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One Big Puzzle, Two Thousand Tiny Pieces: An Analysis of the Juvenile Remains from the Shady Grove Ossuary

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ONE BIG PUZZLE, TWO THOUSAND TINY PIECES:
AN ANALYSIS OF THE JUVENILE REMAINS
FROM THE SHADY GROVE OSSUARY

by

Jaimie Arlene Ide

A Thesis
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of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Master of Arts

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ABSTRACT

ONE BIG PUZZLE, TWO THOUSAND TINY PIECES:
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This thesis is an inventory and analysis of the juvenile remains excavated in 2010 from a Middle Mississippian ossuary at the Shady Grove site (22QU525), located in the Mississippi Delta. This project presents a clear challenge given the commingled and incomplete nature of the sample, as well as the preservation biases associated with subadult material, but this research offers valuable insight into the demographic pattern of the larger population at the site, as well as the mortuary practices which created the ossuary at Shady Grove. A “bone-by-bone” inventory revealed the presence of 43 juvenile individuals between the ages of 0 and 18 years old. Demographic comparisons to contemporaneous populations highlight the under representation of infant individuals within this burial likely due to pre-depositional loss, and the increased representation of 1 to 3 and 3 to 5 years old individuals, potentially relative to the heightened rates of infectious cranial and postcranial lesions in these age groups. The spatial distribution and analysis for each age category display the lack of any intentional pattern or placement design, as well as the high level of commingling and fragmentation within the ossuary. This large mass burial appears to represent the final resting place for a local kin group, bound together by the ritual inclusion in the deposit, and is likely one of many ossuaries still undiscovered at the Shady Grove site.
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TABLE OF CONTENTS

ABSTRACT ........................................................................................................... ii

ACKNOWLEDGMENTS ...................................................................................... iii

LIST OF TABLES ............................................................................................... v

LIST OF ILLUSTRATIONS ............................................................................... vi

CHAPTER

I. INTRODUCTION ............................................................................................. 1

II. REVIEW OF RELATED LITERATURE ..................................................... 5

III. MATERIALS AND METHODS ................................................................. 25

IV. RESULTS ..................................................................................................... 33

V. DISCUSSION AND CONCLUSIONS ....................................................... 59

REFERENCES ................................................................................................. 99
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Distribution of Deciduous Molars across Age Categories and Maximum MNI</td>
<td>57</td>
</tr>
<tr>
<td>2.</td>
<td>Distribution of Adult Molars across Age Categories and Maximum MNI</td>
<td>57</td>
</tr>
<tr>
<td>3.</td>
<td>Minimum Number of Individuals by Skeletal Category</td>
<td>60</td>
</tr>
<tr>
<td>4.</td>
<td>Juvenile Individuals Represented within the Postcranial MNI</td>
<td>76</td>
</tr>
<tr>
<td>5.</td>
<td>Distribution of Age Categories Among Burial Proveniences</td>
<td>79</td>
</tr>
<tr>
<td>6.</td>
<td>Provenience Information and Color Key for Individuals on Age Category Maps</td>
<td>81</td>
</tr>
</tbody>
</table>
LIST OF ILLUSTRATIONS

Figure

1. Marks, Mississippi in Quitman County ........................................ 26
2. The Remaining Mound at Shady Grove, 22QU525, in 1975 and 2009 ........ 27
3. Shady Grove Ossuary, Burial 43: Before Removal and Deposit Bottom .... 28
4. Demographic Distribution by Age of the Shady Grove Ossuary .............. 62
5. Map of the Shady Grove (22WU525) Ossuary, Burial 43. Taken from Scott (2010:xx) ............................................................................................................. 77
6. Spatial Distribution of Perinate Individuals within the Shady Grove Ossuary ... 82
7. Spatial Distribution of 0 to 1 Year Olds within the Shady Grove Ossuary ...... 84
8. Spatial Distribution of 1 to 3 Year Olds within the Shady Grove Ossuary .... 86
9. Spatial Distribution of 3 to 5 Year Olds within the Shady Grove Ossuary .... 88
10. Paired Left and Right Femora of Individual #22 ........................................ 91
11. Spatial Distribution of 6 to 12 Year Olds within the Shady Grove Ossuary ... 92
12. Spatial Distribution of 12 to 18 Year Olds within the Shady Grove Ossuary .... 94
CHAPTER I
INTRODUCTION

Native Americans have inhabited the Southeastern United States for thousands of years, but the climax of their culture occurred during the Mississippian period (A.D. 900-1500), demonstrated by the development of large, well-planned communities, the construction of monumental earthen mounds, long distance regional trade, and heightened levels of sociopolitical complexity (Bense 1994; Peregrine 1996:xx). Such extraordinary characteristics could never have been achieved without the integration of maize horticulture into the early Mississippian riverine subsistence strategy. Although initially just a minor crop during the Woodland period, by A.D. 900 the cultivation of maize had become a widespread practice throughout the region due to its decreased energy expenditure and increased food production (Goodman and Martin 2002:17; Morse and Morse 1990:170; Peregrine 1996:xvii; Schroedl et al. 1990:191).

This significant change in subsistence required a shift from mobile hunter-gathering to a sedentary agricultural lifestyle with relatively permanent fields. Maize quickly became a major dietary constituent for Mississippian peoples, and the additional surplus in food resources supported, and encouraged, the massive increase in population size and density that typifies sites of the period (Bense 1994; Peregrine 1996:xvii-xx; Schroedl et al. 1990:191). These crowded conditions, when supplemented by a low protein, high carbohydrate maize diet, resulted in increased rates of infection, disease, and malnutrition throughout the Southeast (Cohen and Armelagos 1984; Goodman and Martin 2002:17).
The overall decline in health during this time period is of great interest to bioarchaeologists and can be observed through the analysis of human skeletal remains. Mississippian period populations from across the Southeast reveal similar health patterns, with high frequencies of skeletal insults such as porotic hyperostosis, caries, and infectious lesions on both the young and old alike as a result of dietary insufficiencies and malnutrition, increased rates of disease transmission, such as tuberculosis, and greater trauma from increased warfare and regional conflict (Lambert 2000).

Among the individuals buried within a cemetery, the subadult component potentially yields the most valuable information about both individual and overall health (Baker et al. 2005:3-5). Developing bone tissue is extremely sensitive to malnutrition, infection, and environmental insults, producing a physical record of heightened levels of stress during the individual’s childhood (Baker et al. 2005:3-5; Huss-Ashmore et al. 1982:398; Larsen 1997:6-8). Due to the frailty of life during the first few years, children are much more vulnerable and susceptible to mortality, which often creates a bioarchaeological juvenile sample comprised of a high number of infants and young children, and fewer older children or adolescents as individuals become more independent and grow in strength and stature. As a result, the subadult component is the most reflective of an extinct population’s adaptive success, survivorship rates, and overall health (Baker et al. 2005:3-5; Huss-Ashmore et al. 1982:398; Larsen 1997:6-8).

When analyzing and interpreting prehistoric skeletal remains, juvenile or adult, the burial context is another way to extract important cultural information about a deceased individual and the living population. Mississippian mortuary practices, although widely varied across the region, shed light on a community’s religious values, funerary
rites, and levels of social stratification. Features such as included burial goods, placement or location, and increased time and energy expenditure are suggestive of heightened status or importance (Binford 1971:22-23).

