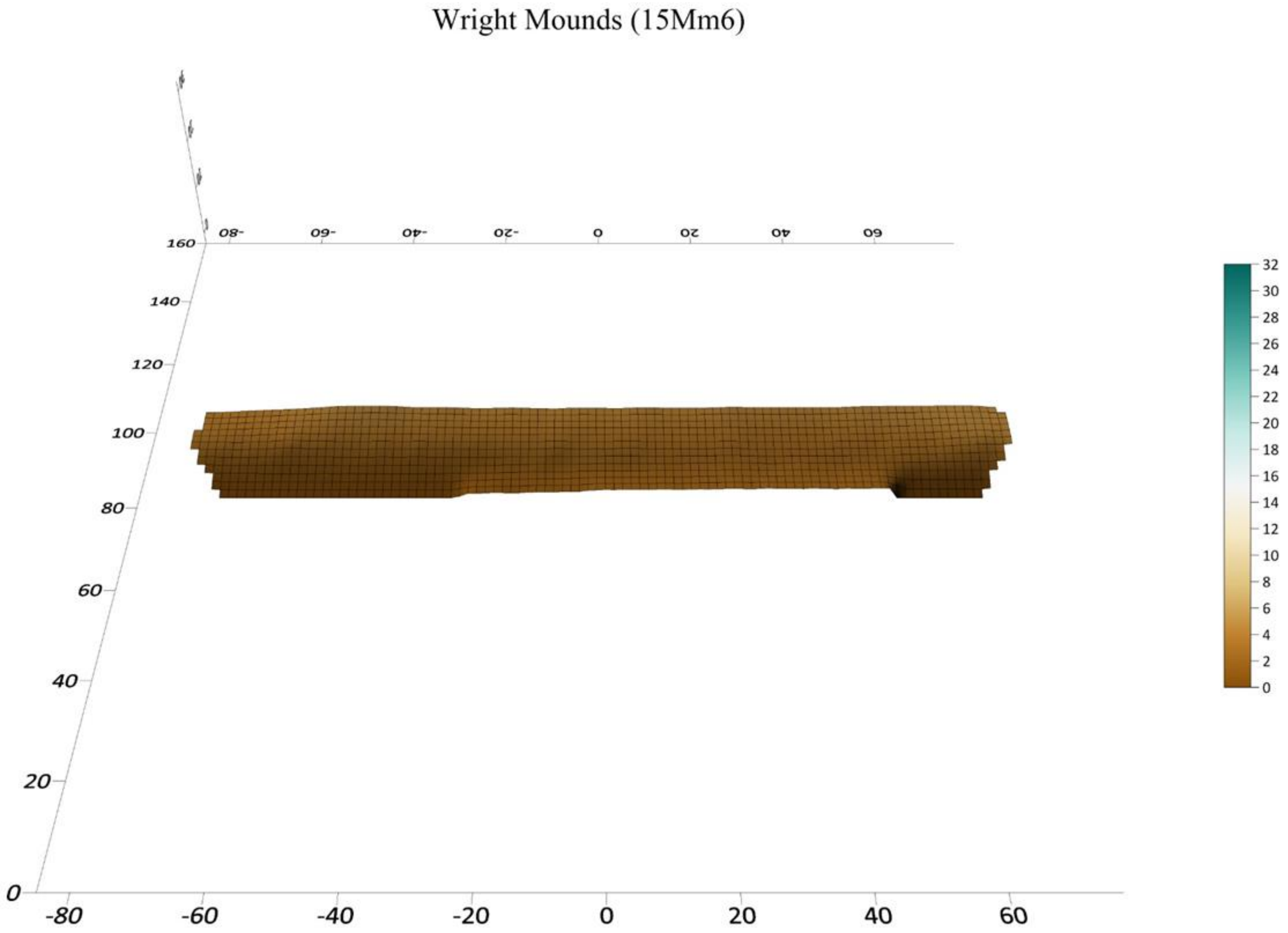


*Figure M.1***.** Wright Mound (Mm6) Sequence – 1. Floor of mound.

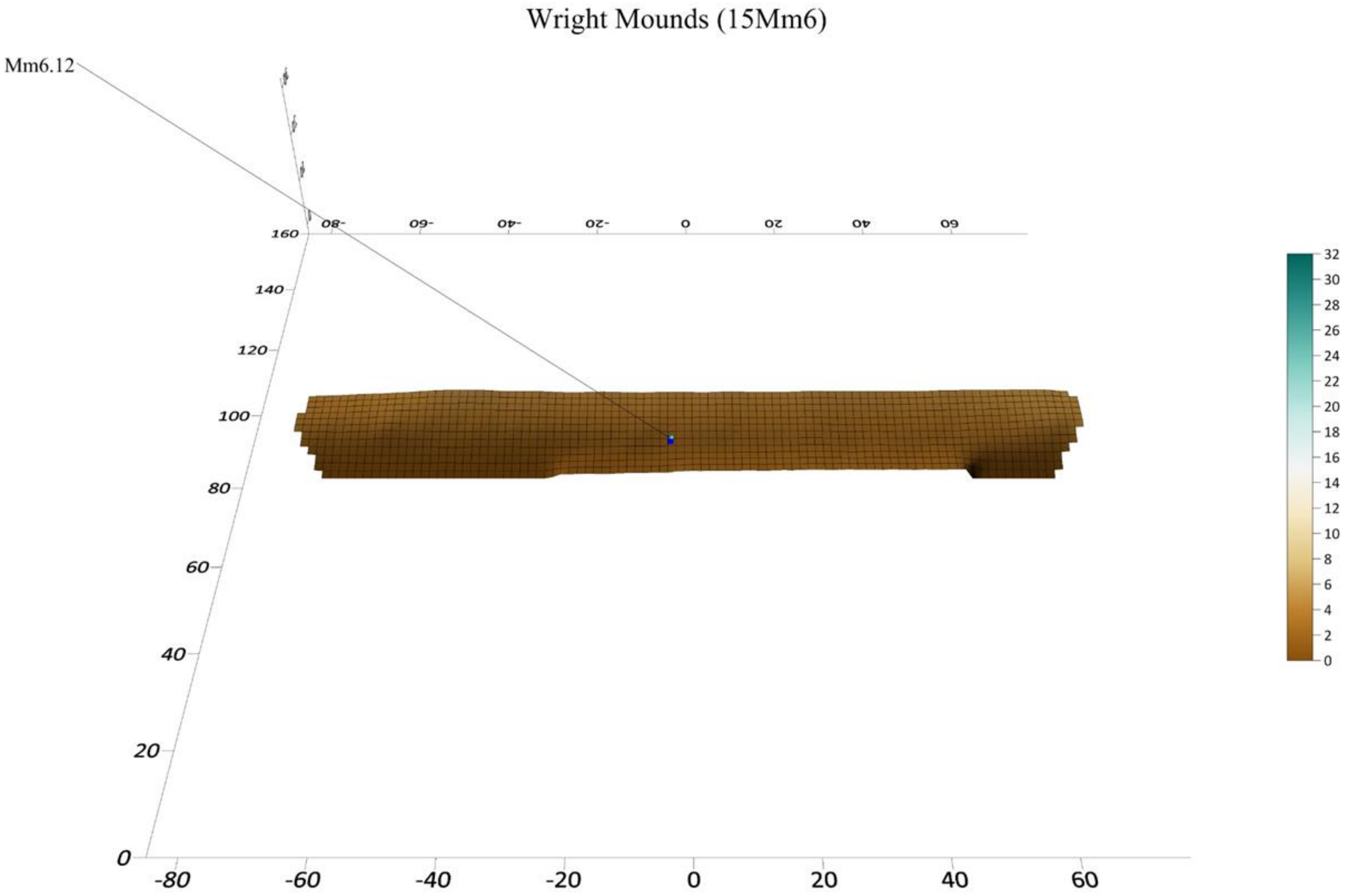


*Figure M.2***.** Wright Mound (Mm6) Sequence – 2. Placement of Mm6.12 in the first interment episode.

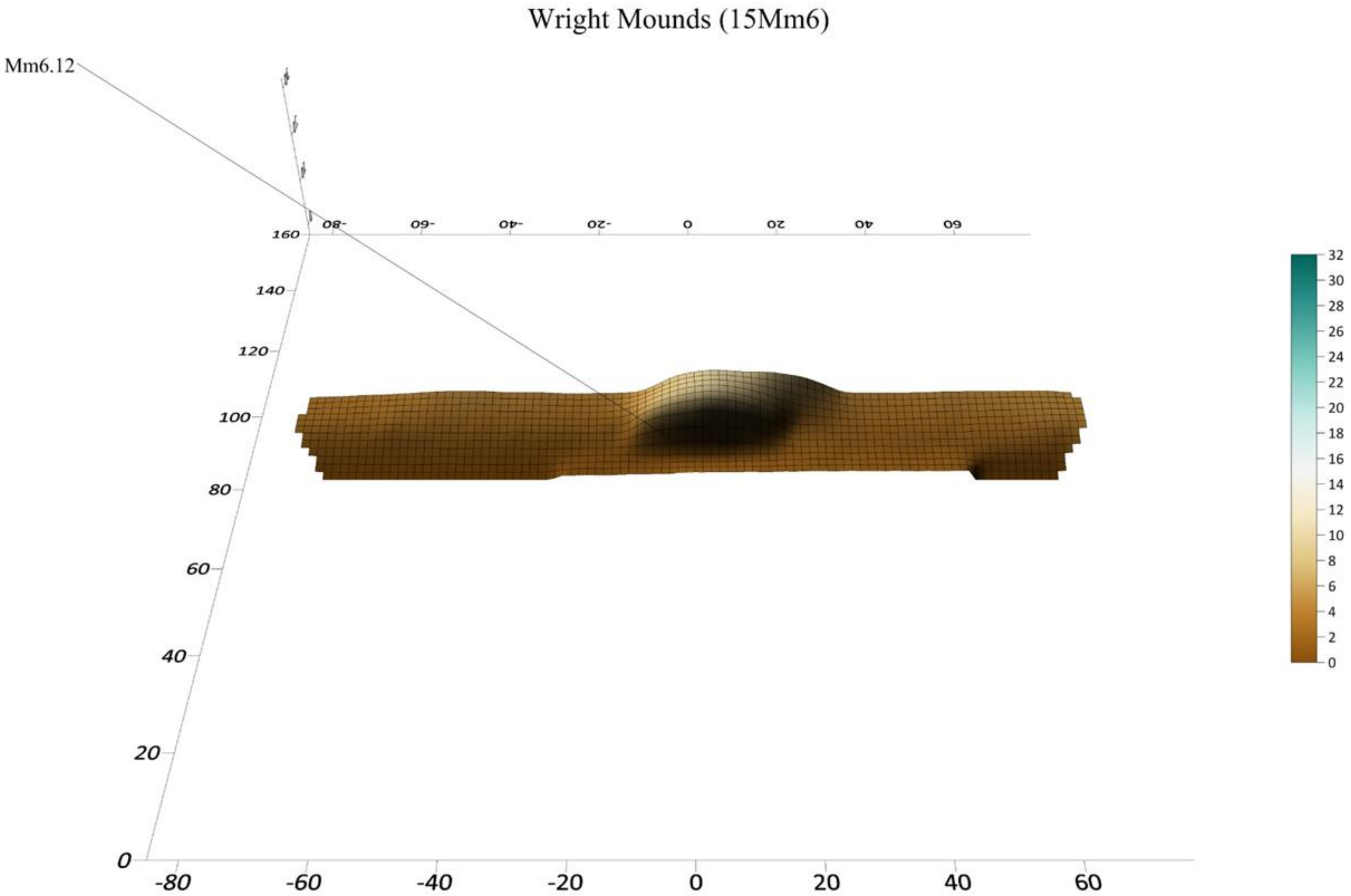


*Figure M.3***.** Wright Mound (Mm6) Sequence – 3. Construction of a “midden core” over the interment of Mm6.12. This was considered by Webb to be distinct from the primary mound structure, even though the two were constructed of the same material (Webb, 1940).

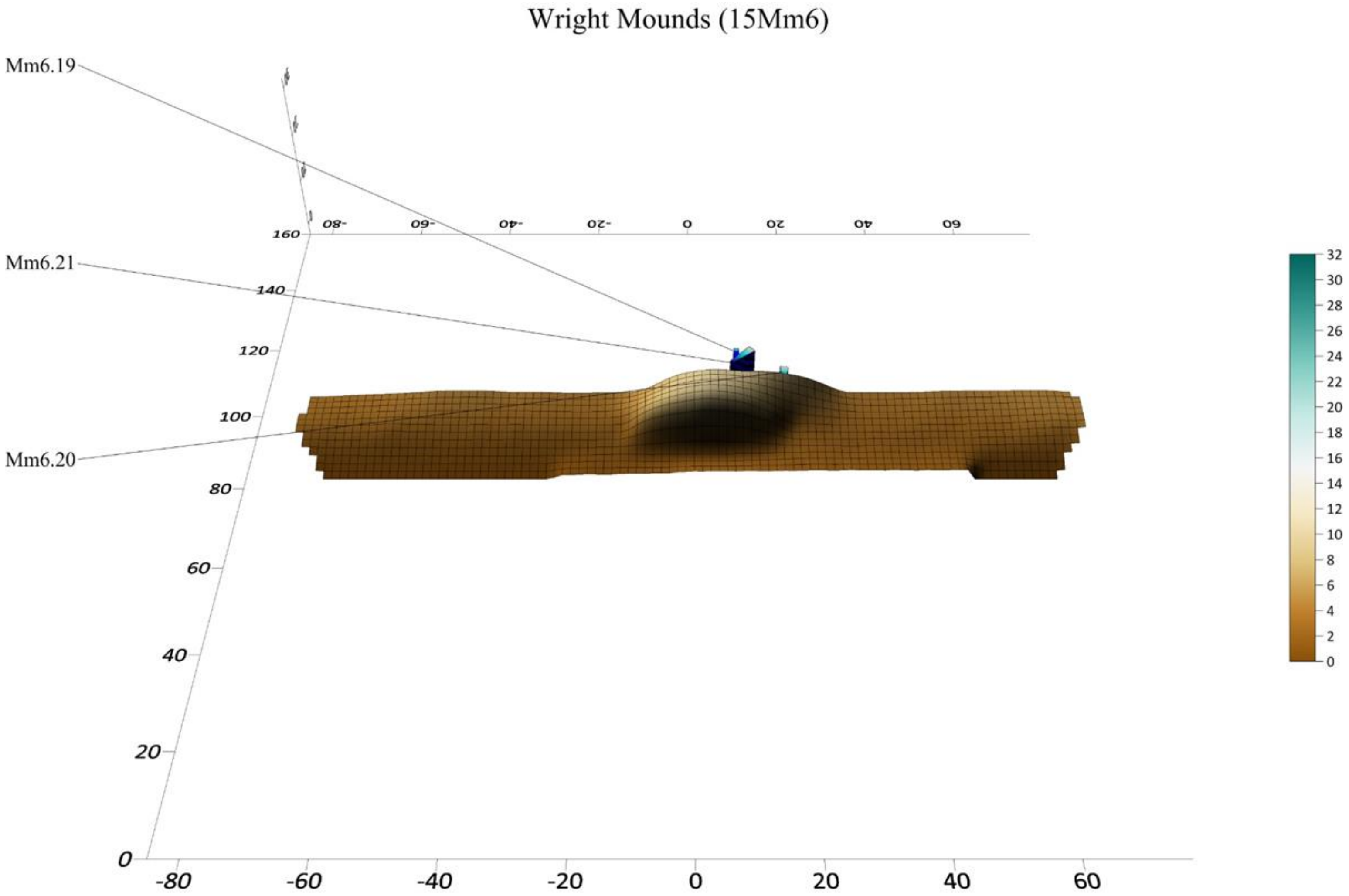


*Figure M.4***.** Wright Mound (Mm6) Sequence – 4. Placement of Mm6.19, Mm6.20, and Mm6.21 in the second episode of interment. These individuals are considered by Webb to have been interred within the primary mound structure.

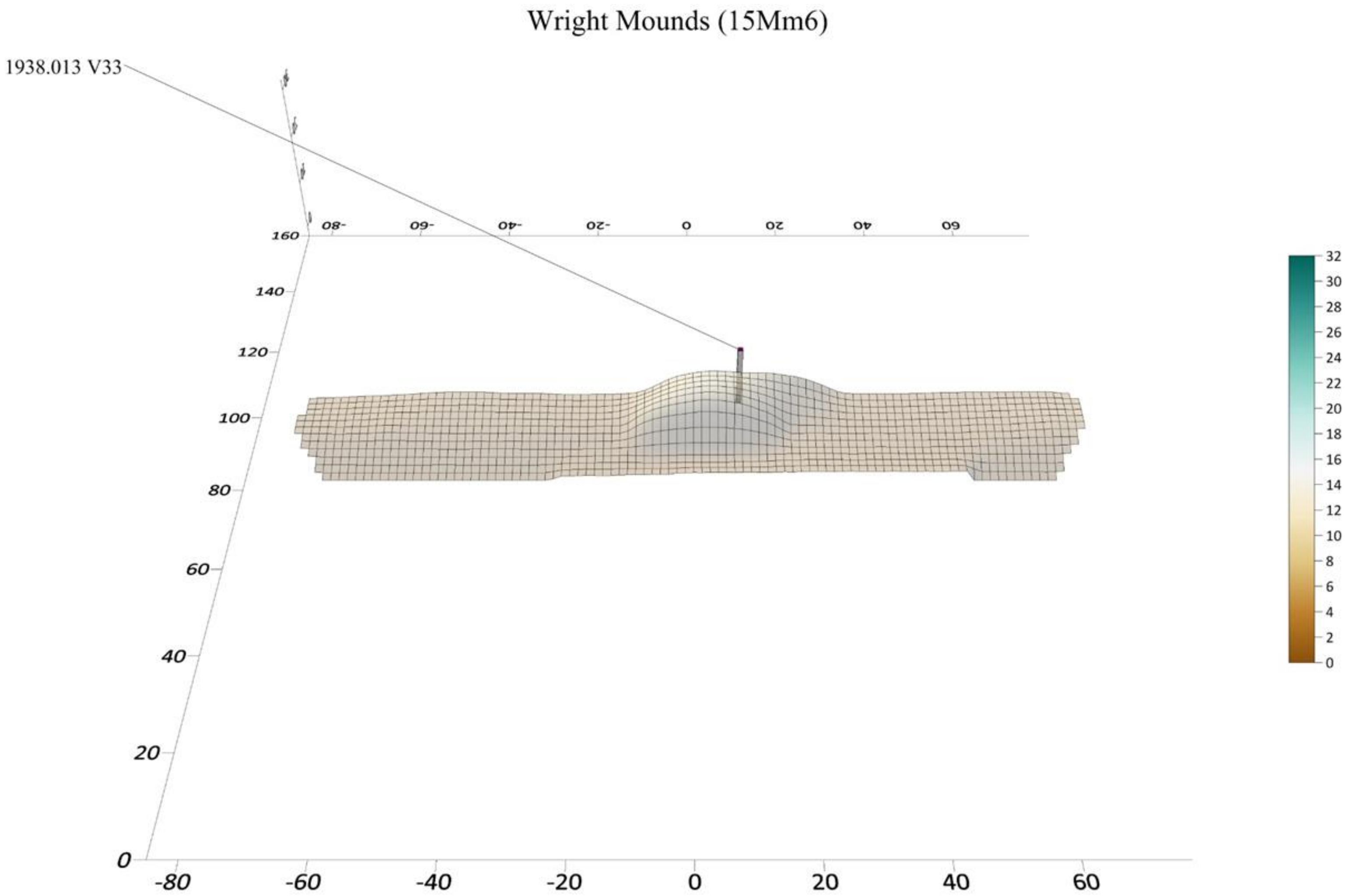


*Figure M.5***.** Wright Mound (Mm6) Sequence – 5. Location from which 1938.013 V33, a sample submitted for radiocarbon dating, is estimated to have been recovered.

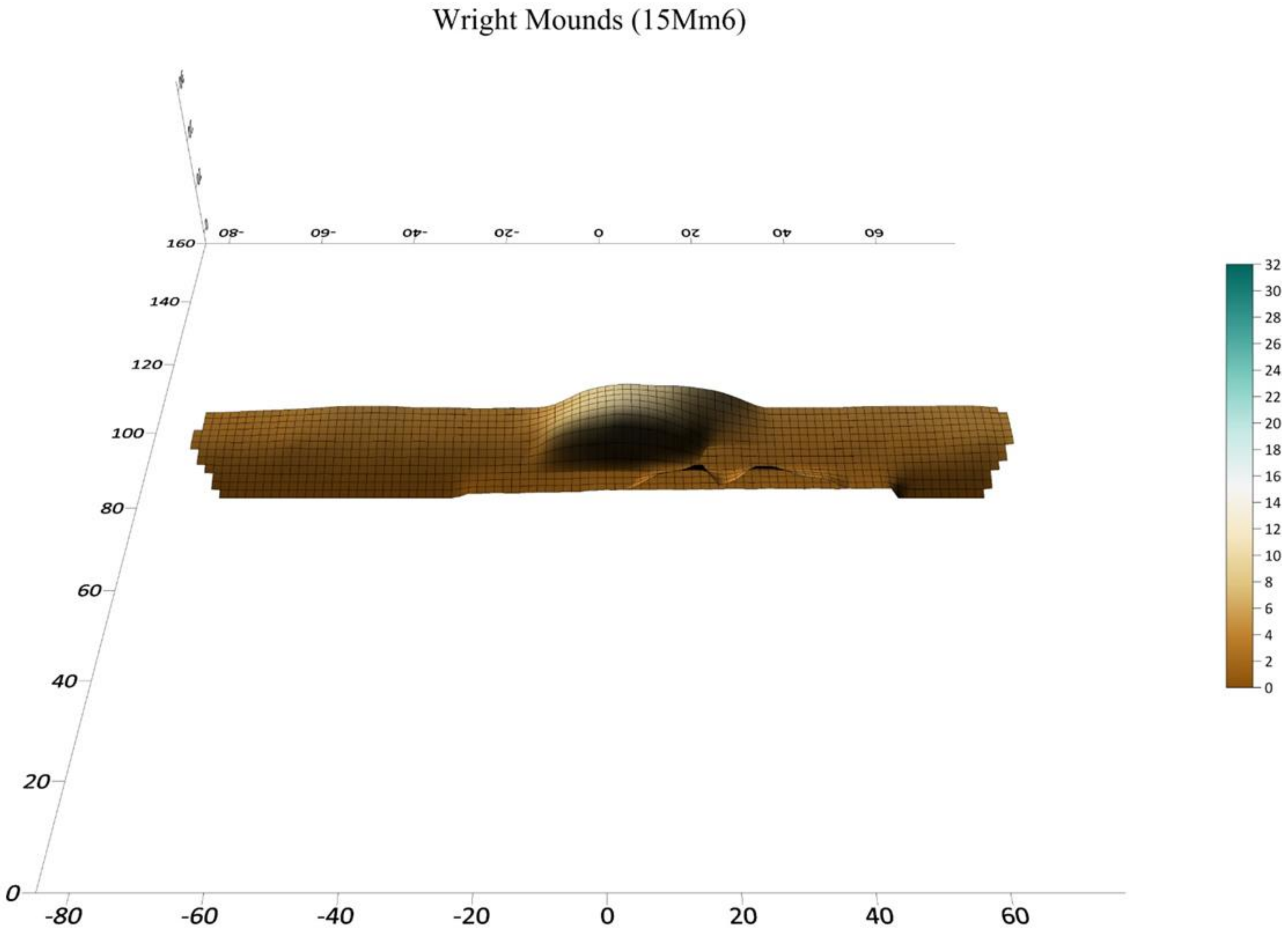


*Figure M.6***.** Wright Mound (Mm6) Sequence – 6. Deposit of a small amount of earth on the southern margin of the mapped area.

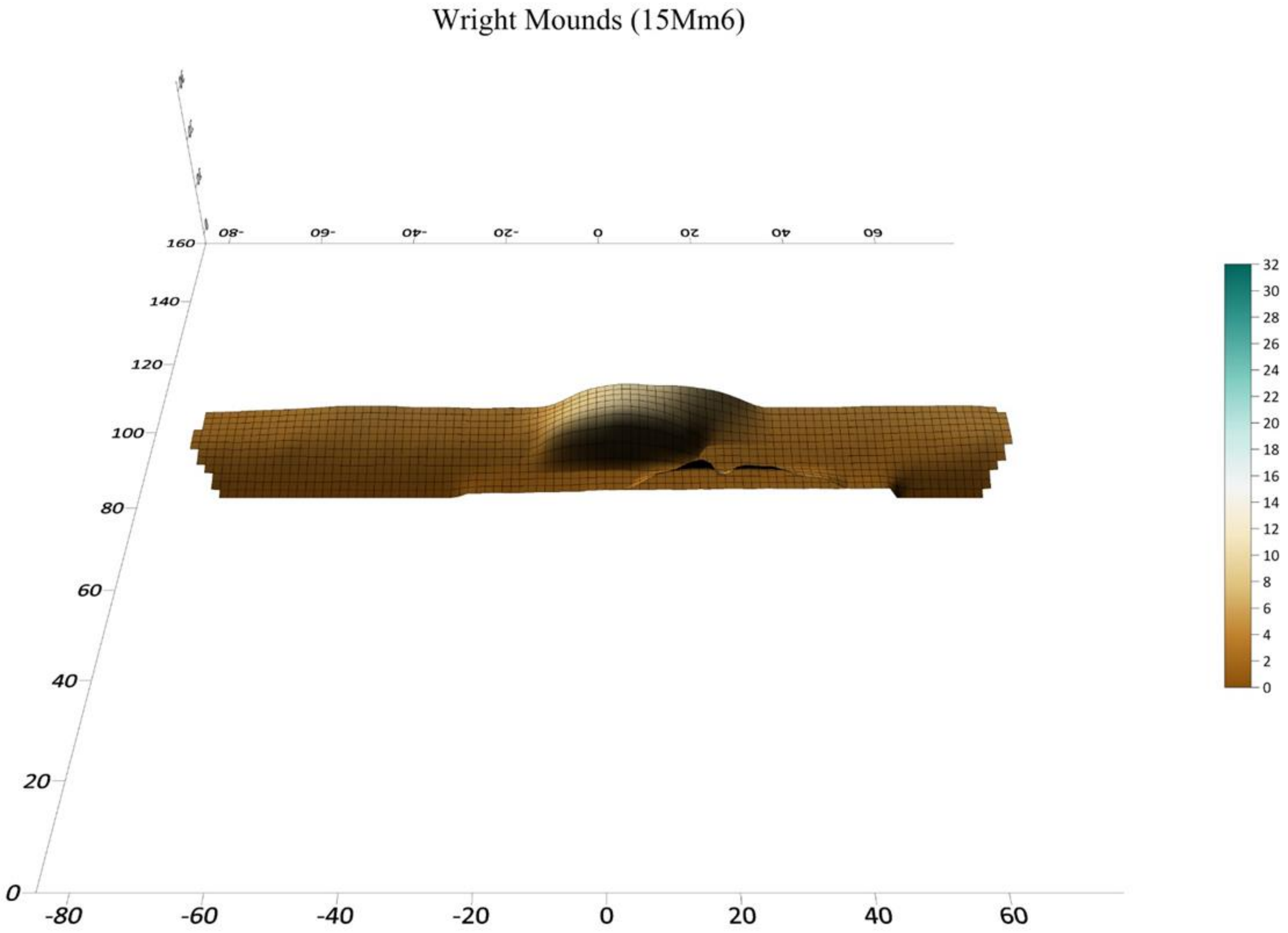


*Figure M.7***.** Wright Mound (Mm6) Sequence – 7. Deposit of a second layer of earth at the southern margin of the excavated area, slightly raising the elevation of the small mounded area.

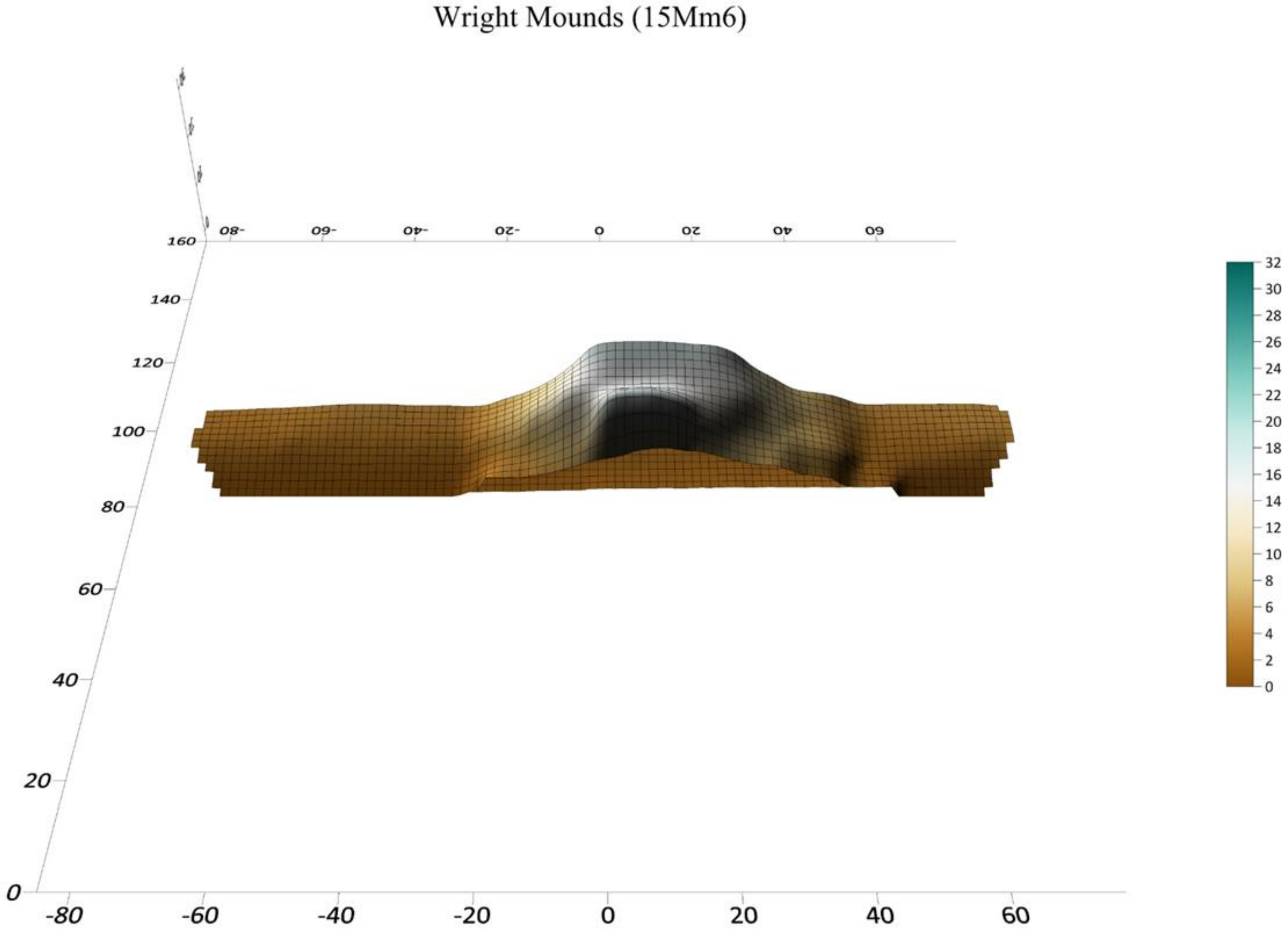


*Figure M.8***.** Wright Mound (Mm6) Sequence – 8. Primary mound structure.

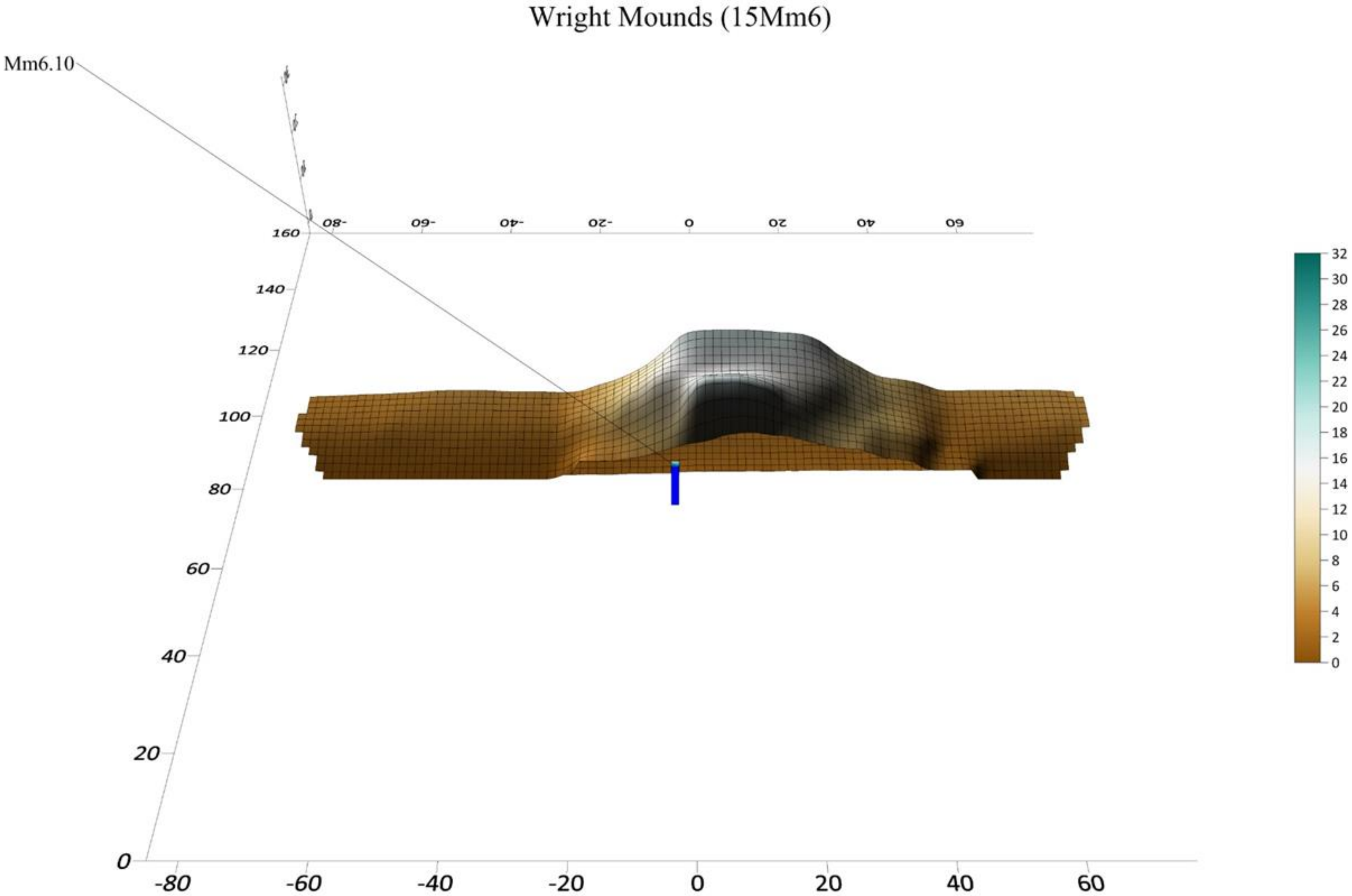


*Figure M.9***.** Wright Mound (Mm6) Sequence – 9. Placement of Mm6.10 in the third episode of interment.

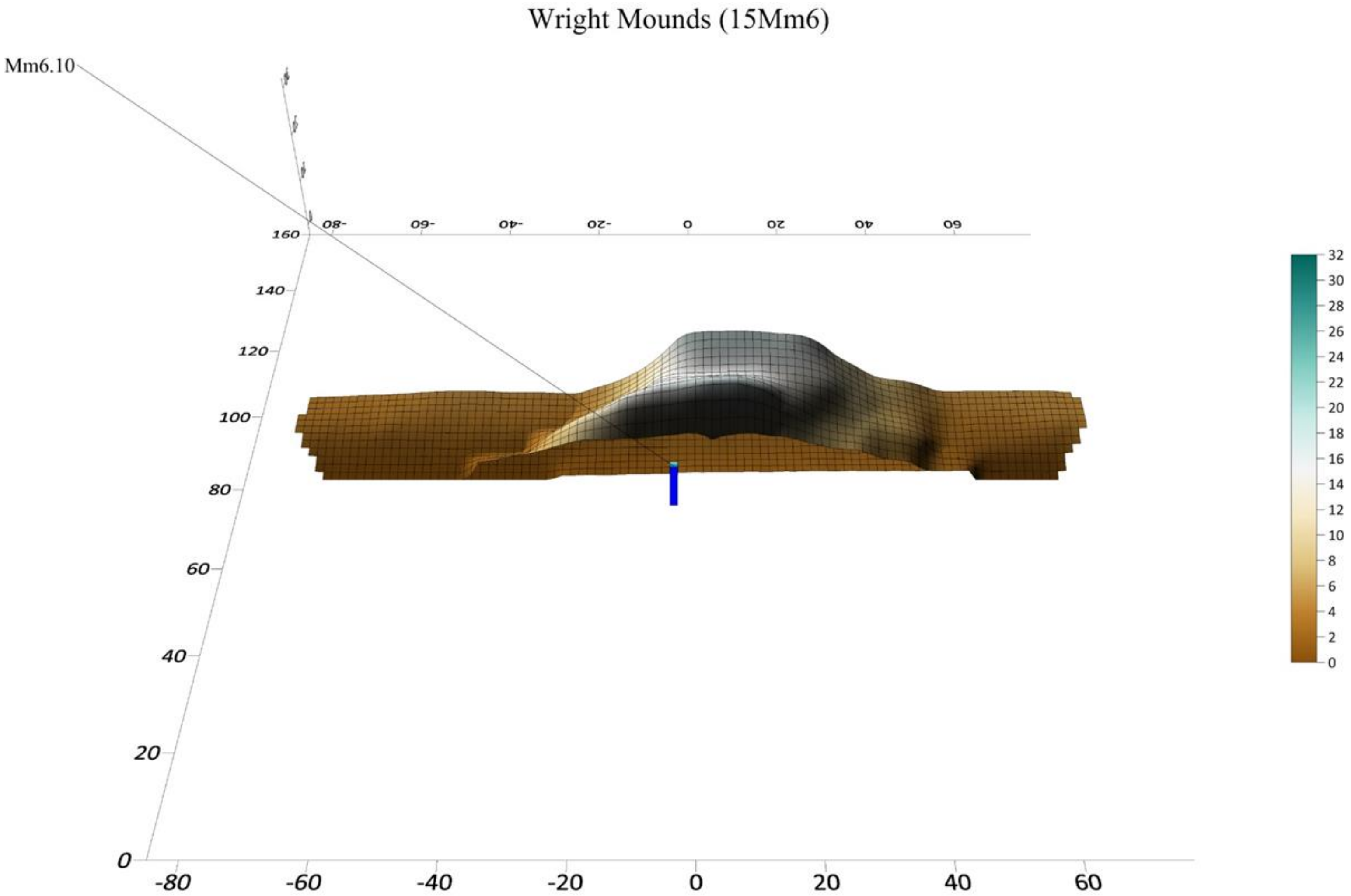


*Figure M.10***.** Wright Mound (Mm6) Sequence – 10. Extension of primary mound structure to cover the interment of Mm6.10.

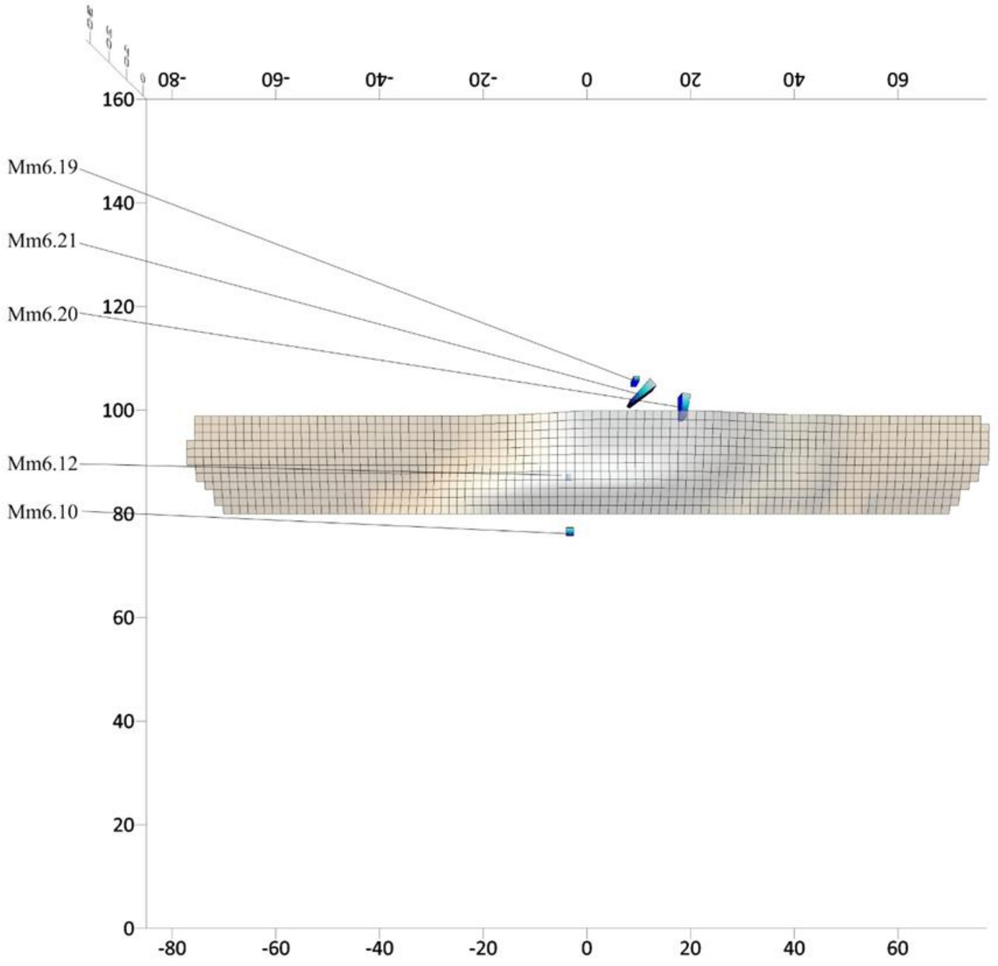
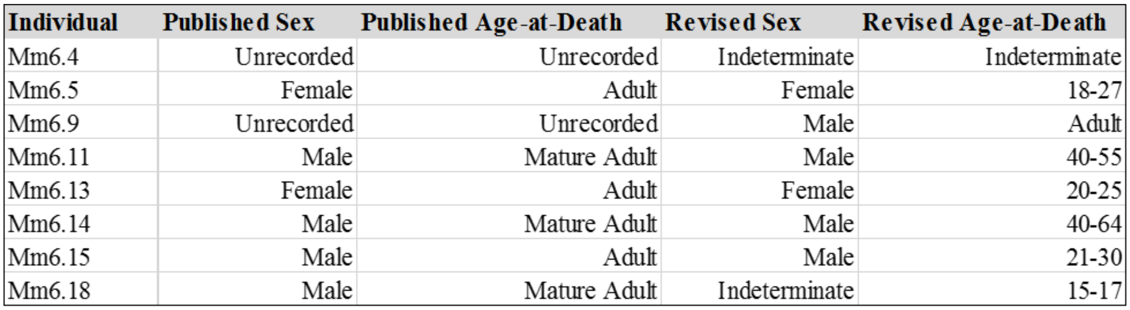


*Figure M.11***.** Wright Mound (Mm6) Sequence – 11. Spatial arrangement of Mm6.10, Mm6.12, Mm6.19, Mm6.20, and Mm6.21, with surface of primary mound structure superimposed. All of these interments were attributed by Webb (1940) to the primary mound.