Ossuaries are a particular style of secondary burial and have only been discovered at a few sites in the Southeast, such as Carson Mounds (James 2010). This is likely because the creation of an ossuary burial required multiple steps of additional handling and preparation, including months of decomposition, a specialist of the most revered kind called a bone picker, a unique holding facility for the skeletal remains called a charnel house, and then finally a single ceremonial deposition into a mass grave (Swanton 2001:170-4, 178). This particular type of mortuary program creates a collective secondary deposit of skeletal material representing all the individuals who died during a fixed cultural time period (Ubelaker 1974:8) and offers bioarchaeologists invaluable mortuary data about the population’s demographic size, mortality rates, and overall health (Ubelaker 1974:7; Ubelaker and Ripley 1999).

In 2010, an ossuary was excavated in the Delta near Marks, Mississippi. With one large rectangular flat top mound, one much smaller rounded mound, and a plaza area, the site at Shady Grove (22QU525) can be considered a simple chiefdom. Ceramic artifacts from within the burial date the site from the Early to Middle Mississippian periods (Scott 2011:52, 61). In addition, similar types and varieties of artifacts have been found at comparative sites within the area, such as effigy vessels and shell gorgets, confirming that the community at Shady Grove fully participated in the Mississippian tradition (Scott 2011:51), including the material culture, regional trade, the transition to agriculture, and dramatic population increase. Upon completion of the initial inventory, based upon
cranial material, the remains of at least 78 individuals, males, females, and children were all buried within this single deposit, poorly organized and highly commingled (Scott 2011). With continued research on this collection, additional subadult remains were discovered commingled within adult material, significantly increasing the sample and requiring a more complex and detailed analysis.

Therefore, this thesis will evaluate the juvenile remains from a Middle Mississippian ossuary at the Shady Grove site, located in the Mississippi Delta. This project presents a clear challenge given the commingled and incomplete nature of the sample, as well as the preservation biases associated with subadult material, but this research can produce valuable insight into the health and demographic patterns of the larger population at the site, as well as the social and ritual systems that governed the mortuary program at Shady Grove.

Given that no standard method exists for analyzing commingled subadult remains, this thesis will also propose a unique system of inventory used to create a realistic minimum number of individuals within the context of the ossuary based on age determination and elements present. Of significant importance is the distribution of fragmented elements within the spatial organization of the ossuary, many of which were refitted during the project, creating connections between multiple burial numbers, and provided a more complete understanding of the ossuary deposition and distribution of an individual’s remains. Few juvenile studies exist on sites in the Southeast around the transition to agriculture, so in addition, this study will significantly add to the available bioarchaeological literature available to future researchers in this field.
CHAPTER II
REVIEW OF RELATED LITERATURE

Mississippian culture developed first at Cahokia in the Illinois River Valley around A.D. 700 (Peregrine 1996:xx), quickly spreading to the Middle and Central Mississippi River Valley, and then even farther across the region to Ohio, Tennessee, Mississippi, Alabama, Florida, Georgia, and the Carolinas. By A.D. 1100, only 400 years after its birth, the Mississippian tradition dominated the cultural landscape of the Southeast (Peregrine 1996:xvii).

The origins of the Mississippian period in the Southeast are complex and difficult to tease apart, but can be traced back to A.D. 400 with the incorporation of maize into the pre-existing indigenous cultivation system. Combined with, and encouraged by, an increase in tool technology and shifts in the surrounding environs, the increasing importance of maize prompted the emergence of a more complex sociopolitical system, transforming prehistoric lifeways (Morse and Morse 1990:170). By A.D. 900, the cultivation of maize was a widespread practice throughout the region, necessitating a shift to a sedentary lifestyle and intensive agricultural subsistence. Within 200 years, agriculture was firmly established throughout the Southeast and much of the Eastern Woodlands (Peregrine 1996:xvii; Schroedl et al. 1990:191).

A number of other traits are also generally accepted as defining Mississippian culture including shell-tempered pottery, large-scale earthen mounds, social stratification and political centralization, long distance trade, planned sedentary communities, and a dramatic increase in population size and density. Secondary features, such as labor and resource control as well as craft specialization, are by-products of the primary features
and therefore also intrinsic to Mississippian societies. These characteristics can be found developed at different times and to different degrees across sites, but by A.D. 1100 the entire Southeast was participating in the Mississippian tradition (Cobb 2003:63; Kidder 1998:123; Milner 1998:2-3; Peregrine 1996:xix-xx; Schroedl 1998:64; Schroedl et al. 1990:191-192; Sullivan and Mainfort 2010:1).

Of great interest to archaeologists is the organization and complexity of the Mississippian sociopolitical structure. In the simple egalitarian societies of the Late Woodland period, the cultural traits that determined status for their social system would have been based upon age, sex, and achievement, but with the intensification of maize agriculture followed a dramatically changed way of life for prehistoric peoples. Much higher quantities of food became available to the producers, which caused a significant increase in population size and density throughout the region (Rose et al. 1984) and necessitated a form of centralized authority. The surplus in resources also generated a need for distributional social mechanisms that the Late Woodland culture lacked, activating and promoting the evolution of status, power, and access differentiation in the Mississippian social system (Muller 1997:52).

Mortuary Practices of Mississippian Chiefdoms

The chiefdom emerged as the standard political structure: highly stratified and organized according to achieved or ascribed status, characterized by an institutionalized inequality based on lineage, and exhibiting much more centralized political control (Bense 1994:191-192; Renfrew and Bahn 2007:132-133). At the largest, most complex chiefdoms, such as Etowah in Georgia, elite political positions were permanent. Rank was determined by kinship rules, and an individual attained their high status position at
within complex chiefdoms, elevation of rank and political control created a significant differentiation of wealth through restricted access to exotic goods, re-distribution of resources, large-scale controlled labor, and craft specializations. In contrast, simple chiefdoms, which were more common in the prehistoric Southeast (Payne 2006:94-95), generally had fewer subordinate levels in their political hierarchy and less status stratification and were directly reflected on the landscape by the presence of a smaller number of mounds at these sites (King 2003:5-6). Created and supported by the surplus in food, the sociopolitical systems of Mississippian chiefdoms were self-reinforcing (Bense 1994:184; Schroedl et al. 1990:192) and standard, within a degree of complexity and variability, of Mississippian sites found throughout the region (Peregrine 1996:xx).

In the archaeological record, the significant change in sociopolitical complexity that is characteristic to Mississippian culture is often best observed through the population’s mortuary programs and burial practices, which reflect the development of rank and status through differential treatment. Although the most common burial type at Mississippian mound centers is a single primary extended interment (Goldstein 1980, 2000; James 2010:9; McKern 1939), due to the broad diversity of mortuary programs throughout the region during this time period, no standard burial style or program exists. Mississippian funerary practices include primary, secondary, bundled, cremated, and multiple interments, the intentional and organized distribution of mound and residential cemeteries, the inclusion or exclusion of funerary goods, and the presence of charnel structures (Goldstein 2000:193). With greater stratification, more contrast between social positions, and a hierarchically ranked system, complex chiefdoms have a higher
frequency and wider range of symbolic mortuary goods present in their burials that cross-cut lines of age and sex. Many of these goods, such as decorative copper, bone, or shell ornaments, indicate elite status due to their scarcity, restricted distribution, or ritual significance, and when found with skeletal remains, are representative of the individual’s social status during life. The exclusivity and segregation of burial areas into elite and non-elite individuals are indicative of the levels of status and importance one would retain even in death (Bense 1994:207). These traits are exemplified at two of the most important chiefdoms in the Southeast: Etowah in Georgia and Moundville in Alabama. As prime examples of complex chiefdoms, mortuary studies from these sites offer comparative models for rank and power within other Mississippian mortuary programs.

*Etowah*

Etowah is located in Bartow County, Georgia, near Cartersville and the Etowah River, and dates to A.D. 950-1450. The site is comprised of three large mounds, three smaller mounds, a plaza, and outlying residential areas. The focus of excavations at Etowah was on one of the larger mounds due to its high density and volume of skeletal remains and associated artifacts. Mound C had multiple construction phases during the site’s occupation and is considered a mortuary temple for the elite class (Larsen 1971:58-61).

Over 350 individuals were excavated from the mound (Larsen 1971:58). A great majority of those were single, primary interments laid end to end in the final mantle. Burials contained adult males and females, as well as subadults, and also included an array of exotic mortuary goods, such as weapons and clothing ornaments (Larsen 1971:61-64). In contrast, burials in the village areas rarely contained mortuary goods,
indicating levels of social stratification and the presence of a non-elite class of individuals (Larsen 1971:66). Stratification within the elite class can also be seen, as a very limited number of burials were lined with wooden planks or covered with structures, and contained a higher quantity of grave goods (Larsen 1971:67). One male in particular, whose burial precedes the final mantle burials, seems to portray the zenith of elite status based on the presence of a small structure, or tomb, built over the grave pit around the time of burial and an extravagant array of exotic mortuary goods. Another individual, possibly female was buried only five feet northeast of the tomb, with bands of shell beads at the ankles and wrists and a mass of shell beads under the head and over the shoulders. Also associated with this construction phase, six feet northwest of the tomb, was a shallow grave containing the remains of what appear to be seven seemingly sacrificed individuals in such poor preservation that sex or age determination was impossible, and the exact number of individuals is unknown. All three burials were then covered with a significant amount of clay, producing an addition to the mound (Larsen 1971:64). A high level of social stratification, more complicated than just elite and non-elite, is displayed through the burials in Mound C and surrounding residential areas, indicating that Etowah was a hierarchically organized complex chiefdom based on ascribed principles.

Moundville

Moundville is located in Hale County, Alabama in the Black Warrior River Valley and dates to A.D. 1050-1500. The site is the second largest of the four dominant mound centers of the Mississippian period and is comprised of thirty-two ceremonial mounds surrounding a large plaza, further surrounded by numerous outlying residential areas (Knight 2010:1; Peebles 1971:80; Powell 1988:23).
Over 3,000 burials have been excavated from the site (Peebles and Kus 1977:435) and can be divided into a three-tier status classification, and even further into more detailed levels of stratification according to burial location and associated grave goods (Peebles and Kus 1977:438). Only seven adults of the highest elite status, probably males, were buried in the mounds and had copper axes, copper covered shell beads, and pearl beads, as well as infant skeletons and skulls, as grave goods. The second superordinate group, many of whose burials were found in or near the mounds, is comprised of 43 adult males and children, with burial artifacts such as copper ear spools and gorgets, stone discs, and bear tooth pendants. The final superordinate category contains 67 individuals, both males and females, and individuals of all ages, buried in cemeteries in close proximity to the mounds with grave goods that include copper gorgets, shell beads, and galena cubes. The two lower classes both contain males, females, children, and infants, and the status differentiation is based on the specific burial inclusions. The 261 individuals in the second category were buried only in cemeteries near the mounds or plaza with effigy vessels, animal bone, shell gorgets, discoidals, bone awls, and projectile points. Those in the lowest, but largest status group were buried in residential areas away from the mounds. Of these, 341 burials contained various combinations of plain ceramic vessels, while 1256 burials contained no artifacts at all (Peebles and Kus 1977:438-439).

The mortuary program at Moundville reveals a complicated, highly ranked society based on the restriction and distribution of iconographic symbols, ceremonial objects, and exotic goods, such as the “eagle being,” axes, and copper, to mound burials and a limited number of cemetery burials. The site’s level of social complexity is also
evidenced by the restriction of local symbols and materials to only cemetery and village burials and is further stratified by their distribution within these burial areas to only certain individuals (Peebles 1971:85, 87).

As models for Mississippian mortuary practices, both Etowah and Moundville demonstrate the correlative nature of burial location to status through the spatial segregation of elite and non-elite burials into areas of corresponding status context. Additionally, the burials at each site display levels of social status through the differential inclusion of exotic and ritualistic mortuary goods with mound individuals, and their general exclusion from outlying residential burial areas. It must be noted that although both sites typify Mississippian culture in the Southeast, Etowah and Moundville represent two of the four largest sites during this time period and may not accurately predict the mortuary programs for smaller but similar sites in the region.

Ossuary Analysis

Studies by Binford (1971) and Saxe (1970) have shown that through the analysis and interpretation of a society’s mortuary program, an archaeologist is able to connect nonrandom mortuary variation observed in the archaeological record to the extinct human social behaviors and sociopolitical systems of the past. Both apply Goodenough’s (1965:7) role theory and concept of the “social persona” to generate assumptions about human social behavior relative to death, identity/status, and the organization of society, disproving Kroeber’s (1927:314) argument that mortuary behavior could not be connected to other aspects of culture (Bartel 1982:50-52; Beck 1995:9-12; Carr 1995:106; Chapman and Randsborg 1981:6-7; O’Shea 1984:4; Sullivan and Mainfort 2010:3-4; Tainter 1978:106-108). As part of their social and religious systems, a society’s
mortuary practices reflect beliefs about life and death, the deceased, and their status while among the living. This visible relationship between mortuary treatment and status yields a better understanding of the complexity and organization of a culture’s social structure, which was previously thought to be unobservable due to its intangible nature.

One primary source of archaeological evidence is differentiation in burial placement, burial goods, and overall time and energy expenditure. Secondary interments, such as bundle burials and ossuaries, indicate increased time expenditure because of the extra handling and preparation required by the living. An ossuary is defined here as a collective secondary deposit of skeletal remains comprised of all the individuals who died during a set time period, initially stored elsewhere and ritualistically buried together (Ubelaker 1974:8).

**Northeastern Ossuaries**

Archaeological evidence suggests that ossuary burials were commonplace among Native American Iroquois groups living in the Northeastern United States and Canada beginning in the 12th century. Detailed ethnographic accounts by French Jesuit missionary Jean de Brebeuf, explorer Samuel de Champlain, and Father Gabriel Sagard, of the Huron living in Ontario and the Great Lakes region all describe a mortuary program that focuses on a fixed, reoccurring ceremony of deposition, integral to their religious beliefs, which took place after a culturally prescribed number of years (Biggar 1929:160-163; Kidd 1953:372-375; Thwaites 1896-1901, X:279-305; Ubelaker 1974:8-9; Wrong 1939:211-212).