Table M.4

Demographic Characteristics of Interment Episode 4

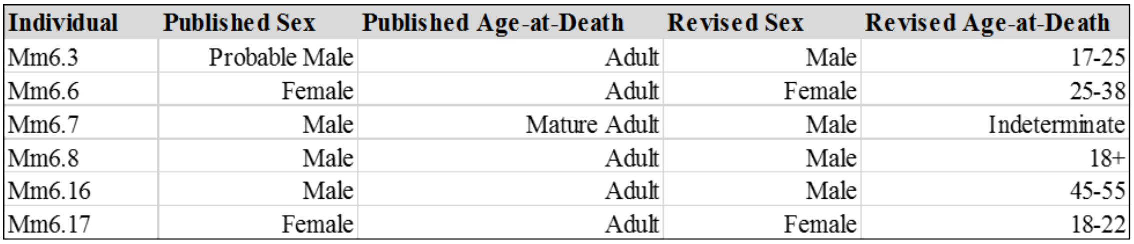


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.4	Unrecorded	Unrecorded	Indeterminate	Indeterminate
Mm6.5	Female	Adult	Female	18-27
Mm6.9	Unrecorded	Unrecorded	Male	Adult
Mm6.11	Male	Mature Adult	Male	40-55
Mm6.13	Female	Adult	Female	20-25
Mm6.14	Male	Mature Adult	Male	40-64
Mm6.15	Male	Adult	Male	21-30
Mm6.18	Male	Mature Adult	Indeterminate	15-17

See Figures M.12, M.13, and M.15

Table M.5

Demographic Characteristics of Interment Episode 5

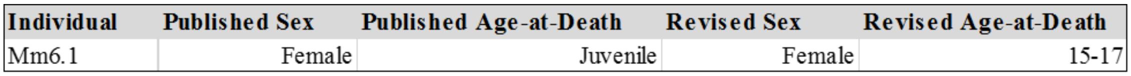


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.3	Probable Male	Adult	Male	17-25
Mm6.6	Female	Adult	Female	25-38
Mm6.7	Male	Mature Adult	Male	Indeterminate
Mm6.8	Male	Adult	Male	18+
Mm6.16	Male	Adult	Male	45-55
Mm6.17	Female	Adult	Female	18-22

See Figures M.16 through M.18

Table M.6

Demographic Characteristics of Interment Episode 6

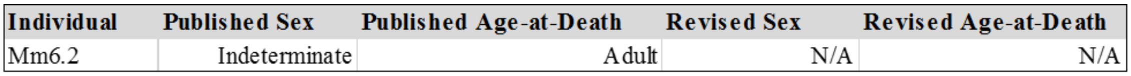


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.1	Female	Juvenile	Female	15-17

See Figures M.19 and M.22

Table M.7

Demographic Characteristics of Interment Episode 7



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm6.2	Indeterminate	Adult	N/A	N/A

See Figures M.20 and M.22

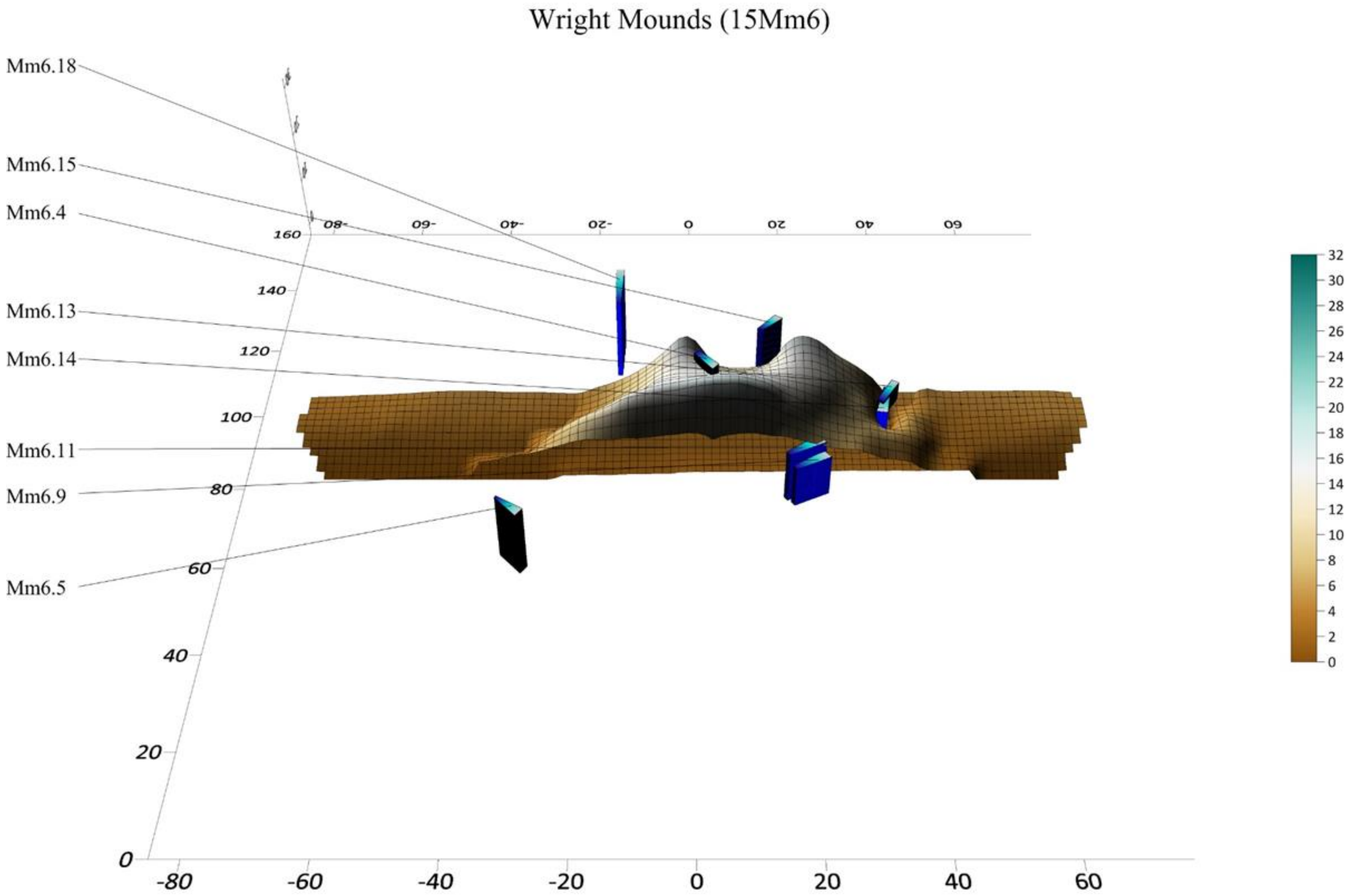


*Figure M.12***.** Wright Mound (Mm6) Sequence – 12. Placement of individuals Mm6.4, Mm6.5, Mm6.9, Mm6.11, Mm6.13, Mm6.14, Mm6.15, and Mm6.18. Webb (1940) attributes Mm6.4 to the final episode of mound construction, but reconstruction places it here, as part of the fourth episode of interment. Note tomb cavity excavated into the top of the primary mound structure.

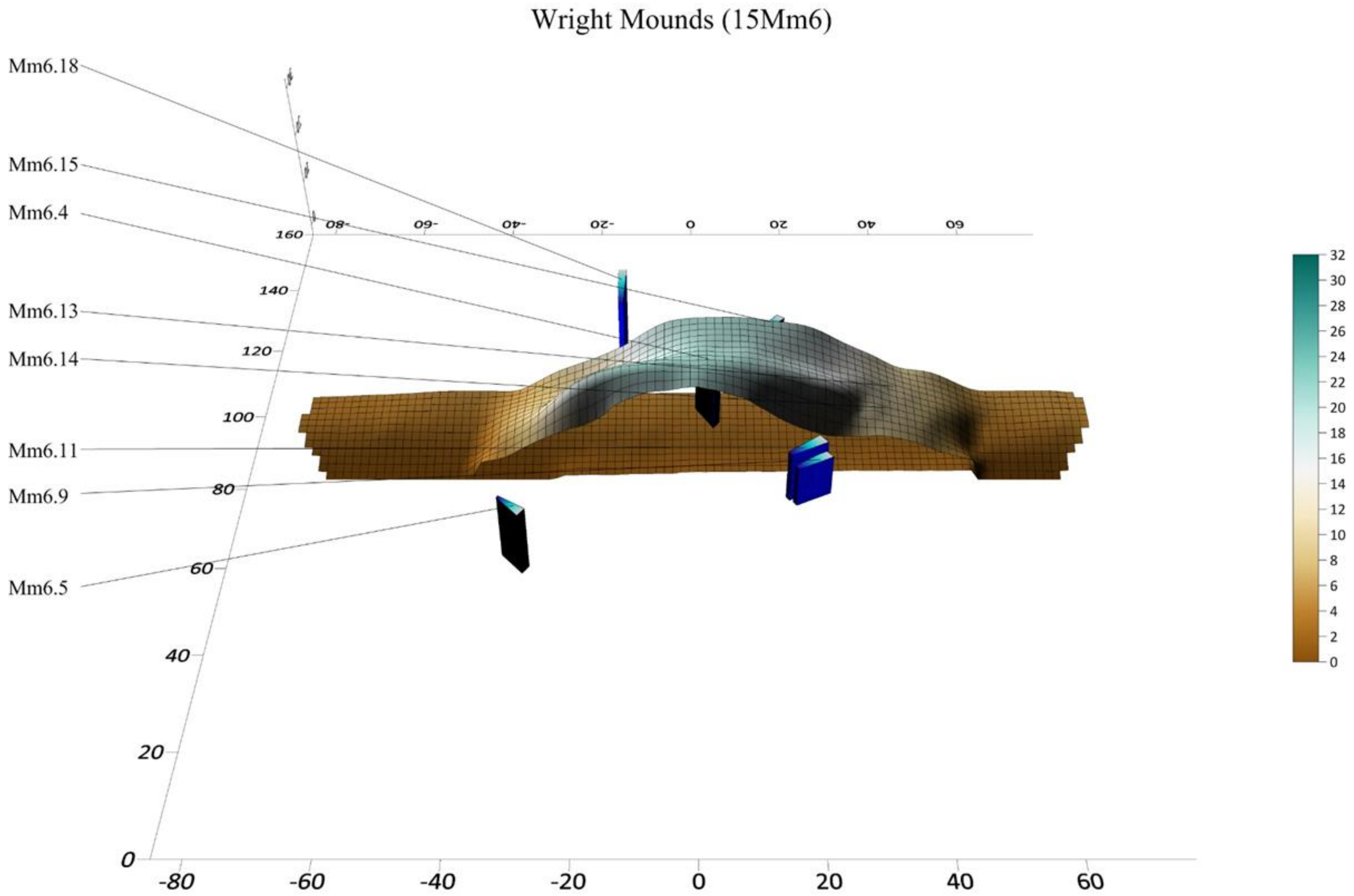


*Figure M.13***.** Wright Mound (Mm6) Sequence – 13. Mound surface after the deposition of earth covering the fourth interment episode. This surface coincides more or less with what Webb (1940) refers to as the secondary mound.

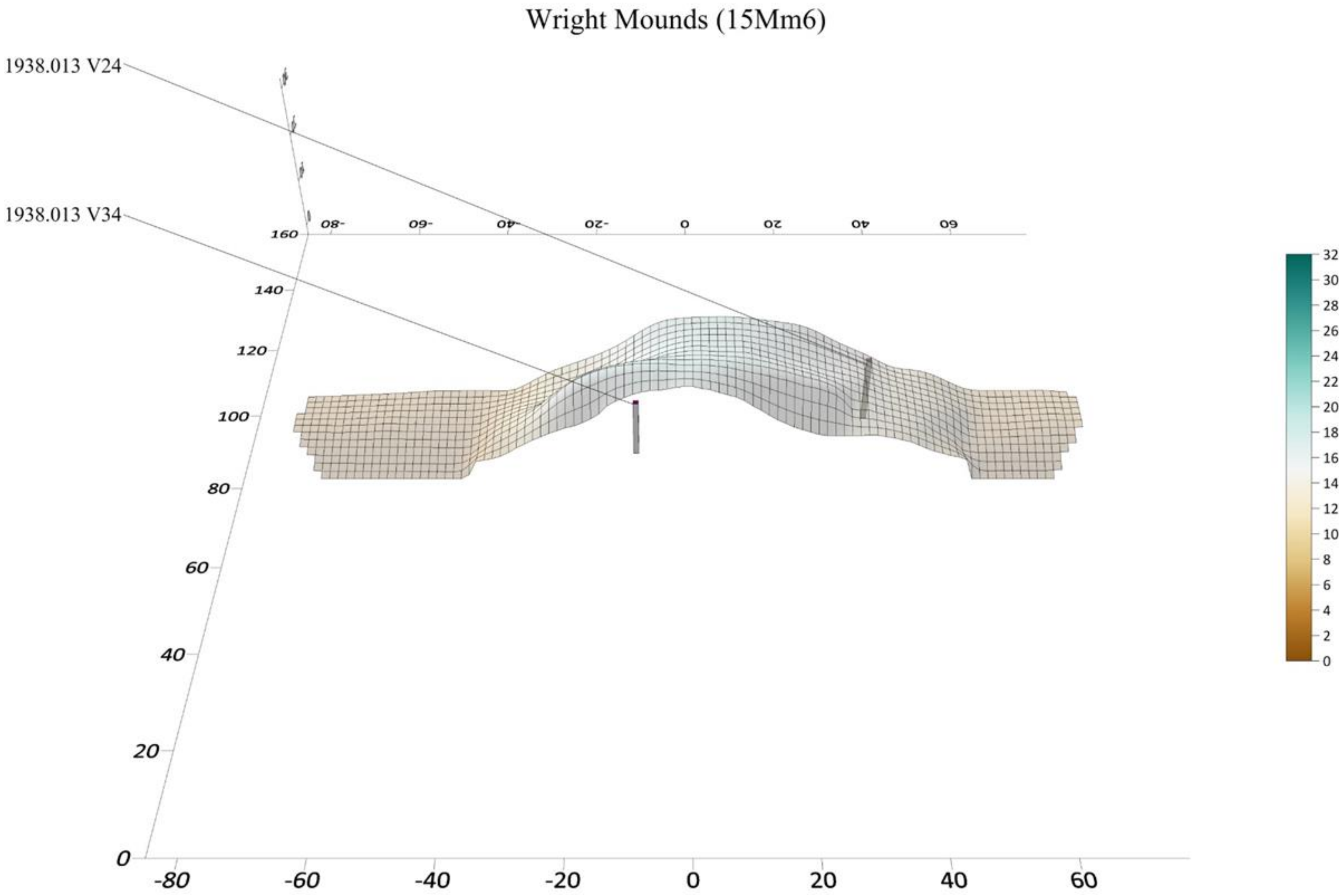


*Figure M.14***.** Wright Mound (Mm6) Sequence – 14. Estimated locations from which 1938.013 V24 and 1938.013 V34, samples submitted for radiocarbon dating, were recovered from the fill of Webb's (1940) secondary mound.

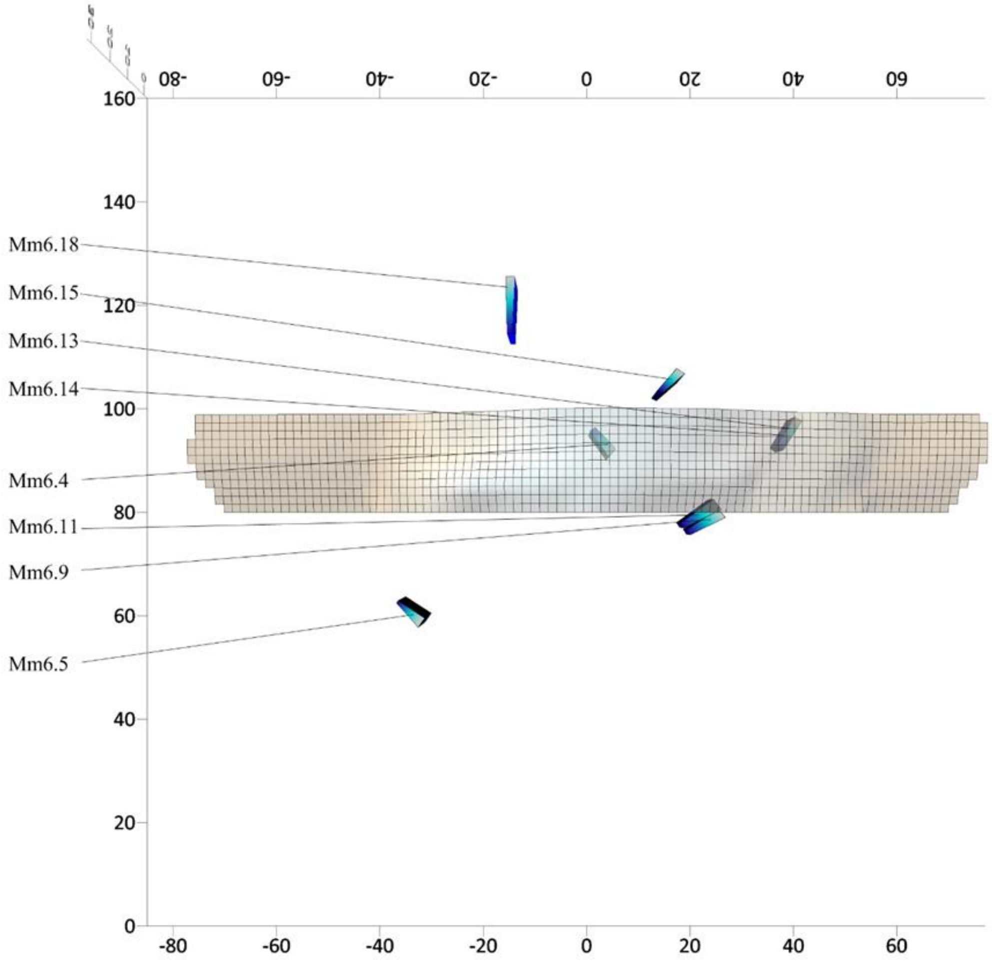


*Figure M.15***.** Wright Mound (Mm6) Sequence – 15. Spatial arrangement of individuals in the fourth interment episode, with surface corresponding to Webb's (1940) secondary mound superimposed. With the exception of Mm6.4, all individuals were attributed by Webb to the fill of the secondary mound.