In these ceremonies, after the date and location were decided upon by area council members, all the remains of individuals who had passed away during this timeframe were
collected from their scaffold tomb in the local cemetery and prepared for reburial. Each family was responsible for its deceased, even very recent deaths. The putrefying corpses were cleaned of their excess soft tissue matter and wrapped reverently in a beaver skin robe for transportation, while those remains in which the decomposition process was complete were picked of their dried vestigial flesh, disarticulated, and bundled together (Quigley 2001:40; Seeman 2011:64-65; Tooker 1991:134-136; Ubelaker 1974:9; Wrong 1939:211-212). In the 12th and 13th centuries, ossuary burials were held annually, and each village had its own ceremony, creating small ossuaries of between four and thirty individuals with very few burial goods. Beginning in the 14th century, mortuary customs changed, and the Iroquois began to wait several years, possibly even a decade, to hold a “Feast of the Dead.” This included participation of a single village or a group of related villages, which created much larger ossuary burials of between one hundred and five hundred individuals and included an excess of burial goods (Seeman 2011:60; Tooker 1991:135 n. 59). Although there is some slight disagreement, the ethnographic accounts from the 17th century concur that the ceremony occurred every eight, ten, or twelve years (Biggar 1929:161; Thwaites 1896-1901, X:143, 275; Thwaites 1896-1901, 39:31; Tooker 1991:134-135; Wrong 1939:211), often triggered by another event such as the death of a leader or the abandoning of a settlement (Fenton and Kurath 1951:143-144; Morgan 1901(1):167; Seeman 2011:62; Tooker 1991:135 n. 58 cont.).

To create the ossuary, first, a very large, deep burial pit was dug and lined with beaver skins, and then a scaffold platform was built around its perimeter in preparation for the ceremonial deposition (Biggar 1929:162; Tooker 1991:136; Ubelaker 1974:8; Wrong 1929:211-212). The remains were taken to the grave; articulated individuals were
placed at the bottom with grave goods, such as copper kettles and beads, and the bundled remains were hung on the platform grouped according to village (Curry 1999; Ubelaker 1974:8; Wrong 1939:163). The Feast of the Dead was literally that, as the next part of the ritual was days of communal feasting and dancing to honor the deceased family and friends (Wrong 1939:211-212). Afterwards, the remains were ceremoniously released into the burial and arranged by men with poles, and the whole deposit was then covered with more skins, tree bark, wood, and earth (Biggar 1929:163; Thwaites 1896-1901, X:279-305; Tooker 1991:137; Wrong 1929:212; Ubelaker 1974:8-9). Lastly, a temporary structure was built around the grave to mark it as a place of respect, and a final feast was held before the contributors dispersed to their home villages (Biggar 1929:163; Tooker 1991:137; Ubelaker 1974:8-9; Wrong 1929:212). By July 16, 1636, when de Brebeuf witnessed the Feast of the Dead in the Huron village of Ihonatiria, over 2,000 Native Americans had gathered from villages around the region to bury their dead, and one can imagine it must have been quite an intense and overwhelming experience for the French missionary (Seeman 2011:1). For the Native Americans of the Northeast, this mortuary practice demonstrated and strengthened the community’s solidarity and social relations through feasts and celebrations, as well as the connection created by the burial ceremony and the mass grave itself (Conser 2006:25; Ubelaker 1974:9).

The presence of hundreds of ossuaries found in the archaeological record throughout the northeastern region corresponds directly to the ethnographic descriptions of this Native American mortuary program. Over 200 ossuaries have been reportedly discovered in the province of Ontario alone (Anderson 1964). Unfortunately, a great many of these burials have been looted by amateurs and collectors due to the abundance
of grave goods, and only a handful remained undisturbed to be excavated and documented by professional archaeologists (Anderson 1964; Churcher and Kenyon 1960; Johnston 1979; Kidd 1952:73, 1953; Ridley 1961; Ubelaker 1974). Also a popular mortuary practice among the Native Americans of the Atlantic coast, a multitude of ossuaries can be found in Massachusetts, New York, Maryland, Delaware, Virginia, and the Carolinas, dating around A.D. 1300 to 1600, and ranging in size from 10 individuals in the smallest and 618 individuals in the largest known deposits (Conser 2006:22; Dent 1995:255; Loftfield 1990:116; Potter 1989:164-5; Quigley 2001:40; Ubelaker 1974:11).

Of the Northeastern ossuaries, the most comprehensive and detailed analysis was completed by Ubelaker (1974) on the Late Woodland Juhle site (18CH89) located in southern Maryland on the north bank of Nanjemoy Creek, a tributary of the Potomac River. Ubelaker (1974) recognized the full potential of this type of mortuary program, as these large burial pits offer bioarchaeologists invaluable mortuary data about the population’s demographic size, mortality rates, and overall health (Ubelaker 1974:7; Ubelaker and Ripley 1999), as well as insight into the culture’s social and ritual systems through the distribution of elements and spatial organization. The meticulous documentation and excavation of two large ossuaries, coupled with an exhaustive bone-by-bone inventory, were the most accurate methods to determine the minimum number of individuals in such commingled states, while also displaying the wide variability of bone representation within the graves.

Ossuary I contained seven articulated individuals located on the pit floor, twelve clear bundles, and ninety-four skulls, and yielded a minimum of 131 individuals, represented by 69 adult right tibiae and 62 subadult left temporals (Ubelaker 1974:15,
Ossuary II contained three articulated individuals, two on the floor of the grave: one male with tightly flexed legs and a female placed face down, flexed at the knees, and one female laid at the top of the bone deposit, placed very last in the burial (Ubelaker 1974:28). Also included were 320 identifiable burned fragments, obviously cremated before the deposition (Ubelaker 1974:30-31), and subadult bones found within adult skulls, indicating they were utilized as containers for transport to the burial location (Ubelaker 1974:31). Although 141 skulls were initially uncovered during excavation, a minimum of 188 individuals is represented within Ossuary II by 99 right adult mandibles and 89 subadult left femora (Ubelaker 1974:33).

Based on the wide variability in the distribution of elements within both ossuaries, Ubelaker determined that a significant amount of skeletal material was absent likely due to loss before deposition, deliberate cultural selection, differential decomposition, or biases created during and after the excavation process (Ubelaker 1974:33). Analyzed as separate populations, the life expectancy of Ossuary I was two years less than Ossuary II, 21 and 23 years at birth, respectively, although Ossuary II had higher rates of mortality in the adolescent and young adult age intervals (Ubelaker 1974:62-63). Although the mortuary program and regional location differ, this study presents an excellent model for the inventory and analysis of extremely commingled skeletal remains found within ossuaries of the Southeast.

Southeastern Ossuaries

Ethnographic accounts of the historic Choctaw in Alabama (Swanton 2001:170-177) describe a mortuary practice similar to that of the Iroquois, but with a few regional differences. Their custom included a detailed multi-step process as the deceased were
allowed to decompose for months upon a scaffold built specifically for them. The bones were then meticulously cleaned by an honored bone picker, or “buzzard man,” who kept very long fingernails on his thumb, fore, and middle fingers for both practical purposes and as markers of his socio-religious position. Finally, the remains were wrapped in cloth or placed in a chest and stored in a bone house for ceremonial deposition (Romans 1775:88; Swanton 2001:170-177; Ubelaker 1974:10). This ritual was the final step as the charnel house was periodically emptied, on a date which was predetermined, and all the skeletal remains placed together in a mass grave and then covered with earth, forming a burial mound (Swanton 1979:726; 2001:170-174, 178). Goldstein (1980, 1995:116, 2000:194) interprets the presence of a charnel house as a representation of group association and solidarity, in which an individual’s relationship to a group, most likely a family network, dictates the mortuary program rather than individual status. This parallels the connection created amongst the living population through the communal placement of all family and friends within a single grave. The result of using such a long-term storage facility is evidenced in the varying states of preservation, color, and articulation of the skeletal remains scattered throughout an interment, adding to the already acknowledged wealth of information bioarchaeologists can glean from this particular mortuary program about prehistoric Native American populations.

Ossuaries have been excavated at few locations in the Southeast, such as the Carson Mounds site (22CO518) located in Coahoma County, Mississippi, dating to A.D. 1300/1400 to 1600 (James 2010). It is the largest mound site in the Upper Yazoo River Basin, comprised of over 80 mounds spanning 150 acres. Land leveling activities at the site revealed a large burial area east of Mound A (James 2010:9), bounded by an earthen
embankment and surrounded by a palisade (James 2010:90). The presence of post molds, house walls, and middens suggest that this area might have first served a habitation function before shifting to its terminal mortuary function (James 2010:37).

Although excavations at Carson have been minimal (James 2010:90), burials found at this site have almost always been secondary bundles, with the exception of two extended individuals (James 2010:36), and all were buried within the embankment. To date the largest interment at the site is an ossuary burial, an enormous pit which contained a minimum of 36 individuals, male, female, and juvenile, along with an assortment of additional long bones, all bundled and compactly stacked on top of one another in two horizontal rows and multiple vertical layers (James 2010:39). The grave as a whole shows no evidence of stratigraphy, indicating one simultaneous deposit of all 36+ individuals (James 2010:52). All of the long bones were placed east to west, except the subadult individuals who were placed northwest to southeast.

Excavations of the ossuary were detailed and tedious, using photo-mapping and precise GIS coordinates to record the location and position of every element and its relation to those around it. The burial was divided and excavated in sections delineated by naturally occurring boundaries, and the remains from each area were kept separated through the sorting, washing, and inventory processes so as to avoid any further commingling (James 2010:42-3). Once in the laboratory, catalog numbers were assigned to specific areas and photographic layers, and an inventory based on the Buikstra and Ubelaker’s (1994) guidelines for commingled skeletal remains was completed, as well as age and sex estimations (James 2010:44). Created by combining each area’s minimum element count, the minimum number of individuals present in the Carson ossuary is
based on the presence of 27 adult right femora and nine subadult skulls for a total of 36 individuals (James 2010:44, 52). Using the geospatial software, ArcMap, each skeletal element was digitized and mapped within the burial, cross-referenced with excavation photos and inventory files, and then analyzed for association and true bundling based on the placement and proximity of skulls and post-cranial elements (James 2010:48-50).

The ratio of males to females present in the ossuary is almost even, and no difference in treatment is apparent due to the absence of mortuary goods associated with the grave, negating any form of social stratification. This is suggestive of the total absence of individual status differentiation within this group or possibly the more substantial importance of the group as a whole. Subadults under the age of two were completely excluded from Burial 4, possibly indicative of a separate burial area for young children and infants (James 2010:89) or a sampling error. No grave goods or artifacts were found in association with the burial, but a high frequency of painted and decorated pottery was excavated from within the area’s midden (James 2010:98). Considering the heightened level of energy expenditure involved in secondary interments, and the cemetery’s placement and palisade, this suggests an elite context based on ascribed principles and a corporate kinship burial (James 2010:87-8). Further excavations at this large mound site are necessary in order to better understand the mortuary program of the individuals living at Carson, as well as a full pathological health assessment and discussion in order to determine the effects of agriculture on the health of the Carson population.
Paleodemographic Analysis

The distribution of age-at-death for most populations follows a generally accepted mortality curve, which is highest at birth and then continuously declines after the first year until it begins its ascent again around puberty into adulthood. This is because the first year of life is the most difficult to survive, and once an individual begins gaining independence with childhood, his or her survival rates increases. Infant mortality drives the life expectancy of its population; therefore, low infant mortality rates are suggestive of a relatively successful population in which the greater majority of individuals reach adulthood. Due to the high risk of mortality during childhood, within most living and non-living populations, 30-70% of individuals are deceased before 15 years old (Buikstra and Konigsberg 1985). Once an individual has surpassed the culturally established rite into adulthood, most often signified by the onset of puberty, which generally occurs during early teenage years, he or she is then able to participate in more dangerous, life-threatening adult activities such as warfare and childbirth. As individuals continue to age through adulthood, mortality rates steadily increase until reaching the highest point within older adults.

An established method for the interpretation of demographic information is the analysis of a population’s life table, as they represent mortality samples over several generations. The absolute number of deceased individuals within each age category is recorded, and from that the percentage of the population dying during each interval is generated. Also calculated from this information is remaining life years, probability of dying, and overall life expectancy. However, assumptions about population stability and stationarity, as well as accurate age and sex determination, expose the flaws of this
approach, its vulnerability to variation, and the difficulties in predicting a living population’s growth based on a sample of its deceased.

Within a skeletal population, the remains of the juvenile component are among the most useful when evaluating and interpreting changes in prehistoric lifeways, such as the effects of agriculture on health. Due to the sensitive nature of developing bone tissue to environmental and cultural insults, subadult remains become a physical record of the individual’s health history (Baker et al. 2005:3-5; Huss-Ashmore et al. 1982:398; Larsen 1997:6-8). The ability to more accurately determine age at death can yield information about the population’s overall size, demographic structure, life expectancy, and mortality rate (Baker et al. 2005:3-5), while a variety of skeletal pathologies and conditions, such as porotic hyperostosis and infection, can be examined to assess the population’s childhood health, as well as overall health (Larsen 1995, 1997).

As informative as juvenile age distributions might be, the difficulties in excavation, preservation, and analysis of subadult skeletal remains are a thoroughly discussed topic in bioarchaeological literature (Gordon and Buikstra 1981; Pinhasi and Bourbou 2008; Stodder 2008; Turner-Walker 2008; Ubelaker 1989; Walker 1995; White and Folkens 2005:7-20, 49-66, 333-343), cited as issues or limitations in almost every bioarchaeological study to date. In many cases, juvenile bones have been too fragmented for the proper analysis due to post-mortem damage caused by extrinsic factors such as poor or incomplete excavation, soil pH level, or even mortuary practices. It is also generally accepted in bioarchaeological studies that the remains of subadult individuals are frequently underrepresented in skeletal samples due to intrinsic factors relative to the bone’s taphonomic strength based on degrees of bone mineralization (Angel 1969;
Johnston and Zimmer 1989:12; Von Endt and Ortner 1984; Walker et al. 1988). The bones of young children are not completely calcified, since they are in the earliest stages of the growth process, and can disintegrate easily in soil with high acidity levels (Gordon and Buikstra 1981). But as tiny cartilaginous models of the adult skeleton, infant and young child bones are very dense (Baker et al. 2005:6-7), and even small perinatal cranial elements such as the post-sphenoid and greater wings can and will often preserve in the archaeological record. Also, due to the overall small size of baby bones, even when fragmented, elements such as the long bones can easily be re-constructed from only a few pieces.