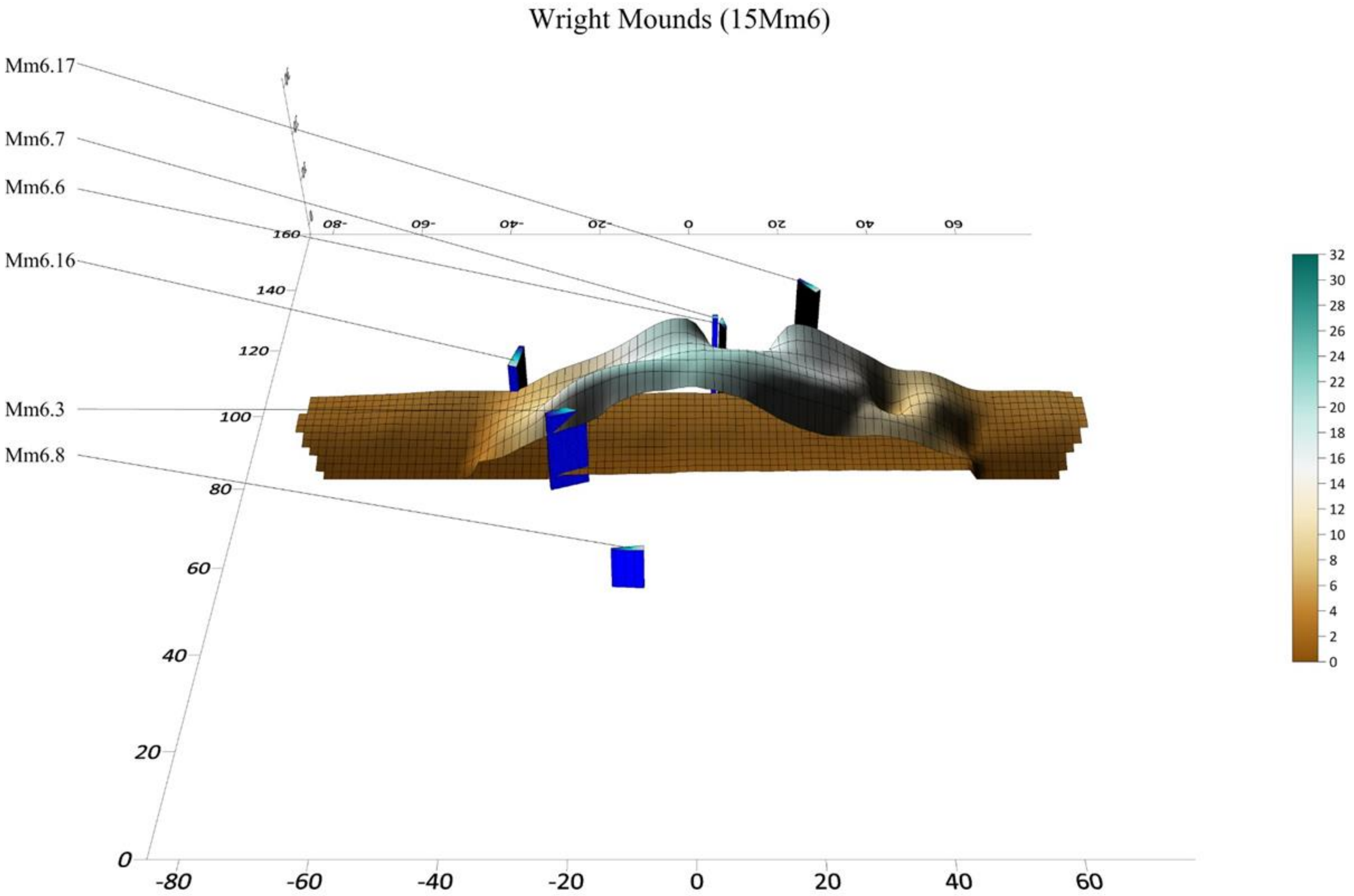


*Figure M.16***.** Wright Mound (Mm6) Sequence – 16. Placement of individuals Mm6.3, Mm6.6, Mm6.7, Mm6.8, Mm6.16, and Mm6.17 in the fifth episode of interment. Note the excavation of tomb cavities into the surface of Webb's (1940) secondary mound.

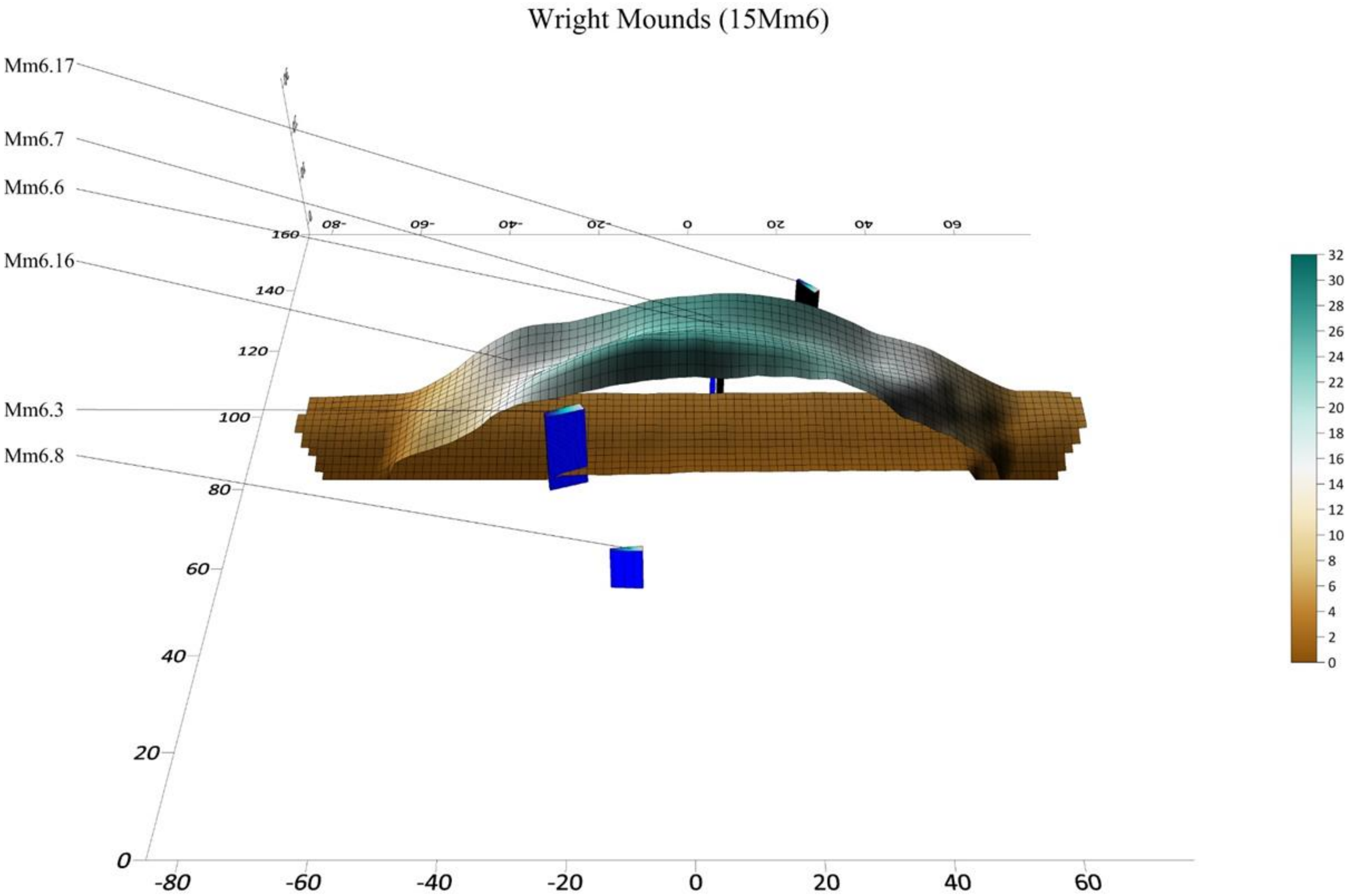


*Figure M.17***.** Wright Mound (Mm6) Sequence – 17. Mound surface after the deposition of earth covering the fifth interment episode. This surface coincides more or less with what Webb (1940) refers to as the tertiary mound.

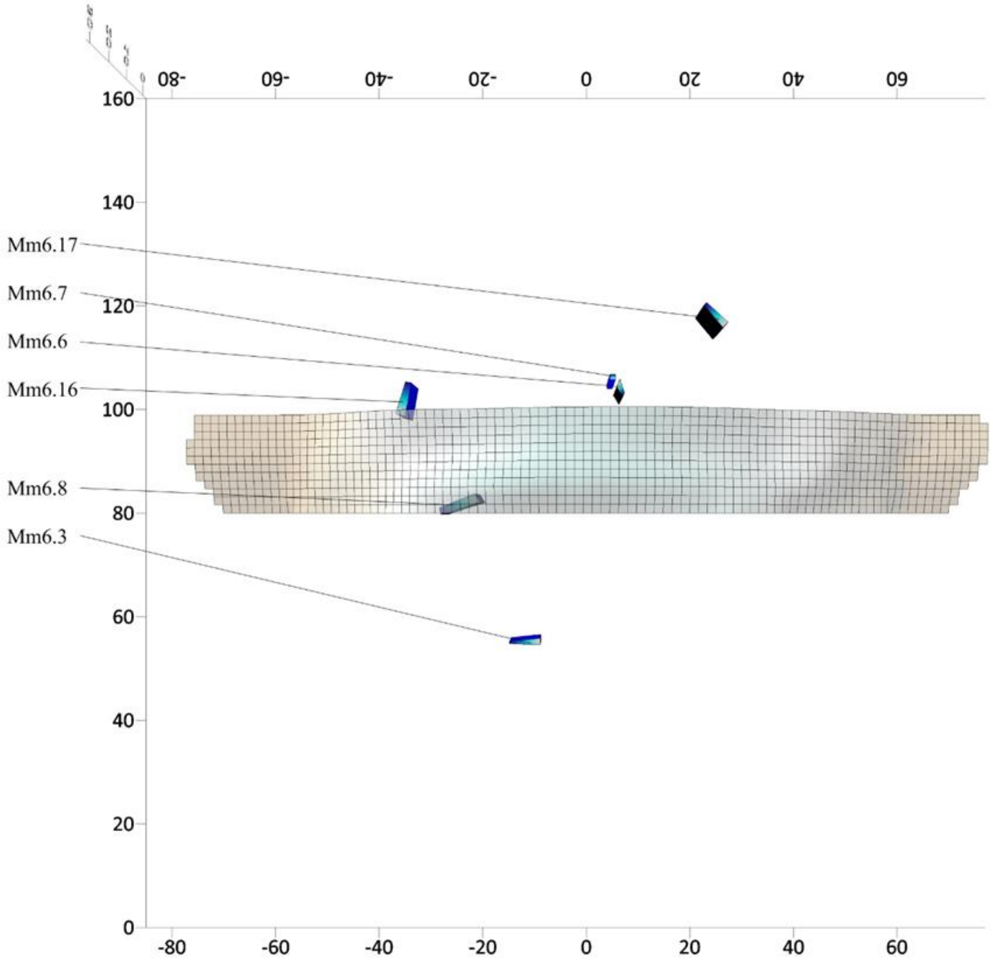


*Figure M.18***.** Wright Mound (Mm6) Sequence – 18. Spatial arrangement of individuals in the fifth interment episode, with surface corresponding to Webb’s (1940) tertiary mound superimposed. All of these individuals were attributed by Webb (1940) to the fill of his tertiary mound.

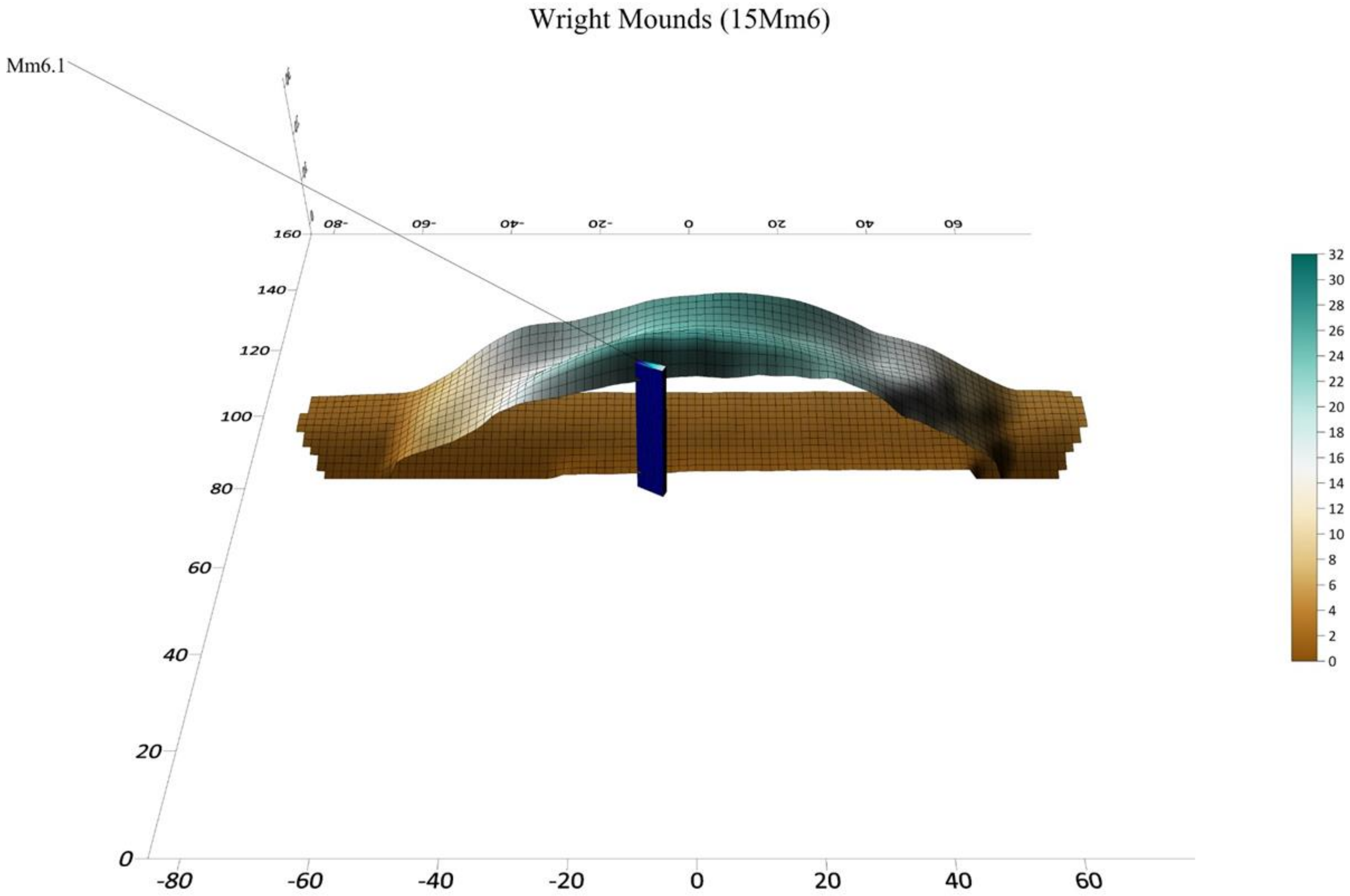


*Figure M.19***.** Wright Mound (Mm6) Sequence – 19. Placement of Mm6.1 above the surface corresponding to the tertiary mound and within the fill of what Webb (1940) refers to as the quaternary mound. This represents the sixth episode of interment.

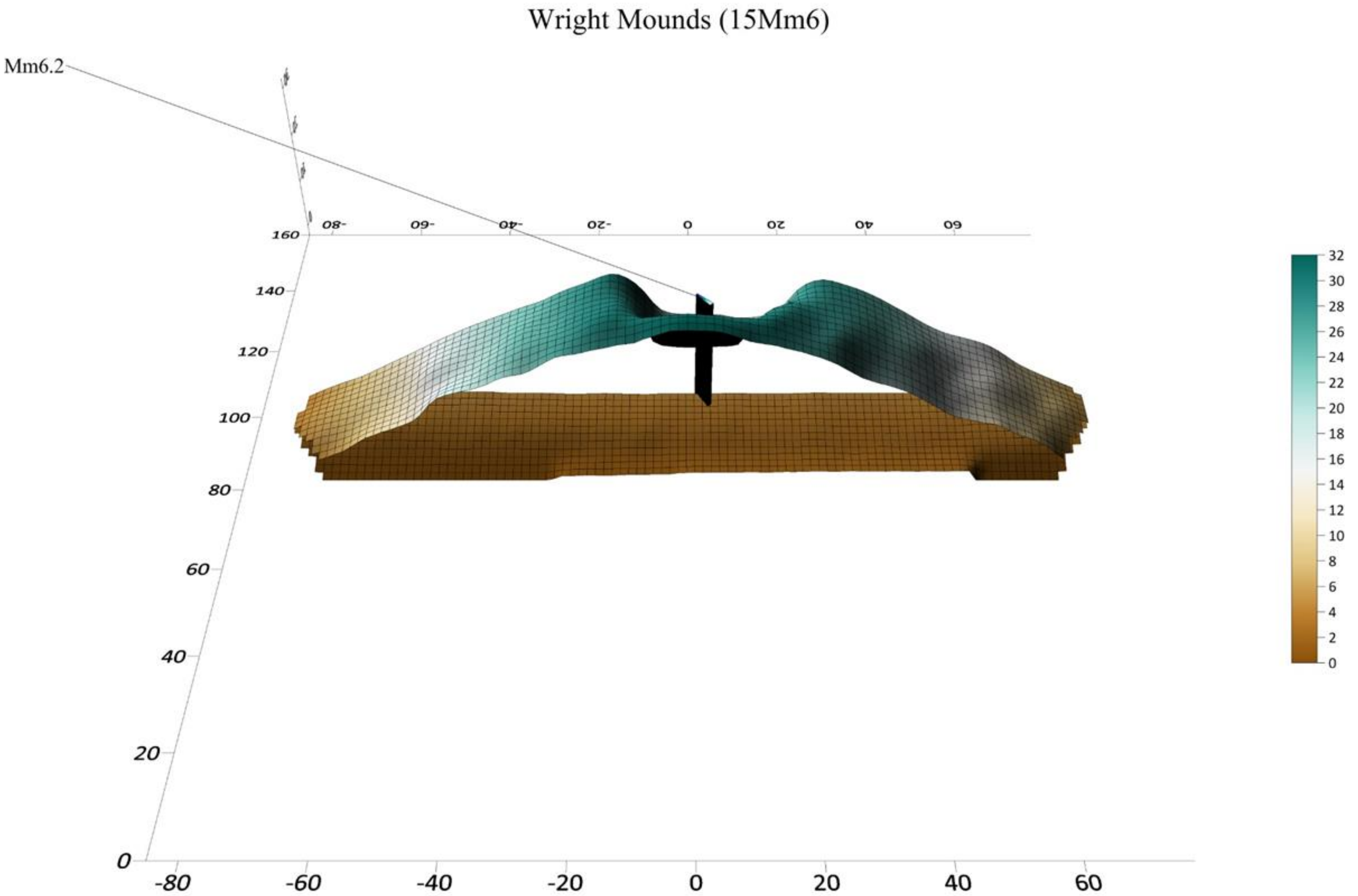


*Figure M.20***.** Wright Mound (Mm6) Sequence – 20. Placement of Mm6.2 within a tomb cavity excavated from the apex of the surface corresponding to what Webb (1940) refers to as the quaternary mound. This represents a seventh episode of interment.

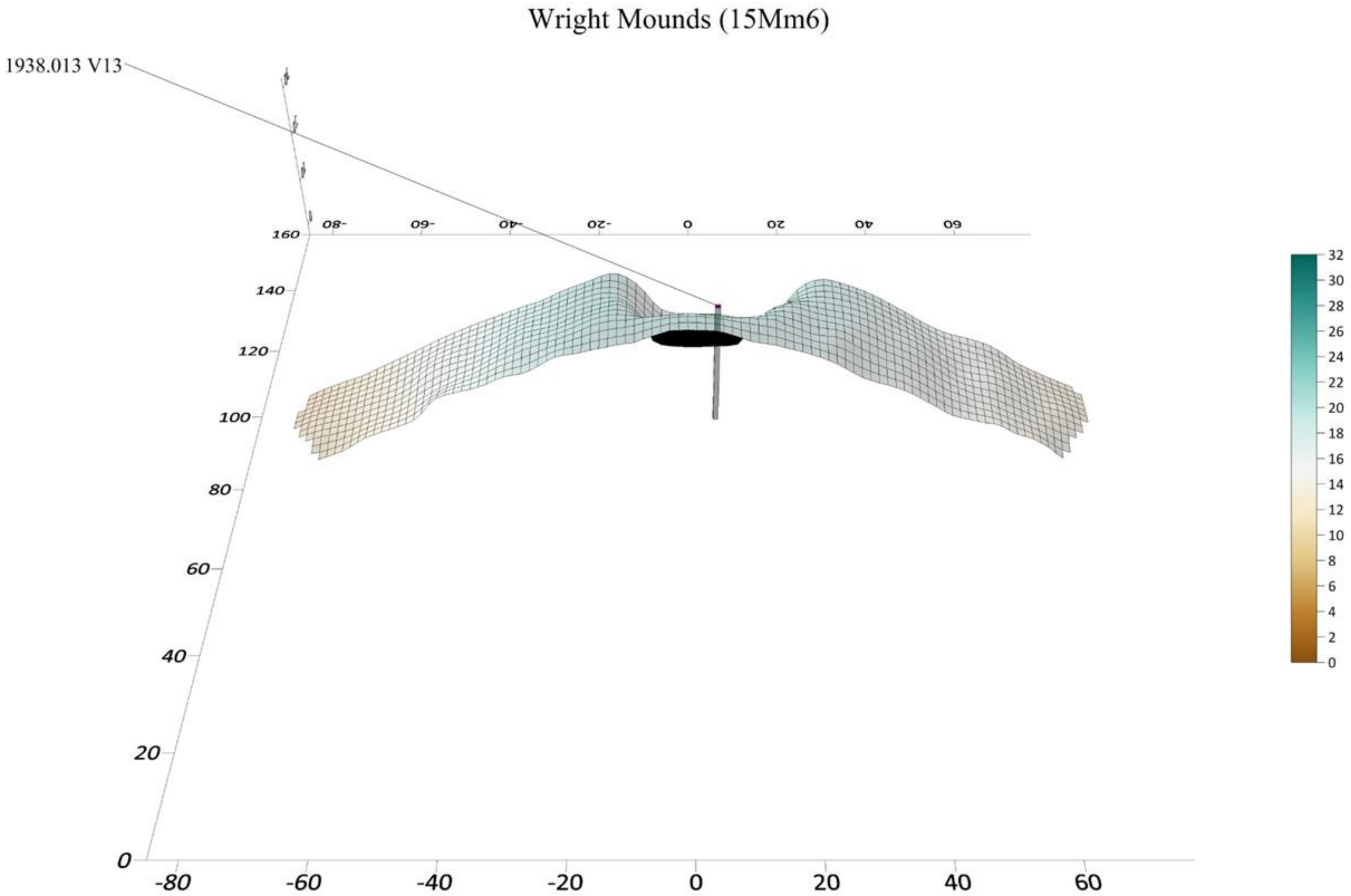


*Figure M.21***.** Wright Mound (Mm6) Sequence – 21. Estimated location from which 1938.013 V13, a sample submitted for radiocarbon dating, was recovered from the mound.

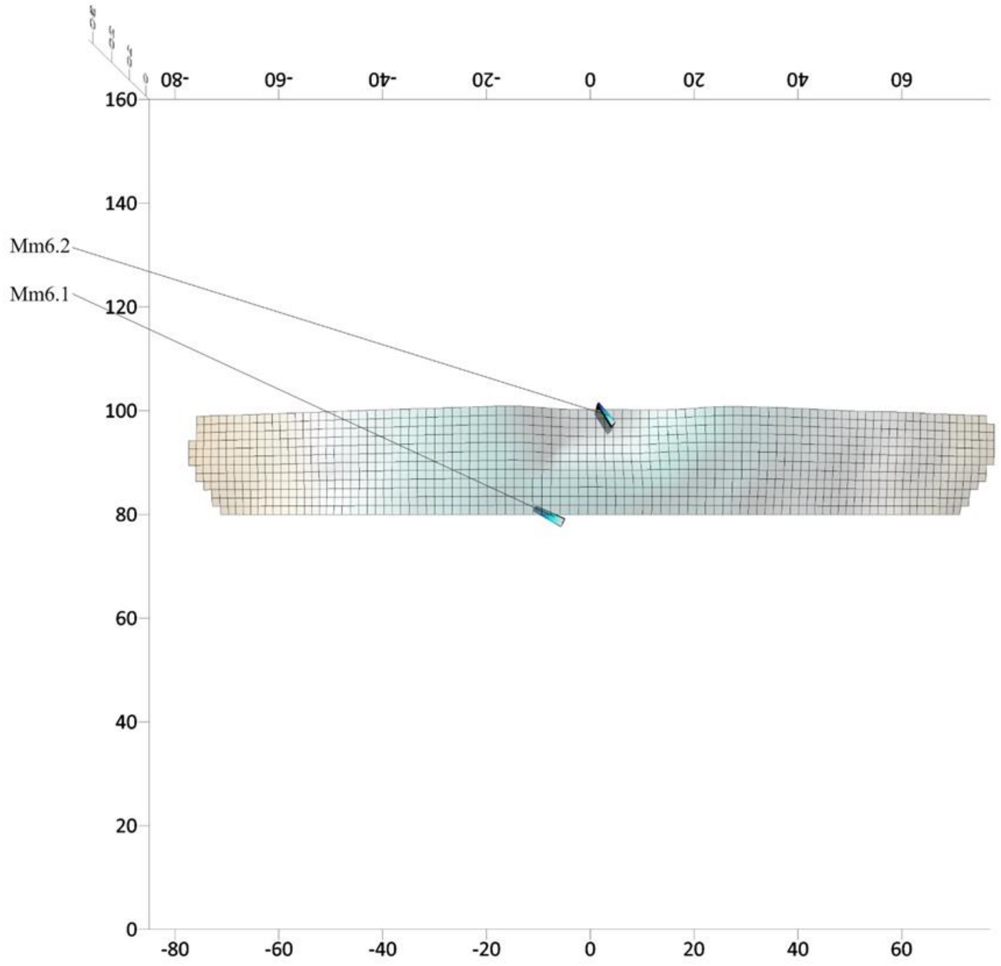


*Figure M.22***.** Wright Mound (Mm6) Sequence – 22. Spatial arrangement of Mm6.1 and Mm6.2 with surface corresponding to Webb's (1940) quaternary mound superimposed. Both of these individuals, as well as Mm6.4, were attributed by Webb to the fill of the quaternary mound.

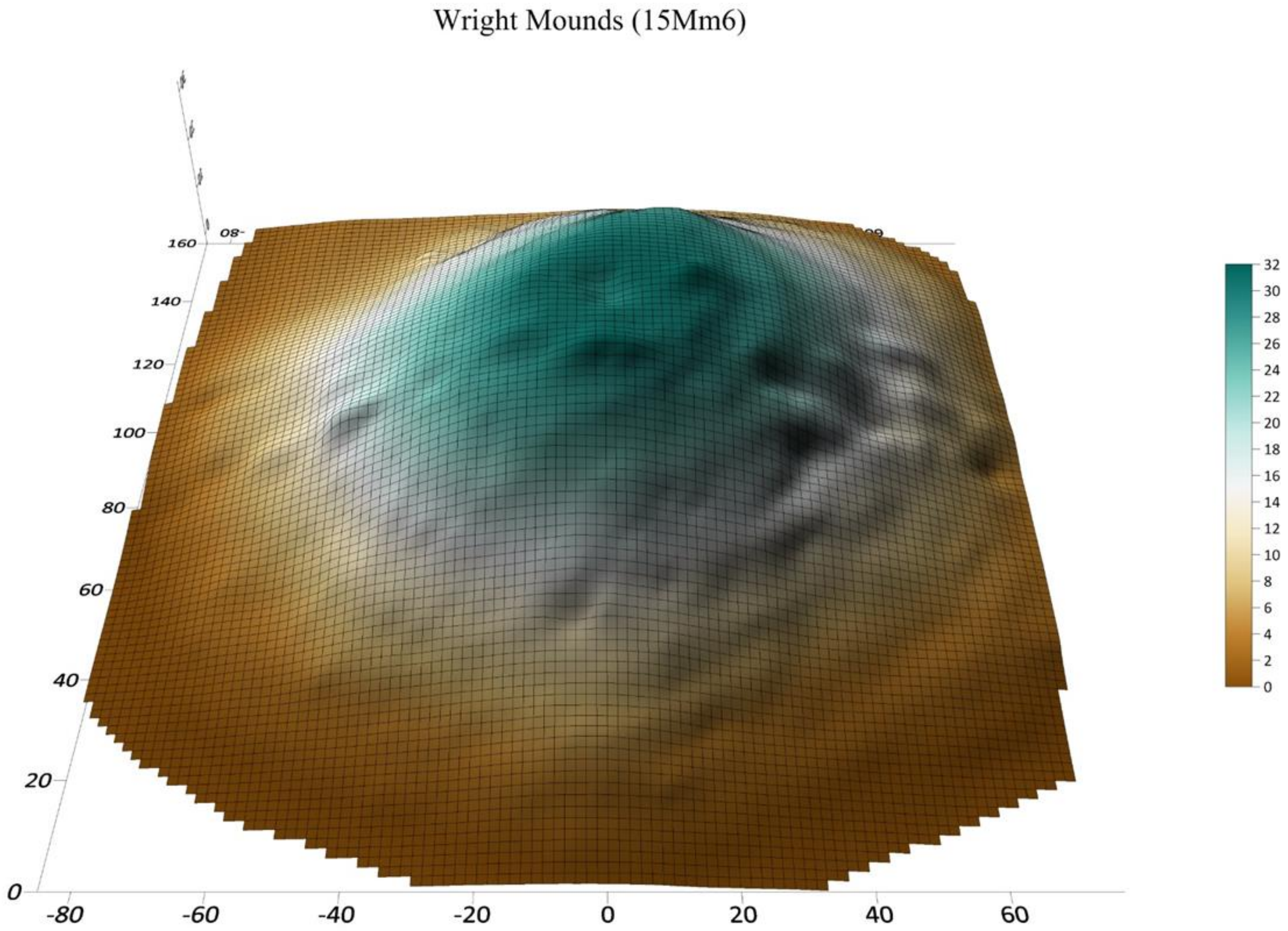


*Figure M.23***.** Wright Mound (Mm6) Sequence – 23. Surface of mound at the time of its excavation.

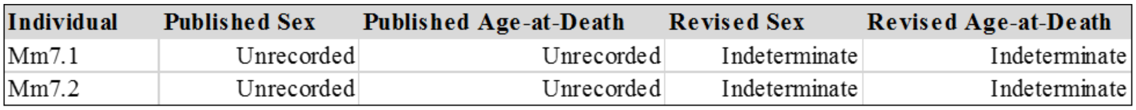
APPENDIX N

CONSTRUCTION SEQUENCE FOR THE WRIGHT MOUND (15MM7)

The purpose of this appendix is to provide visual representations of the sequence of construction for the smaller Wright mound (15Mm7) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red.

Table N.1

Demographic Characteristics of Interment Episode 1



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Mm7.1	Unrecorded	Unrecorded	Indeterminate	Indeterminate
Mm7.2	Unrecorded	Unrecorded	Indeterminate	Indeterminate

See Figures N.2, N.3, and N.7

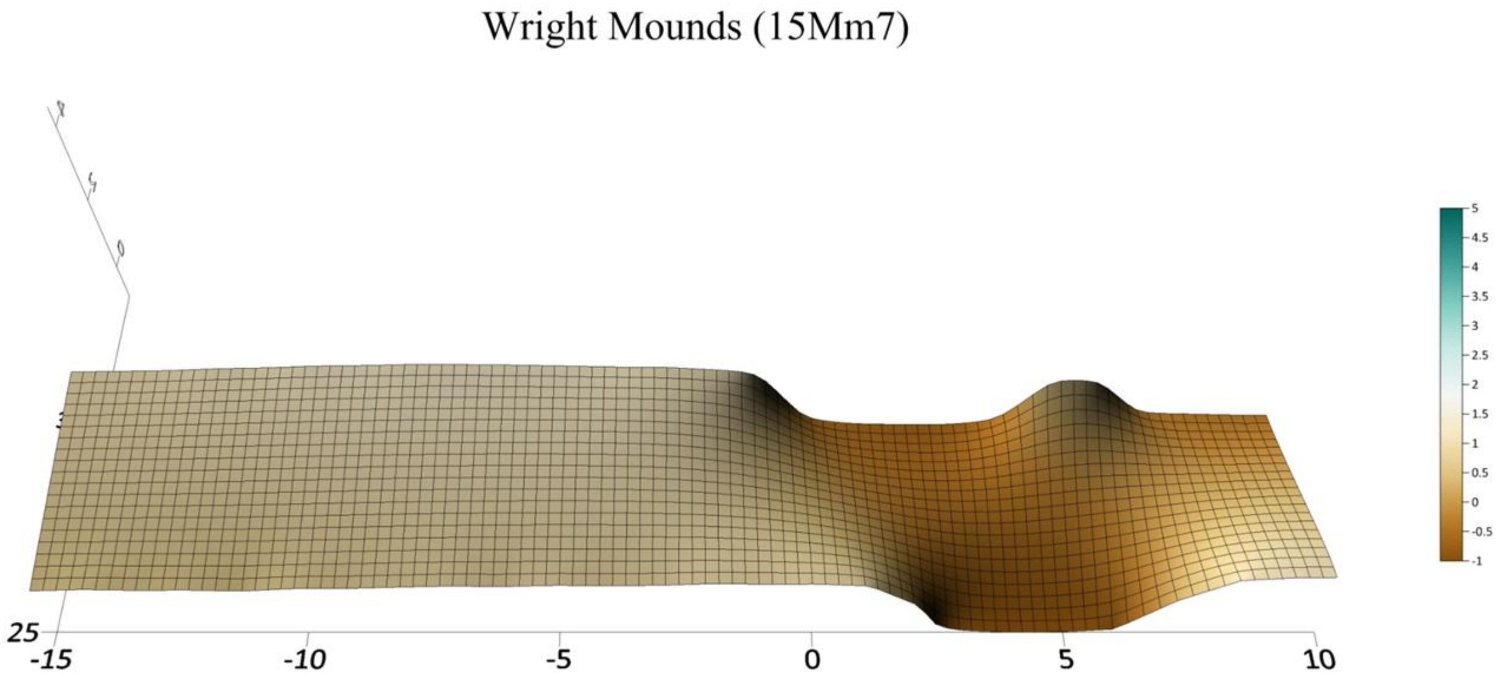


*Figure N.1***.** Wright Mound (Mm7) Sequence – 1. Hardpan and prehistoric excavation into the hardpan.

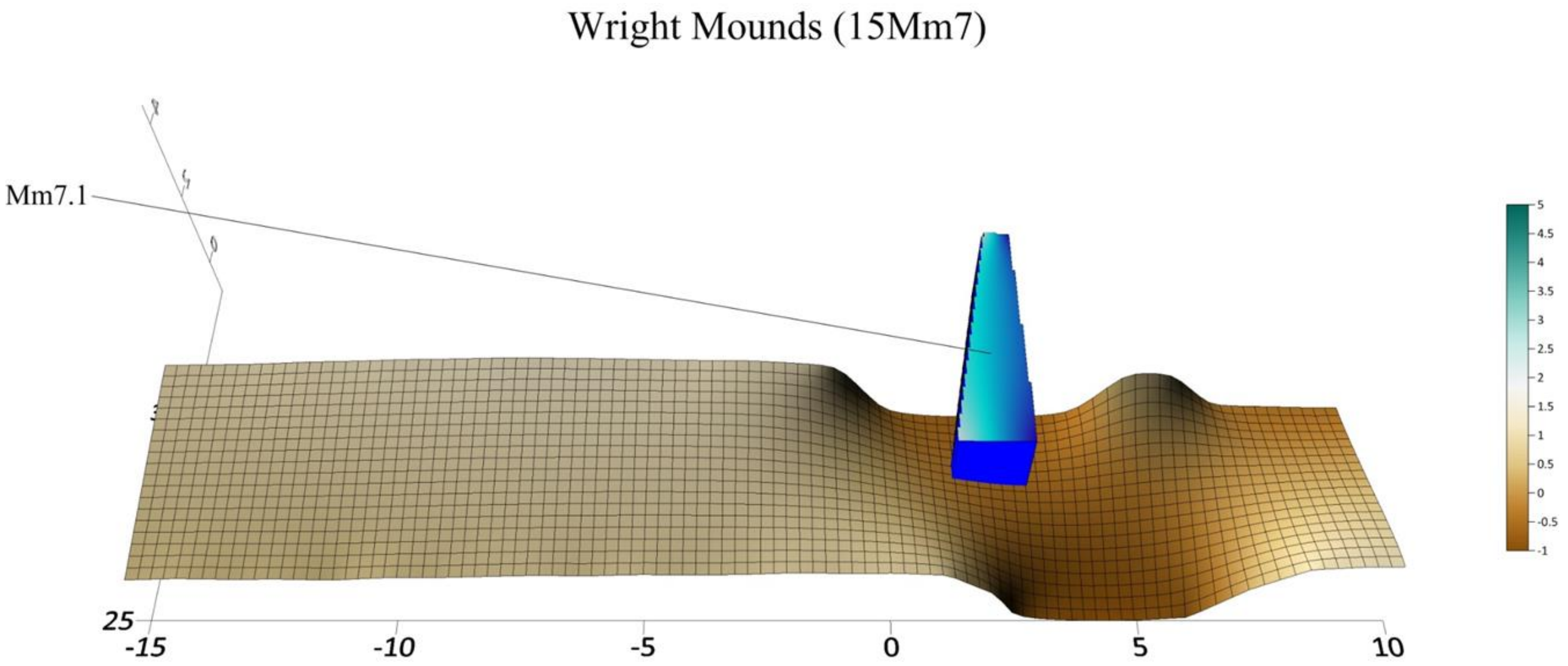


*Figure N.2***.** Wright Mound (Mm7) Sequence – 2. Placement of Mm7.1. The location of Mm7.2 is outside of the area for which spatial data was available. These two burials represent a single episode of interment.

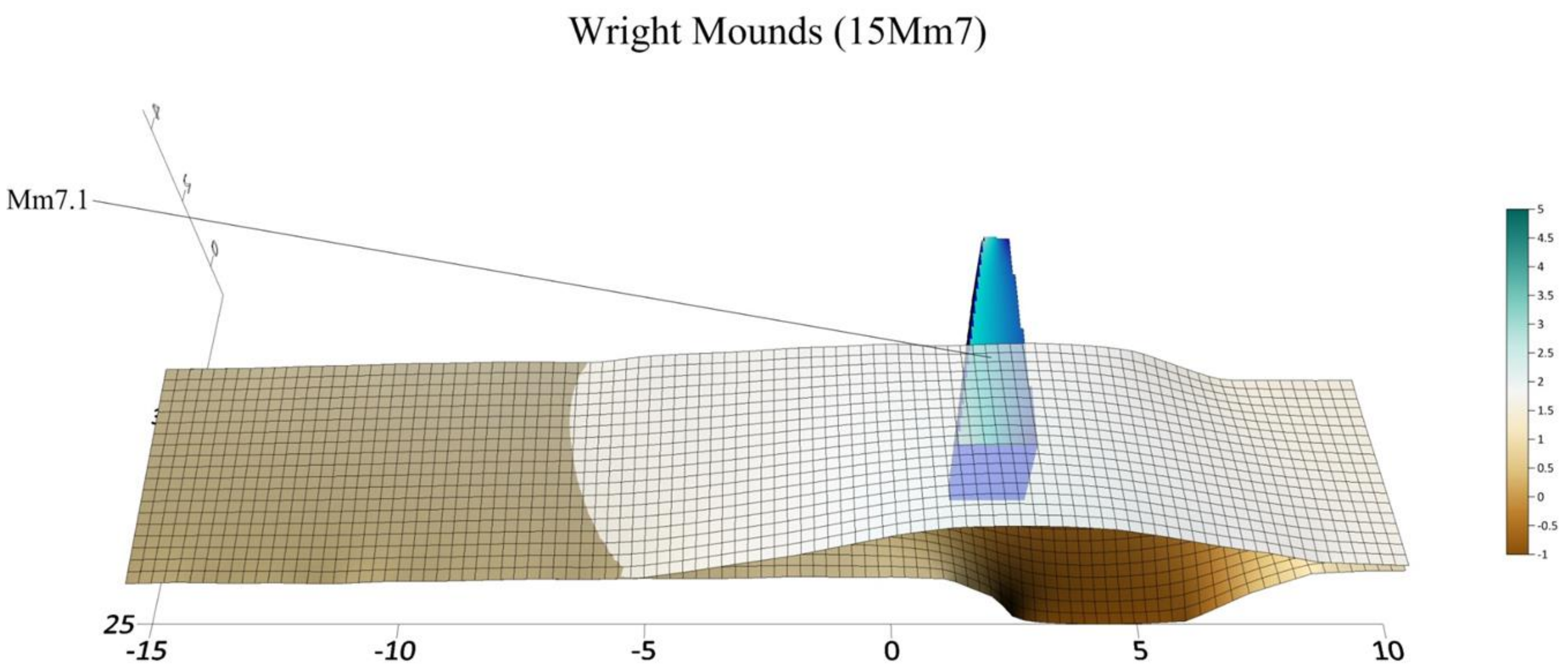


Figure N.3. Wright Mound (Mm7) Sequence – 3. A layer of ashes and midden material deposited over Mm7.1. This layer has been rendered transparent to better visualize the depth to which it covers the interment of Mm7.1.

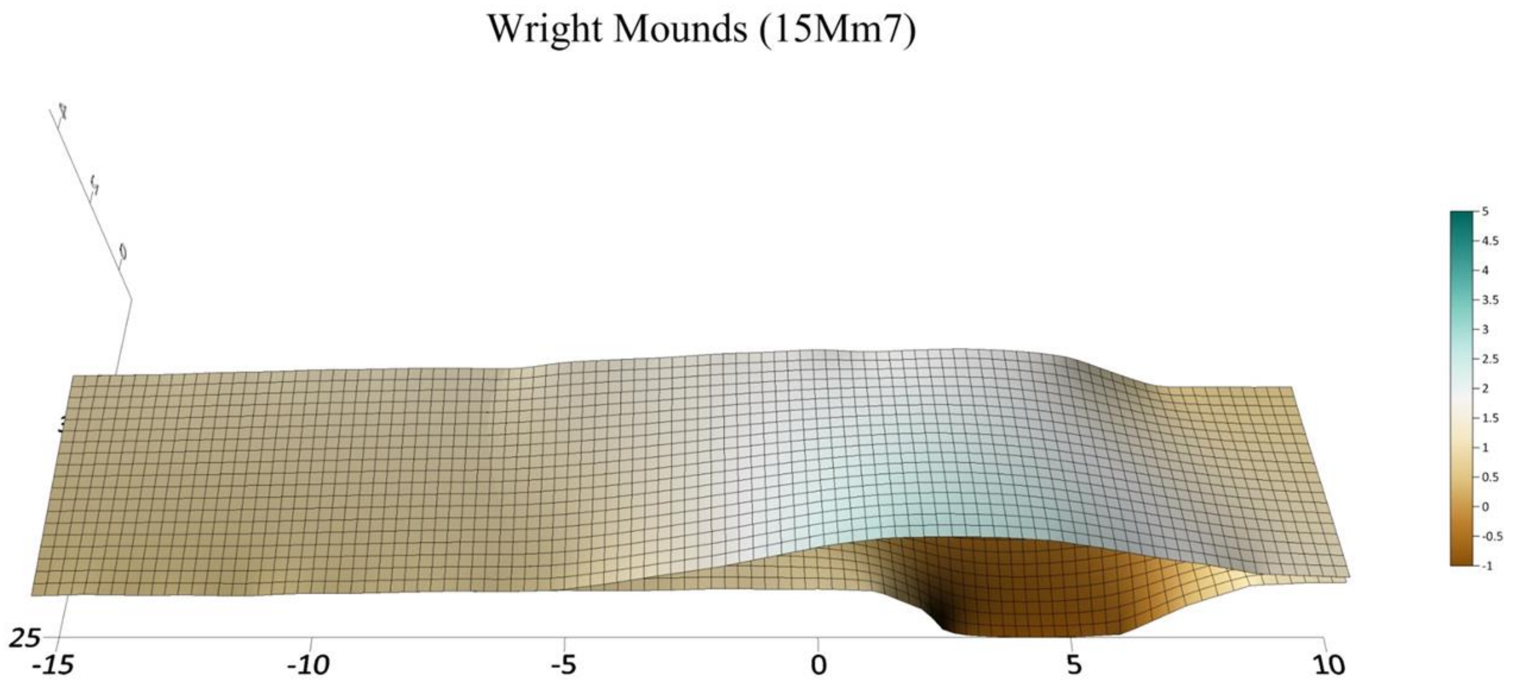


*Figure N.4***.** Wright Mound (Mm7) Sequence – 4. Midden and ash layer covering burials.