A great example of the difficulty in recovering a complete juvenile component can be seen in the excavations and research studies done on the Libben site, located in Ottawa County, Ohio. The site dates between A.D. 800-1100 to a Late Woodland/Early Mississippian occupation, and produced quite possibly the largest and best-preserved skeletal sample to date in North America. A total of 1327 individuals were excavated from the cemetery, ranging in age from sixteen weeks in utero to over seventy years old (Howell 1982:263; Lovejoy et al. 1977:291). Great care was taken during excavation and analysis to avoid potential biases created by the loss of subadult remains or inaccuracies in age estimation, and only articulated remains were considered for the population’s demographic profile (Lovejoy et al. 1977:292-3). Of the 1289 individuals included for analysis, 226 of them are infants under the age of one year old, 287 are children under the age of five, 94 are juveniles under the age of ten, and 92 are teenage adolescents around the age of 15 years old, for a total of 699 subadult individuals or 54% of the sample. The remaining 46% are all adults under the age of 50 years old. This indicates a very young
living population because 50% of the population is under the age of 15 and no one
survived past the age of 55 years old (Howell 1982:266; Lovejoy et al. 1977:292). With a
relatively even adult sex ratio and life expectancy at birth of only 20 years, Lovejoy et al.
(1977) report a low infant mortality and high adult mortality for this population compared

Many have questioned the reliability of paleodemographic analysis. Even with
the large well-preserved sample at Libben, Howell (1982) has argued that the
reconstructed demographic profile at the site would create the sort of community that
would have had a high number of orphans or children without parents and very few
individuals who lived long enough to become grandparents. Since this would produce an
impossible social structure, and no society can function under such parameters, the
demographic profile for this skeletal population has to be incorrect and is evidence that
even when we believe we have great preservation and the population is complete, it is
very unlikely.

Others have challenged the validity of the data themselves. For a demographic
distribution to be reliable, it must be representative of the entire population, aged
correctly, and from a relatively closed population. We can compare the demography of
prehistoric and modern populations to check for representativeness although we must
acknowledge that the recovery of juvenile bones will always be a large issue in
bioarchaeological studies. While the estimation of adult age is continually problematic
and difficult to establish without broad age ranges, children can be aged relatively
accurately and defined in very narrow age categories. Addressing the last concern,
ossuaries represent such a short time period of use that it is unlikely that factors such as
changes in fertility levels or high levels of immigration will be of importance. So then overall demography can be difficult but can also potentially offer very important information about the living population.
CHAPTER III
MATERIALS AND METHODS

This chapter discusses the site location, excavation, and previous studies done on the skeletal collection from an ossuary deposit discovered at Shady Grove. The sample for this project is comprised only of the juvenile component from this prehistoric Native American population. The specific method logy used to inventory these commingled remains and the subsequent analyses, such as the demographic profile, spatial organization, and health assessments, will also be discussed in greater detail.

The Shady Grove Site

The Shady Grove Site (22QU525) is located south of Marks, Mississippi, in Quitman County on the west bank of the Coldwater River (Figure 1). First recorded in 1941 by Phillips, Ford, and Griffin during their archaeological survey of the Lower Mississippi River Valley (Phillips et al. 1941), the site was originally comprised of one large rectangular flat top mound, which still remains (Figure 2), one much smaller rounded mound, and a plaza area, all of which were oriented eastward (Phillips et al. 1941:4-6). According to local residents, the round mound was once 70 feet in diameter and 6 to 7 feet in height, but was almost entirely leveled by bulldozing, leaving only 3 to 4 feet of midden remaining (Connaway 1975:186, 1981:29). In recent years, destruction through agricultural plowing has since erased the round mound from the landscape (Connaway 1975:188, 1981:31).

Salvage excavations at the site have been very limited. In 1975, two days of testing and excavations by Mississippi Department of Archives and History archaeologists John Connaway and Sam Brookes recovered a mass of secondary bundle
burials and a primary cremation from an ossuary deposit within the remaining round mound, reporting at least five individuals present (Connaway 1975:187, 1981:29). A later, more detailed analysis of the remains revealed at least 24 individuals based on fragments of the mandibular symphysis (Scott et al. 2009). Radiocarbon samples taken during excavation suggest occupation at this site from the Early Woodland to the Late Mississippian period, dating from 600 BC to A.D. 1450, which correlates with the ceramic artifacts found during excavation and in the surrounding area, such as Baytown Plain and Mississippi Plain potsherds (Connaway 1981:31; Scott 2011:16).

Figure 1. Marks, Mississippi in Quitman County.

In 2009, Connaway returned with Stacy Scott, a graduate student at the University of Southern Mississippi, to Shady Grove to attempt to locate and excavate the rest of the ossuary uncovered nearly 35 years earlier. Preliminary shovel skimming did not reveal the outline of the early excavations or the burial pit, so at the suggestion of a local collector, they shifted their activity to the east and revealed the outline of a large pit
feature beneath the stripped surface. Labeled Burial 43, the new ossuary contained over 70 crania, loosely bundled with long bones, stacked two and three deep on the western boundary and up to five deep on the eastern border. The feature was totally encased by a shell midden matrix, which was not a part of the original Baytown midden (Scott 2011:19-20) (Figure 3).

*Figure 2. The Remaining Mound at Shady Grove, 22QU525, in 1975 (left) and 2009 (right).*

The Shady Grove ossuary appeared to have some degree of spatial organization, so during excavation, as they were being discovered, each cranium was tagged with a sequential burial number which served to anchor it to the surrounding skeletal elements. Any material with questionable association due to close proximity to more than one skull received multiple burial numbers (Scott 2011:23, 33). Laboratory analysis revealed the burials to be extremely commingled, yielding multiple individuals within single burial numbers, so isolated elements and material were then given sequential burial letters to differentiate individuals, such as “7M.” Currently, the Minimum Number of Individuals, or MNI, for the ossuary’s adult component is 41 based on the right femur and 55 based on cranial material (Scott 2011:34).

The adult remains of this ossuary have been the focus of a number of studies by The University of Southern Mississippi students, including health analyses and
evaluations based on long bone metrics, and skeletal and dental pathologies (Cargill 2010, 2011; Cargill and Danforth 2011; Davis et al. 2012; Oubre 2011; Scott 2011). Oubre’s (2011) investigation suggests the adult population at Shady Grove is generally comparable in size and height to the population excavated from the Mangum site (22CB601), but more gracile than the peoples of Lake George (22YZ557). As well, Cargill and Danforth (2011) determined that the inhabitants of the site were more highly stressed during childhood, likely due in part to the transition in diet from breast milk to maize-gruel, based on linear enamel hypoplasias present at high frequencies in adult canines and incisors at an average age at formation of 2.4 years. The pathological analysis for the adults, although currently in progress, is an on going thesis project and should be utilized for comparison upon completion (Davis 2015, n.d.).