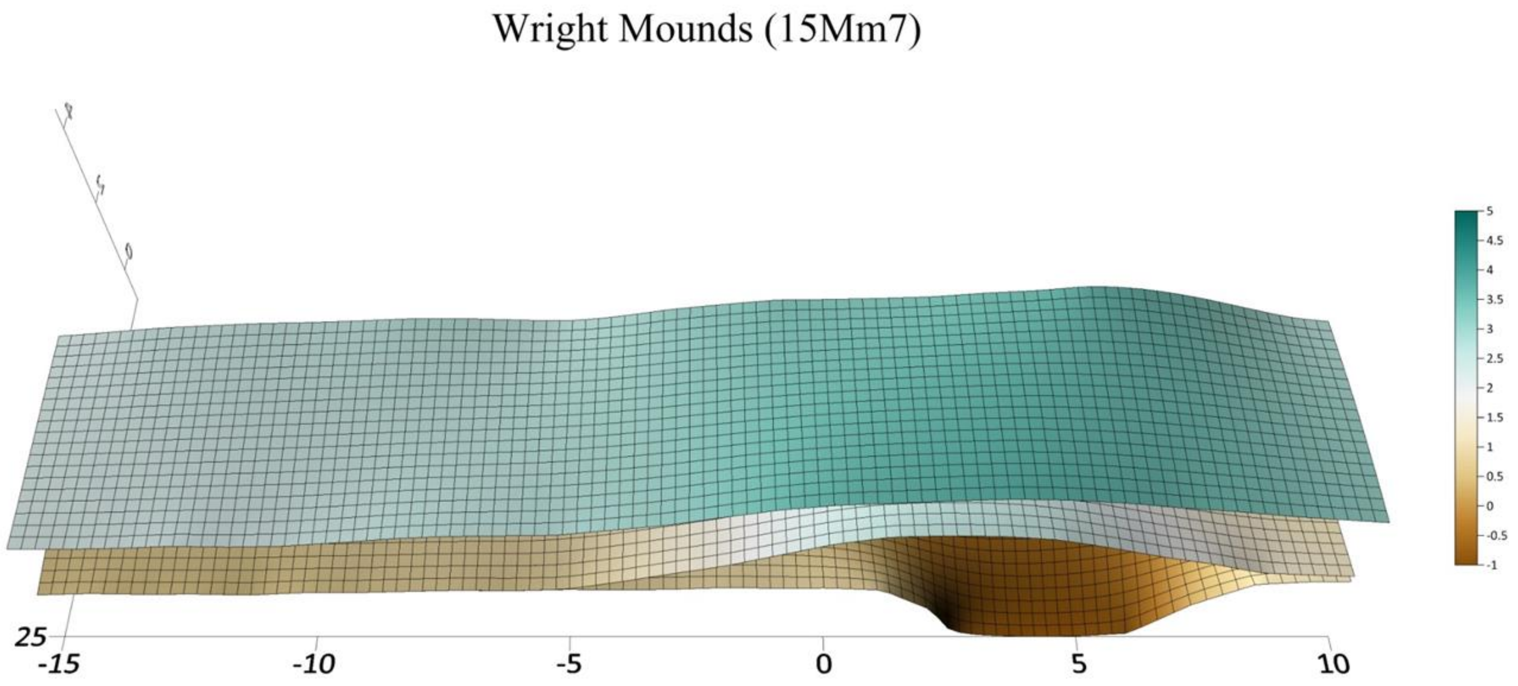


*Figure N.5***.** Wright Mound (Mm7) Sequence – 5. A layer of ‘made earth’ was deposited over the layer of ash and midden materials.

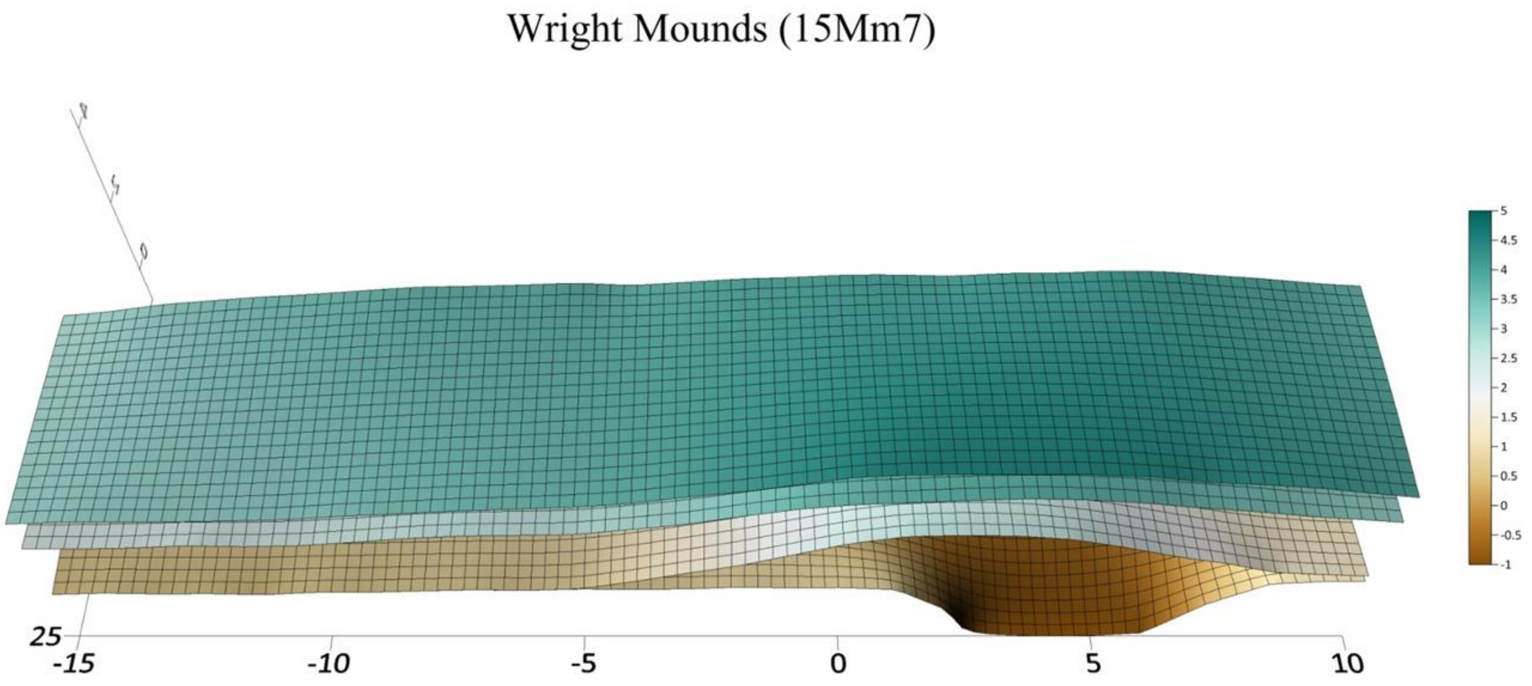

Wright Mounds (15Mm7)

*Figure N.6***.** Wright Mound (Mm7) Sequence – 6. Surface of the mound at the time of excavation.

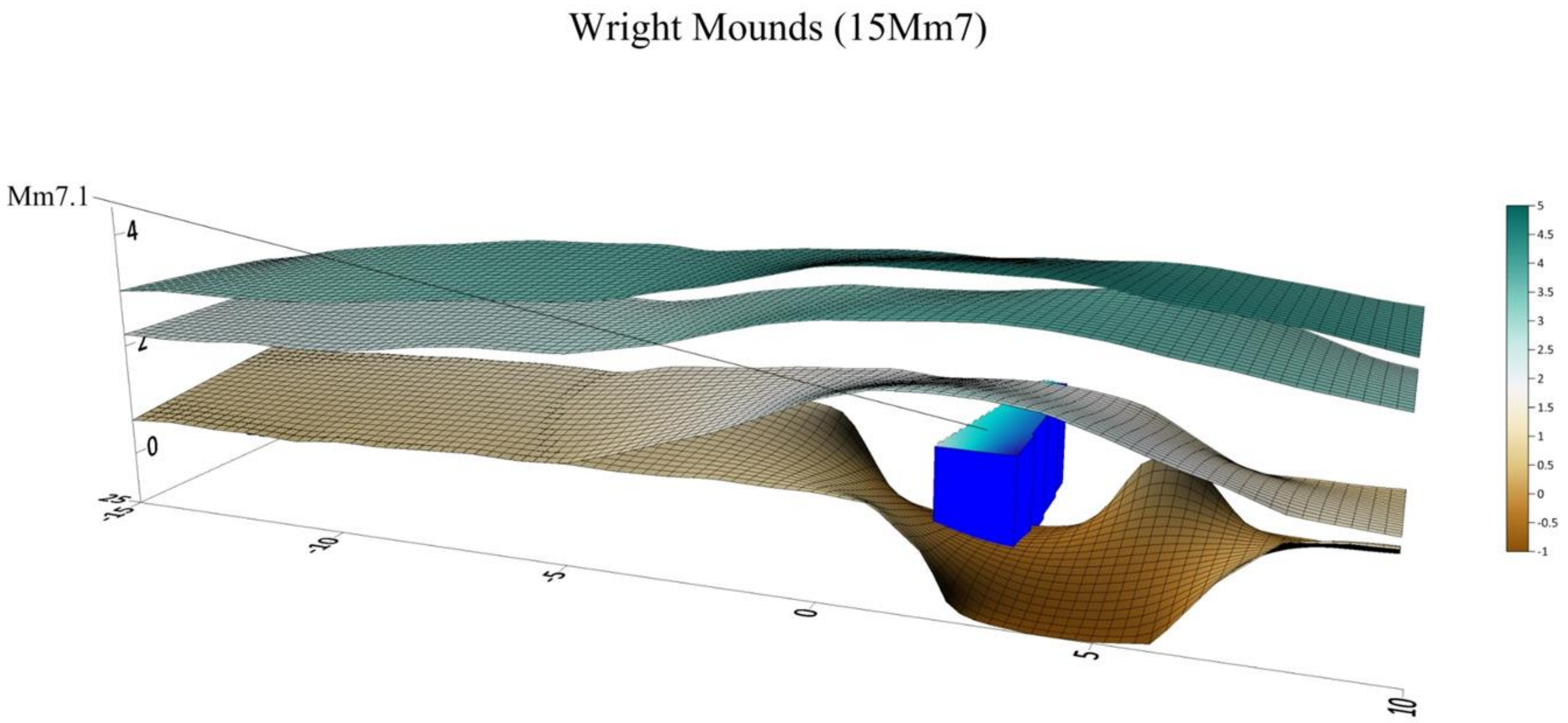


*Figure N.7***.** Wright Mound (Mm7) Sequence – 7. Rotated view to better illustrate the relationship of the stratigraphic layers to each other. This view is facilitated by the relatively simple structure of this mound.

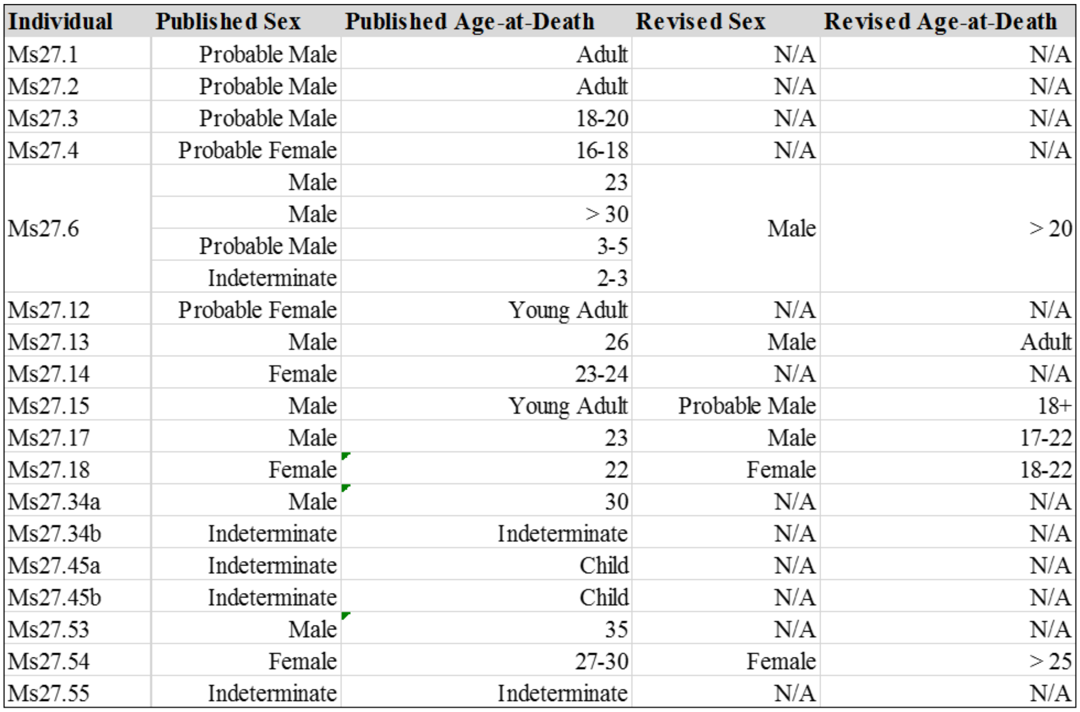
APPENDIX O

CONSTRUCTION SEQUENCE FOR THE DOVER MOUND (15MS27)

The purpose of this appendix is to provide visual representations of the sequence of construction for the Dover mound (15Ms27) as well as descriptions of the demographic characteristics of the burials in each distinguishable group of interments. In the following images, the color scale to the right indicates relative elevations of the mound surfaces. Inhumations are depicted in blue and cremations as well as partial cremations are depicted in red.

Table O.1

Demographic Characteristics of Interment Episode 1



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Ms27.1	Probable Male	Adult	N/A	N/A
Ms27.2	Probable Male	Adult	N/A	N/A
Ms27.3	Probable Male	18-20	N/A	N/A
Ms27.4	Probable Female	16-18	N/A	N/A
Ms27.6	Male	23	Male	> 20
	Male	> 30		
	Probable Male	3-5		
	Indeterminate	2-3		
Ms27.12	Probable Female	Young Adult	N/A	N/A
Ms27.13	Male	26	Male	Adult
Ms27.14	Female	23-24	N/A	N/A
Ms27.15	Male	Young Adult	Probable Male	18+
Ms27.17	Male	23	Male	17-22
Ms27.18	Female	22	Female	18-22
Ms27.34a	Male	30	N/A	N/A
Ms27.34b	Indeterminate	Indeterminate	N/A	N/A
Ms27.45a	Indeterminate	Child	N/A	N/A
Ms27.45b	Indeterminate	Child	N/A	N/A
Ms27.53	Male	35	N/A	N/A
Ms27.54	Female	27-30	Female	> 25
Ms27.55	Indeterminate	Indeterminate	N/A	N/A

See Figures O.3 and O.4

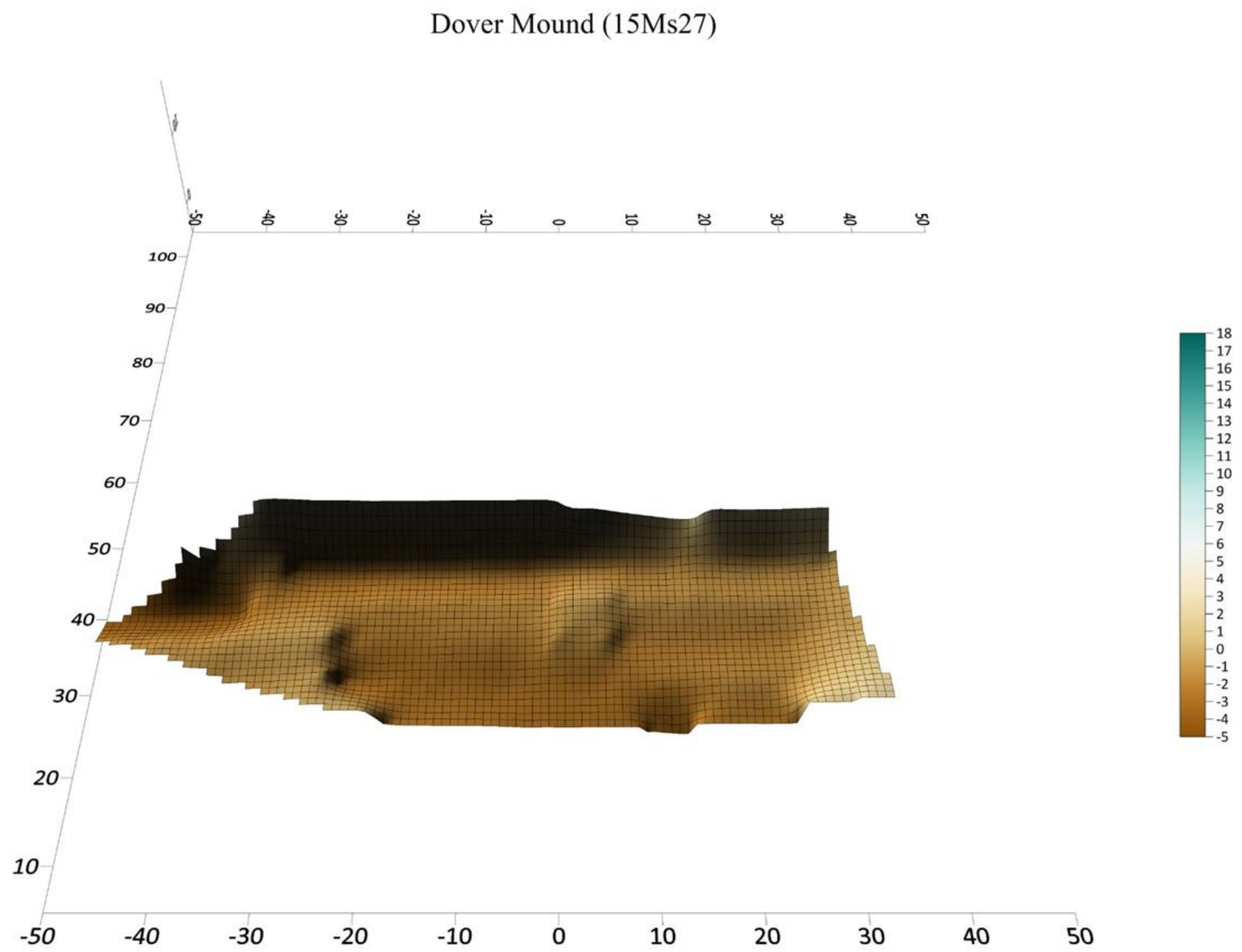


*Figure O.1***.** Dover Mound Sequence – 1. Base of excavation of 15Ms27.