Figure 3. Shady Grove Ossuary, Burial 43: Before Removal (left) and Deposit Bottom (right).

A preliminary inventory of the juvenile remains was completed as a part of Scott’s thesis (2011), identifying 15 individuals under the age of 20 based on the right femur and 23 individuals based on cranial material, five of whom were infants. Further research on the Shady Grove collection revealed enough additional fragmentary subadult elements to suggest the current subadult MNI was incorrect and needed to be reassessed.
Until now, these remains had never been systematically inventoried, sorted, and analyzed in great detail. Of interest to bioarchaeologists are the analytical methods that can be applied to sort out extensively commingled remains such as these. In this, each element must be evaluated and aged separately in order to avoid any inaccuracies or biases, making past research less applicable and this particular project one of a kind within its unique realm of academia. This research will include a skeletal inventory, demographic, pathological, and mortuary analysis for the subadult component of the Shady Grove population.

Inventory Analysis

Following the techniques used in previous ossuary research (Adams and Konigsberg 2004; Ubelaker 1974; Ubelaker and Ripley 1999), this project includes a “bone-by-bone” inventory of the entire juvenile component, sorted by type of bone and by age. In order to carry out this research, all juvenile elements (fetus-20 years of age) recovered from Shady Grove were inventoried using methods outlined in The Standards for Data Collection by Buikstra and Ubelaker (1994). Supplemental sources that were consulted include Juvenile Osteology: A Laboratory and Field Manual by Schaefer et al. (2009), The Osteology of Infants and Children by Baker et al. (2005), Human Skeletal Remains: Excavation, Analysis, Interpretation by Ubelaker (1989), and The Human Bone Manual by White and Folkens (2005). The second step was to determine the overall MNI based on elemental representation for each age group, as well as identification of specific individuals among the commingled remains. Matches made between and across burials display the spatial distribution of particular individuals across the ossuary, with the
potential to yield cultural information about the type and time frame of this ritual deposition.

The age of each juvenile element was estimated based on indicators such as the degree of dental formation and eruption, the level of fusion of epiphyseal growth plates, the diaphyseal lengths of long bones, and any available osteological measurements in accordance with growth standards in the mentioned resources. Although the samples for these studies are likely of different ancestry and health status than the Shady Grove juveniles, which has the potential to create error in age estimation, these standards are accepted in the professional community; therefore, slight variations between populations are expected, and any bias will be applied across the entire collection. Skeletal casts from three individuals, a full-term fetus, a 1-2 year old, and a 7-8 year old, were heavily utilized as comparative models for size and development, especially when assessing fragmented remains. When compared to the juvenile measurements found in Schaefer et al. (2009), the infant and young child samples both age to the older end of the interval, two years and eight years, respectively, and set the scale for the age estimations of this study. Digital sliding calipers were used to measure elements from infants and young children and an osteometric board for long bones in older children and adolescents.

After age was determined, elements were placed in one of the following age categories: perinatal-birth (0), 0 to 12 months (1), 1 to 3 years (2), 3 to 5 years (3), 6 to 10 years (4), and 10 to 18 years or adolescents (5). Each element was also coded for the level of fusion (blank = unobservable, 0 = open/unfused, 1 = partial union/fusing, 2 = complete union/fused) and relative completeness (1 = >75% present–complete, 2 = 25%-75% present–partial, 3 = <25% present–poor). Due to their multiplicity and high level of
fragmentation, elements such as the ribs and vertebrae were not coded for completeness, but their condition was noted. The remains were then physically checked for fragmented counterparts and paired matches according to age (size), color, pathologies, and level of preservation. This method created the most realistic estimated number of immature individuals present in the Shady Grove ossuary.

Demographic Analysis

The age distribution of the juvenile sample was also investigated in order to better understand the population’s demography. The life table of this skeletal sample was created based on the age at death for all individuals, and used to create mortality and survivorship curves, as well as determine life expectancies and mortality rates (Weiss and Wobst 1973). Utilizing comparative sites, such as Libben (Howell 1982; Lovejoy et al. 1977), as demographic models for other juvenile studies can help to orient the data set within the appropriate context.

Mortuary Analysis

Within the Shady Grove ossuary, the spatial distribution of the juvenile remains was examined given their ability to yield valuable cultural information about the ritual and deposition behind this elaborate mortuary practice. Elements with close anatomical proximity found in close spatial proximity suggest evidence of articulation due to incomplete decomposition before burial. Potentially indicative of the living’s deliberateness, specific individuals were well represented by multiple bones, all situated within a particular location within the ossuary and tagged under the similar provenience information. Paired elements as well as refitted fragments, although newly associated after the completion of this inventory, were initially scattered across the ossuary. These
connections support the unintentional, but natural, disbursement of remains during the deposition. In order to analyze the spatial distribution, a color-coded map of the ossuary deposit was created for each age category. Provenience information for the remains of established individuals were highlighted and linked together; unassignable material was also noted. Distance between elements for individuals and overall age categories were determined as well.

With this multitude of information, a database was created, comprised of over 2,000 juvenile bone fragments recovered from the Shady Grove ossuary. It was expected that its analysis would provide a great wealth of knowledge and information about the prehistoric peoples who inhabited this small site in the Mississippi Delta. The results will be discussed in the following chapter.
CHAPTER IV
RESULTS

This chapter discusses the results of the inventory and analysis of the juvenile remains from the Shady Grove Ossuary. Beginning with the perinate group and ending with the adolescents, the composition of each age category and the representation of identified individuals are addressed in detail. The final chapter will then discuss the demographic distribution and spatial analysis of the subadult component.

Inventory and Analysis

With the idea in mind that there cannot be an infinite number of juveniles present within this ossuary, a Minimum Number of Individuals (MNI) was generated based on the postcranial elements, in conjunction with the cranial and the dental material present for each age category. Due to the high level of commingling within most of the assigned burial numbers, a considerable number of elements were separated from their original designation due to differences in age and development, as well as coloration and/or preservation. This includes juvenile elements found within an adult inventory and multiple juveniles within a single burial number. These commingled remains clearly represent a different individual, and potentially one of those reported within the MNI. Therefore, many of these elements were reassigned to a new burial assignment with confidence based on clear-cut similarities in age, size, development, coloration, and preservation.

In the following sections, beginning with the postcranial remains, each individual is addressed separately, including age estimation, the representation and distribution of elements, and when it is of note, the overall color and preservation of the bones as well as
any new associations from other burial numbers. The dental and cranial material for each individual, when applicable, is also included, and the discussion notes age estimation, the representation and distribution of the teeth, and new associations made such as matched left and right maxilla or isolated teeth matching their socket within the alveolar bone. The individual inventories are chronological in age from before birth to adolescence and are organized into each distinct age category.