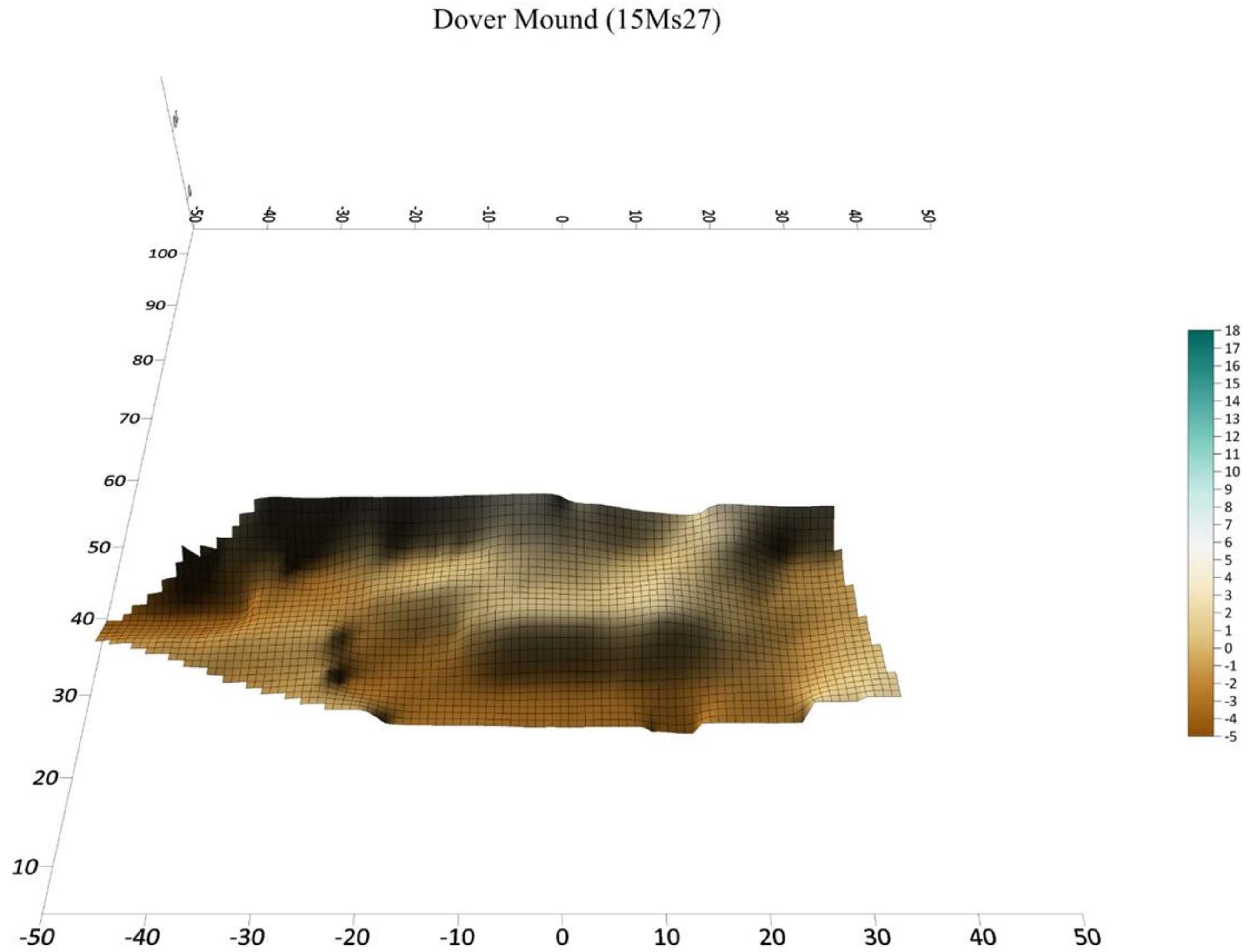


*Figure O.2***.** Dover Mound Sequence – 2. Surface resulting from the deposition of a layer of gray-brown earth.

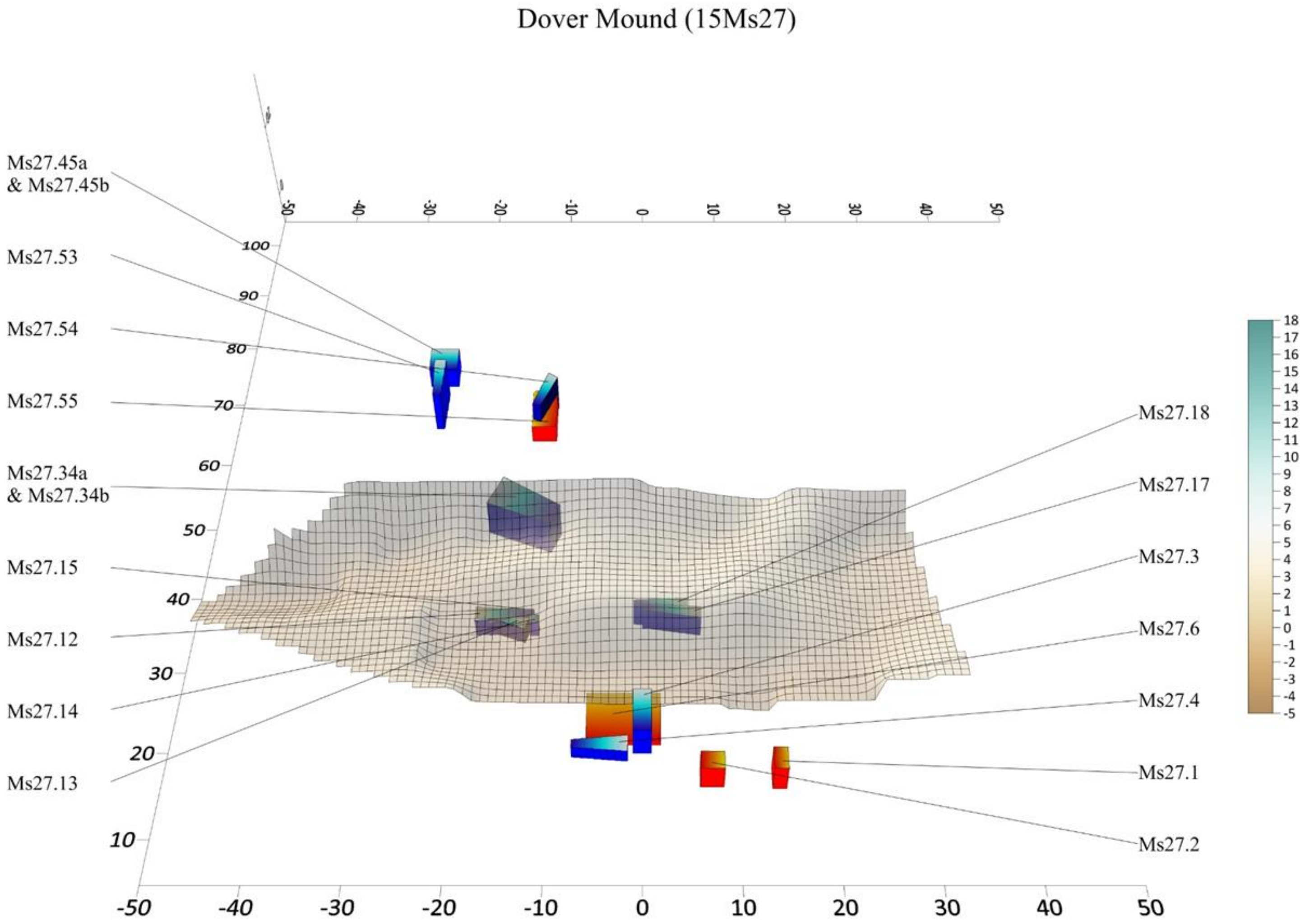


*Figure O.3***.** Dover Mound Sequence – 3. Placement of individuals in the first interment episode. See also Figure O.4.

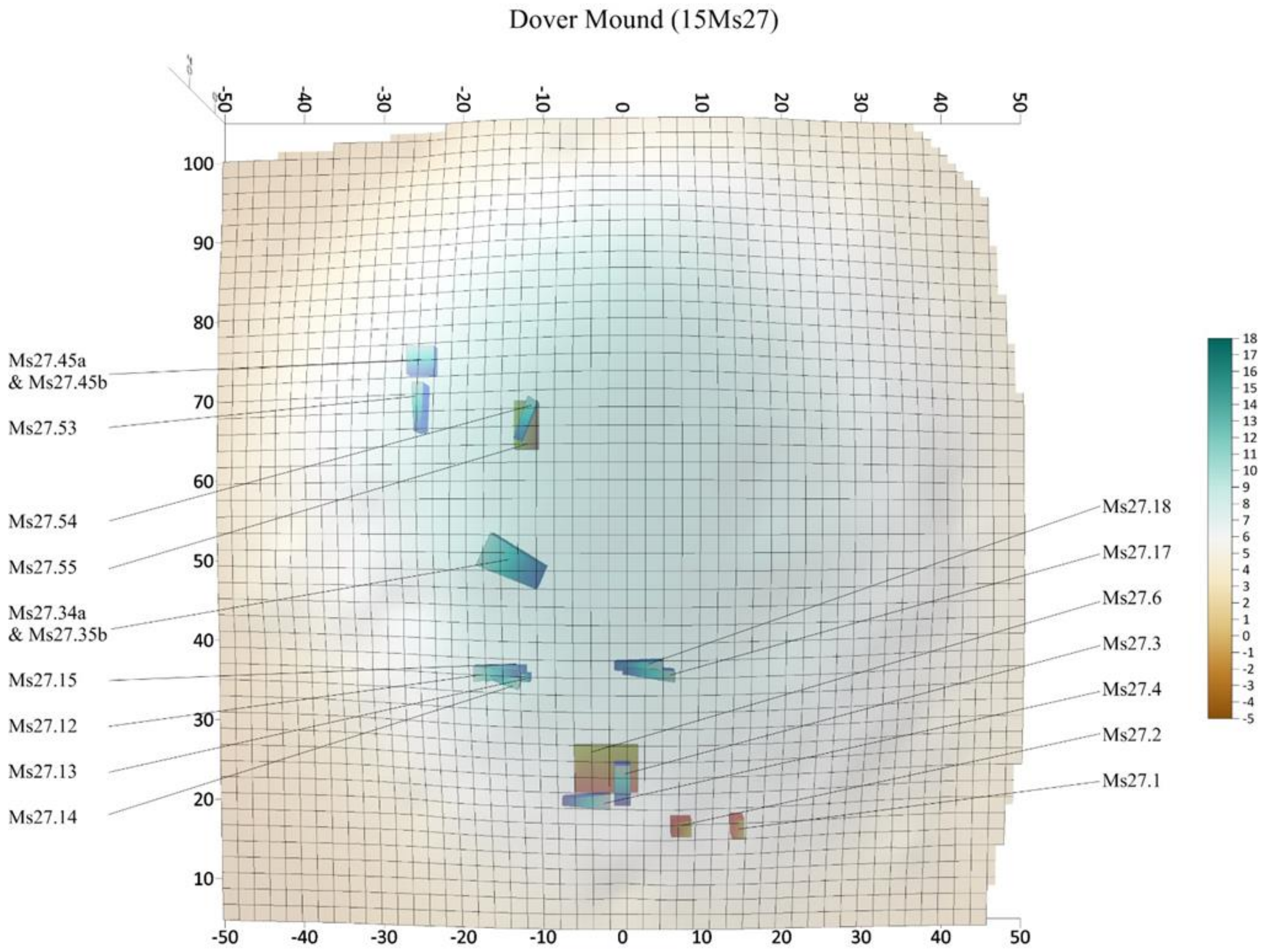
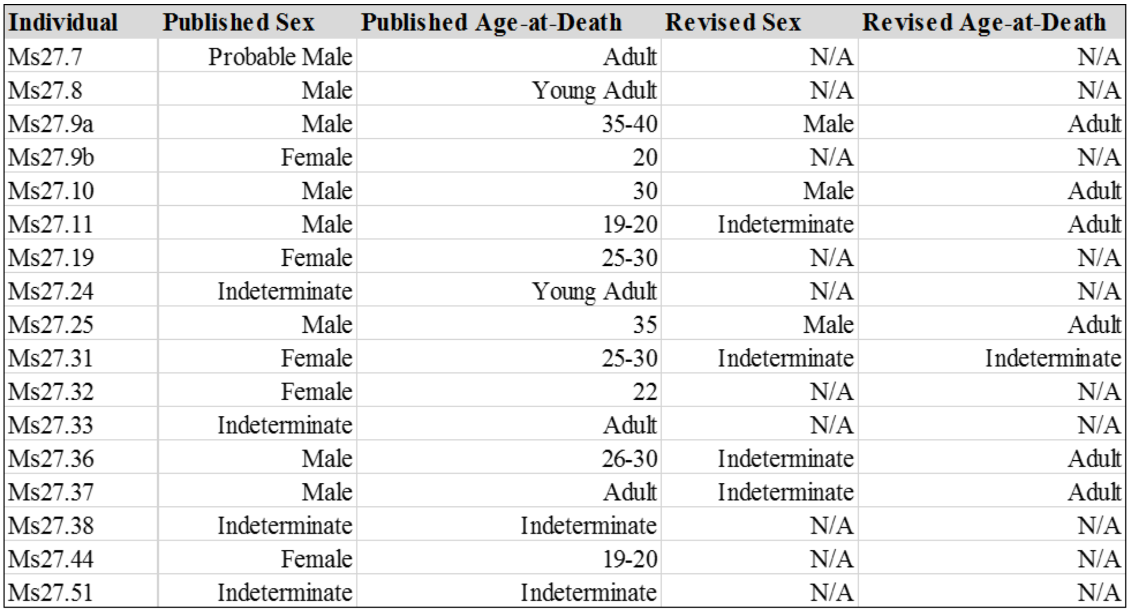


Figure O.4. Dover Mound Sequence – 4. Spatial arrangement of the first episode of interments with transparent rendering of mound surface for reference.

Table O.2

Demographic Characteristics of Interment Episode 2

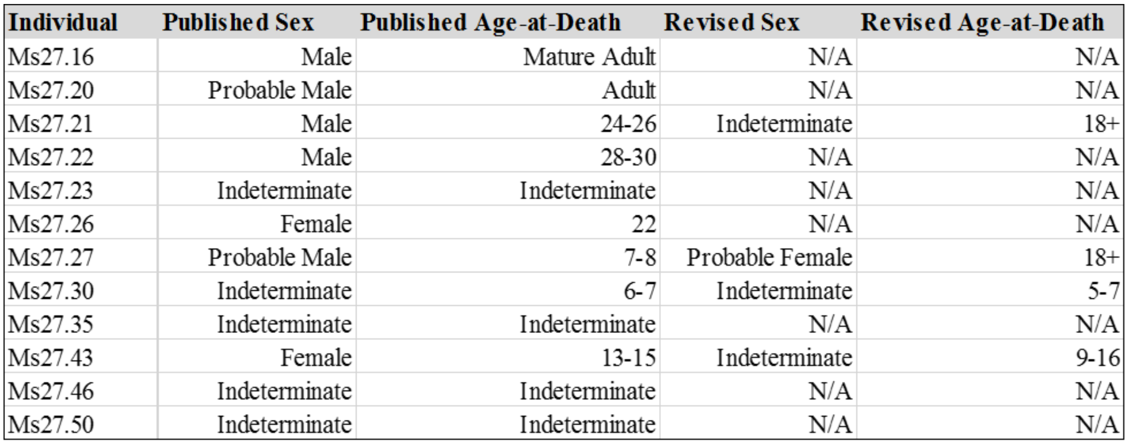


Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Ms27.7	Probable Male	Adult	N/A	N/A
Ms27.8	Male	Young Adult	N/A	N/A
Ms27.9a	Male	35-40	Male	Adult
Ms27.9b	Female	20	N/A	N/A
Ms27.10	Male	30	Male	Adult
Ms27.11	Male	19-20	Indeterminate	Adult
Ms27.19	Female	25-30	N/A	N/A
Ms27.24	Indeterminate	Young Adult	N/A	N/A
Ms27.25	Male	35	Male	Adult
Ms27.31	Female	25-30	Indeterminate	Indeterminate
Ms27.32	Female	22	N/A	N/A
Ms27.33	Indeterminate	Adult	N/A	N/A
Ms27.36	Male	26-30	Indeterminate	Adult
Ms27.37	Male	Adult	Indeterminate	Adult
Ms27.38	Indeterminate	Indeterminate	N/A	N/A
Ms27.44	Female	19-20	N/A	N/A
Ms27.51	Indeterminate	Indeterminate	N/A	N/A

See Figures O.5 through O.7

Table O.3

Demographic Characteristics of Interment Episode 3



Individual	Published Sex	Published Age-at-Death	Revised Sex	Revised Age-at-Death
Ms27.16	Male	Mature Adult	N/A	N/A
Ms27.20	Probable Male	Adult	N/A	N/A
Ms27.21	Male	24-26	Indeterminate	18+
Ms27.22	Male	28-30	N/A	N/A
Ms27.23	Indeterminate	Indeterminate	N/A	N/A
Ms27.26	Female	22	N/A	N/A
Ms27.27	Probable Male	7-8	Probable Female	18+
Ms27.30	Indeterminate	6-7	Indeterminate	5-7
Ms27.35	Indeterminate	Indeterminate	N/A	N/A
Ms27.43	Female	13-15	Indeterminate	9-16
Ms27.46	Indeterminate	Indeterminate	N/A	N/A
Ms27.50	Indeterminate	Indeterminate	N/A	N/A

See Figures O.9 and O.10

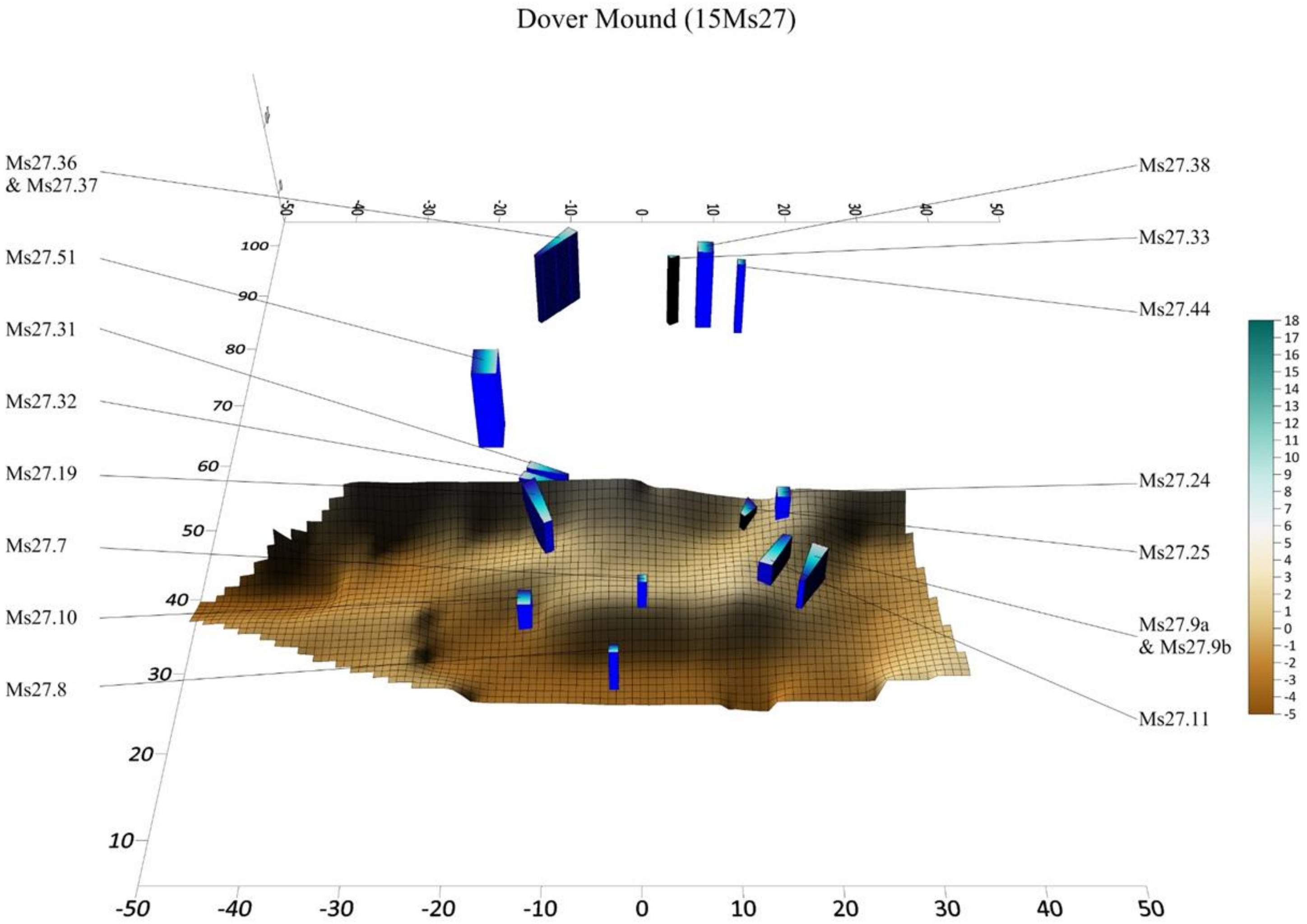


*Figure O.5***.** Dover Mound Sequence – 5. Placement of individuals in the second episode of interment. See also Figure O.7.

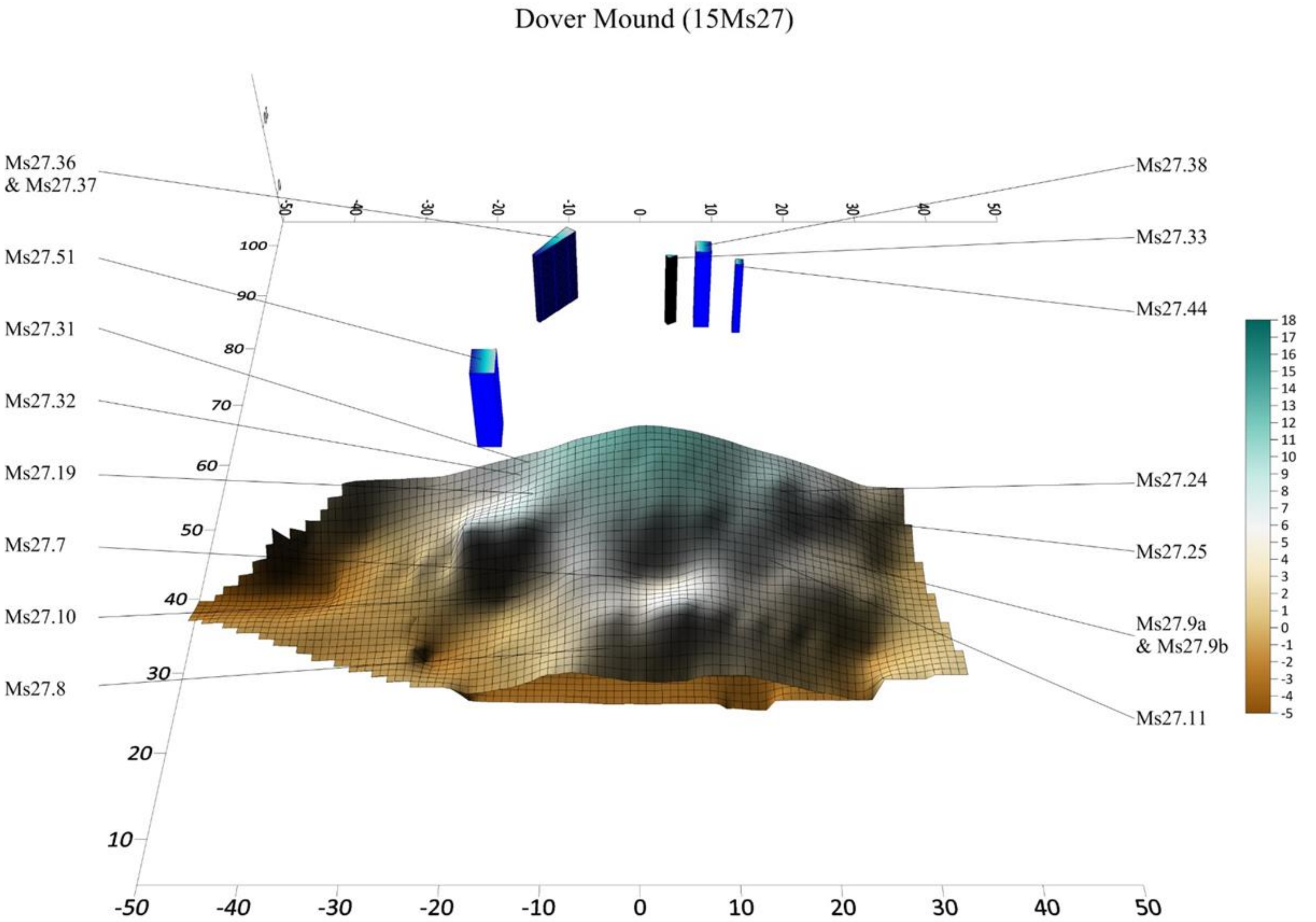


*Figure O.6***.** Dover Mound Sequence – 6. Deposition of a layer of hard clay covering the individuals placed during the second episode of interment.

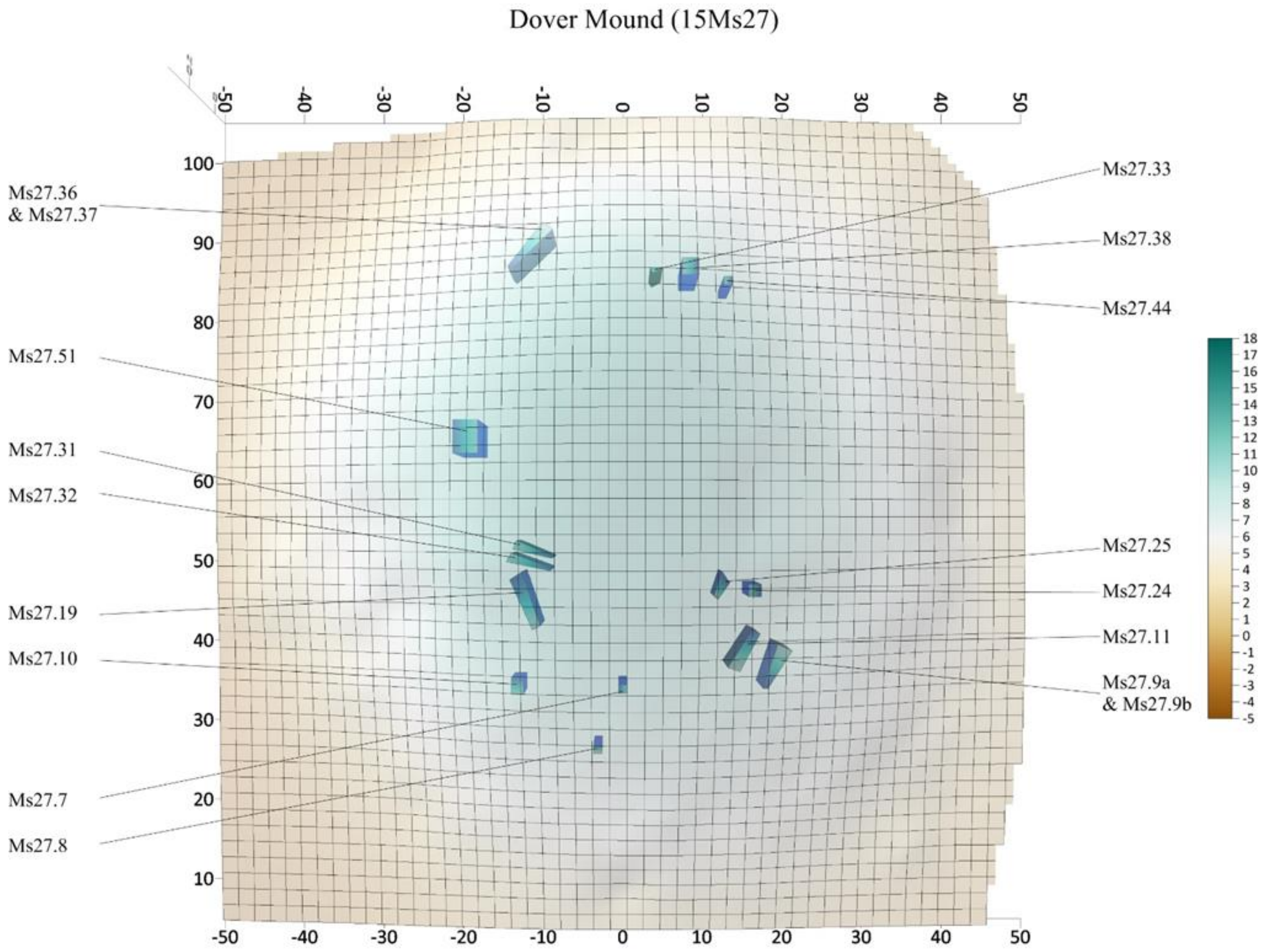


*Figure O.7***.** Dover Mound Sequence – 7. Spatial arrangement of the second episode of interments with transparent rendering of mound surface for reference.

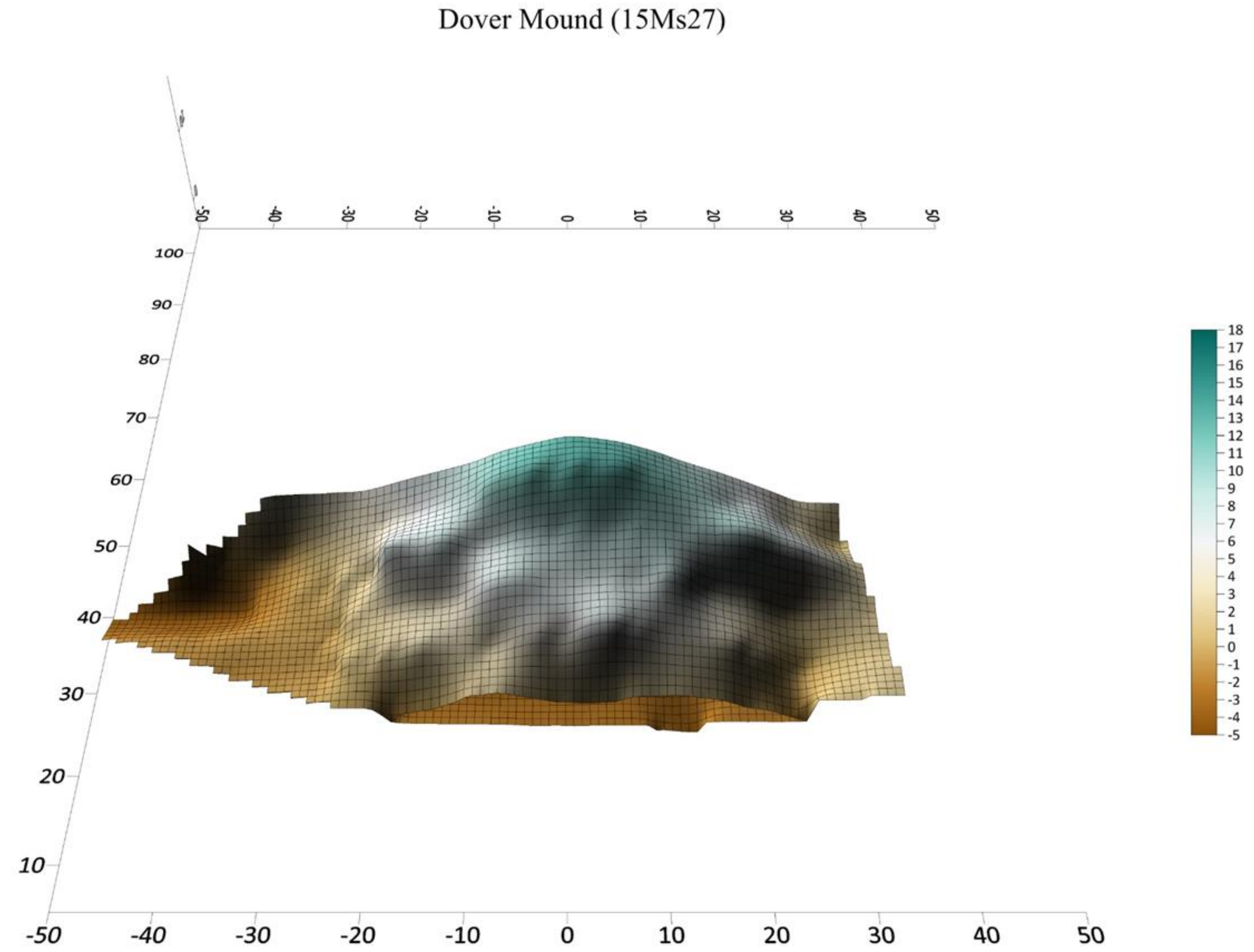


*Figure O.8***.** Dover Mound Sequence – 8. Mound surface after the addition of a layer of sandy earth above the hard clay.

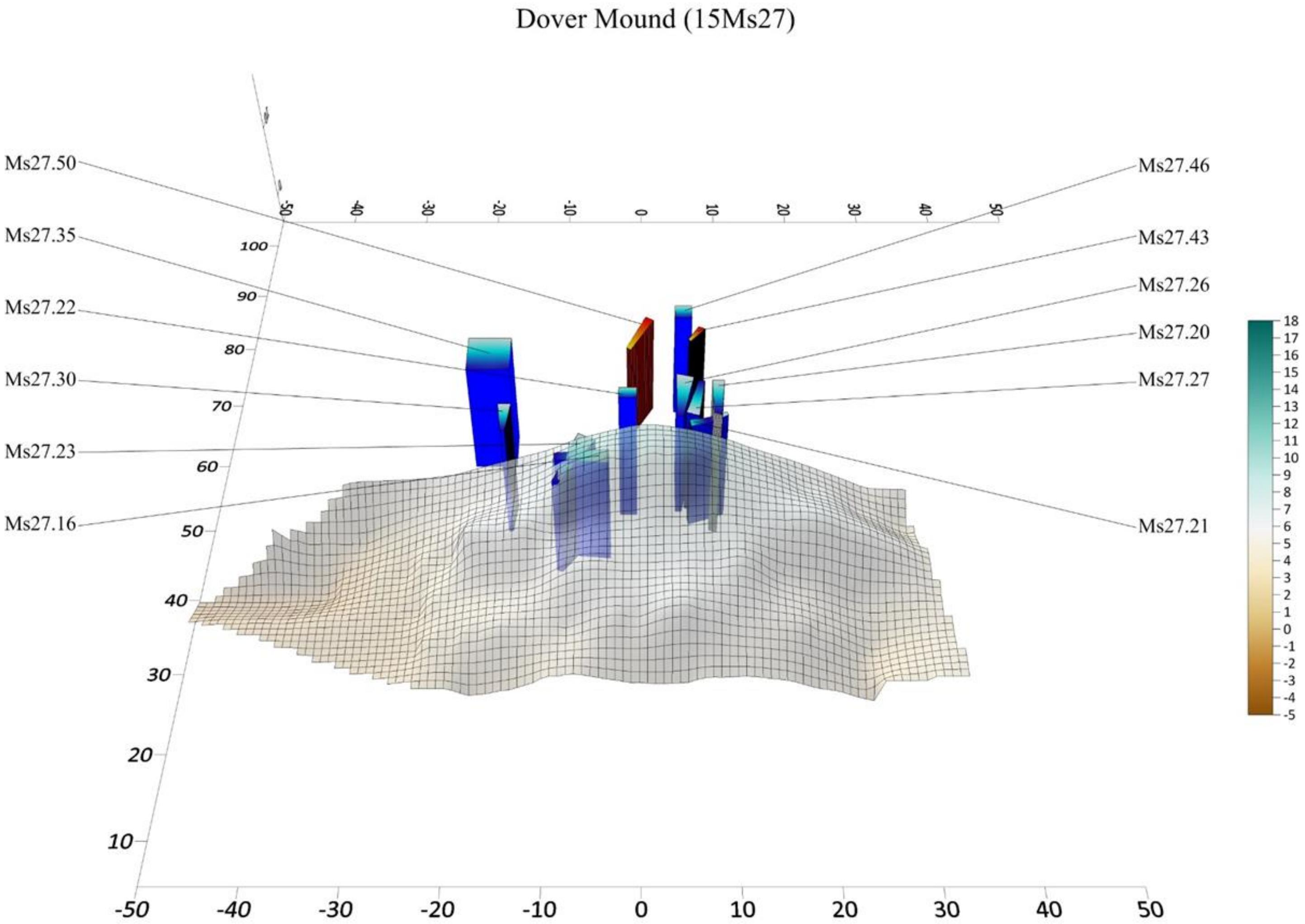


*Figure O.9***.** Dover Mound Sequence – 9. Sandy earth layer rendered transparent to visualize the placement of individuals in the third episode of interment. See also Figure O.10.

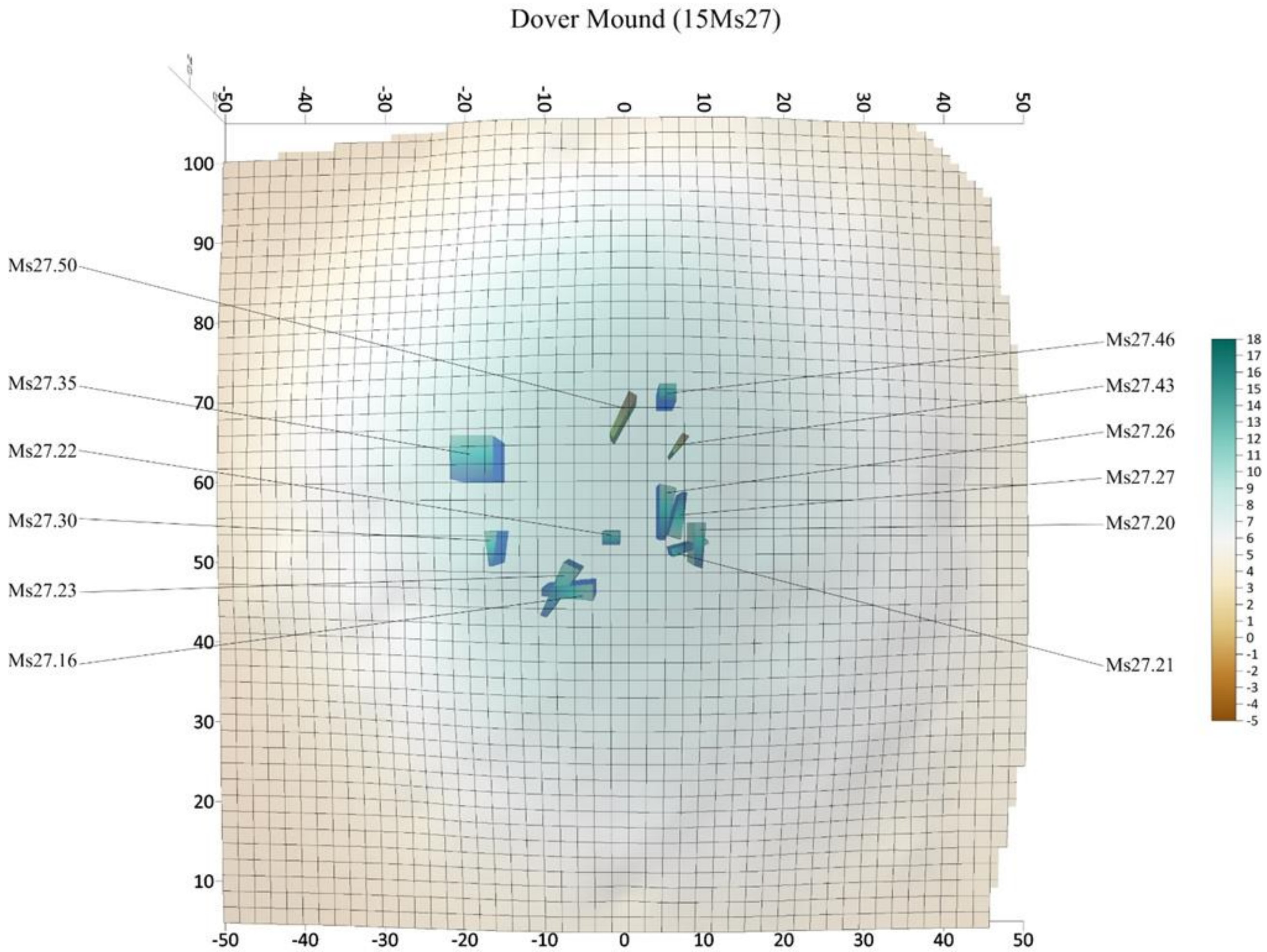


*Figure O.10***.** Dover Mound Sequence – 10. Spatial arrangement of the third episode of interments with transparent rendering of mound surface for reference.

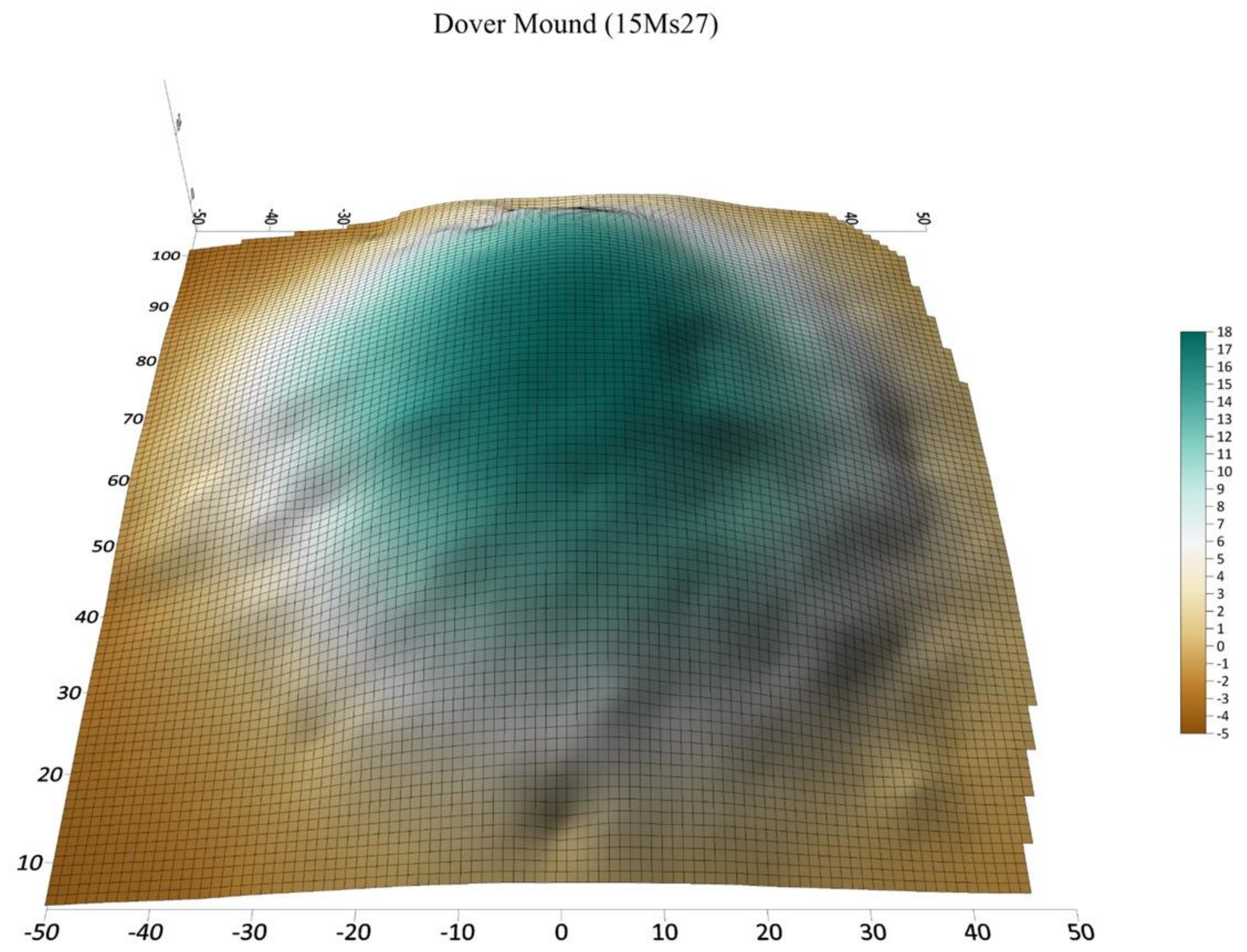


*Figure O.11***.** Dover Mound Sequence – 11. Mound surface at the time of its excavation.