_Fetuses and Perinates_

Of the skeletal remains within the Shady Grove ossuary, the youngest age category is comprised of fetuses and perinatal infants and is represented by 30 identifiable postcranial bones. Present are five humeri, four radii, three ulnae, four femora, five tibiae, and one fibula. Within the shoulder girdle region, the scapula and clavicle are less represented, each with a complete pair from separate individuals. Within the pelvic girdle, two ilia and two ischia are present. The pubis is the only significant postcranial element that is not represented in the perinatal group. The minimum number of individuals is three, based on the presence of three left humeri: all at least 95% complete, and three right radii, two of which were over 90% complete, and three left tibiae, two of which were at least 95% complete.

Based on the age variation apparent in the overall element distribution, there appear to be at least four individuals present in this age category, well represented by multiple postcranial elements:

_Individual #1_. The perinate labeled 60 has been aged at 20 to 24 fetal weeks and is the youngest individual within the Shady Grove Ossuary. Present is the left and right ischium, the right and left temporal, the left zygomatic, and a frontal orbit fragment, as
well as maxillary segments and an indeterminate tooth bud, which all have an overall
coloration of tawny yellow. Although these remains were initially assigned to burial 60,
this provenience yielded a total of three perinatal individuals, and these elements were
significantly smaller in size and development, and therefore distinctly different. A
sphenoid body originally assigned to 57/58 was reassigned with this individual based on
age estimation.

*Individual #2.* The perinate designated 60 has been aged at 36 to 38 prenatal
weeks and is represented by fourteen postcranial elements: a left and right scapula, left
and right humerus, left and right radius, left and right ulna, left ilium, right femur, left
and right tibia, and a right fibula. A left femur assigned to burial 54, with a refitted
proximal half from 56, is now associated with the individual from 60 based on size and
identical coloration, which is a light gray/brown, with tawny darkening at the
metaphyses. Crania and dentition could not be assigned to this individual due to age and
burial provenience duplication in the remaining material.

*Individual #3.* This individual was recovered with 60 has also been aged at 36 to
38 fetal weeks and is represented by a left and right clavicle, right humerus, right ulna,
right radius, right *pars lateralis*, vertebrae, and both upper and lower first deciduous
molars. The perinate was buried, excavated, and bagged with a second, much older,
individual of 15 years; based on their ages, this suggests the possibility, although
unlikely, of a mother and infant burial. It is noteworthy that present within this material
were fully developed inner ear ossicles. Cranial material could not be assigned to this
perinate.
*Individual #4.* The perinatal designated 24 has been aged at 38 to 40 prenatal weeks and is represented by six postcranial elements: a left humerus, a left and right femur, a left ilium, and a left and right tibia. All of these elements have similar coloration, in which one side is a light brown/gray and the other is more yellow and tawny, likely related to their postmortem exposure and storage. The cranial material for this individual includes a left and right frontal, a left *pars petrosa*, a right temporal *pars squama*, and the left and right halves of a mandible, both of which lack dentition.

The remaining postcranial elements, which cannot be reliably associated with one of these four individuals based on coloration, are a left humerus from burial 60, a right radius fragment from 31, and a left tibia fragment from 44. All three elements have been independently aged at 34 to 36 weeks, but based on coloration, could not be considered a single individual.

*Cranial Material.* Of the four perinatal individuals represented by postcranial elements, two of those, both assigned to burial 60, do not include crania. Of the cranial material remaining, based on the presence of four right *pars petrosa* as well the distribution of vault elements, four individuals could be identified but could not be conclusively associated with one of the perinates already identified.

As noted previously, burial 60 includes multiple perinatal individuals based on duplication of elements and significant variation in size and age estimation. The cranial material assigned to burial 60/62 has been estimated at 40 weeks to birth, and includes an occipital fragment, the right and left frontal, the right half of the mandible, and four teeth. Designated 60A, this individual has been aged at 34 to 38 weeks and includes the right and left *pars petrosa*, the right zygomatic, the right temporal, the *pars basilaris*, and the
sphenoid body. The cranial material designated 60B has been aged at 38 to 40 weeks +/- 2 weeks and includes a near complete occipital, the left and right pars lateralis, the pars basilaris, the right pars petrosa, and the sphenoid body, as well as its left greater wing. Although it is possible that the cranial material from 60/62 and 60A belong to a single individual based on the lack of element duplication and similar coloration, it was not sufficiently conclusive to combine or associate with postcranial remains.

Estimated to be 40 weeks to birth of age, the cranial material assigned to burial 56 includes the right temporal, the right pars petrosa, and an occipital fragment. Based solely on its burial provenience, it is possible that these cranial elements should be associated with the postcranial elements designated perinatal individual #2.

Isolated cranial elements that could not be assigned to an identified cranial set based on size, development, or coloration include: a right pars petrosa from burial 31/35, vault fragments from burial 12, and a tiny maxilla fragment from burial 67, all of which could not be accurately aged. Also unassociated are a right frontal from burial 29 and a left pars petrosa from burial 31, both estimated to be 34 to 36 weeks of age, and identified as the same individual.

When considering all of the skeletal material present for the perinate age category, with four individuals represented by postcranial elements, and at least two more represented by cranial material, the minimum number of individuals for this group is six.

Infants Under One Year of Age

The next age interval includes infants under the age of one year old and is comprised of 36 postcranial elements. The minimum number of individuals represented from these remains is five based on the presence of five left femora, all of which are at
least 50% complete. Similar to the perinatal group, the shoulder girdle and pubis are poorly represented, as well as the most of the long bones including the radius, ulna, tibia, and fibula, with two or fewer elements present. There is no single assigned burial number within this age group that contains enough elements to be considered a well-represented individual. In addition, the very high variability in element preservation and weighted element distribution suggests that members of this age group are the most highly commingled and spread throughout the ossuary. Five individuals within this age range were reassigned with commingled material from other burial assignments.

Based on the presence of four upper right deciduous second molars, all aged 6 to 9 months or 9 months to 1 year, the strict minimum number of individuals for this age category is four. Additionally, two younger individuals, aged 0 to 3 months and 6 months, are clearly represented by dentition; therefore, the real MNI based on dental material for individuals under the age of one year is six. Where applicable, isolated dentition has been associated with the five previously established individuals according to similarities in age and burial provenience.

*Individual* #5. The youngest individual for this age group was aged to be 1.5 to 3 months old and is represented by a left femur from burial 21, and based on similar coloration, a left humerus from burial 20 as well as a right temporal *pars squama* and a small fibula fragment from burial 26 were assigned to this juvenile. Also associated with this infant is a single, isolated right mandibular first molar, originally designated as burial 60 but is the only tooth in the entire ossuary to age between 0 to 1.5 months.

*Individual* #6. The second infant of this category is 3 to 6 months old and is represented by a left femur from burial 7, which has a distinct gray/light to dark brown
coloration and high quality preservation level with taphonomic damage to the long bone ends, making association of elements simple and straightforward. Also included with this individual is a right femur assigned to burial 19, which also has a refitted distal end from 44/17, a right tibia from 24, a right humerus from 44, a left humerus from 19, and a left ilium and right ischium from burial 42. All of these elements display the same coloration and age estimation. Also included are the mandible, maxilla, and right temporal, aged at six months, from burial 44/17, as well as a small lateral fragment from the left clavicle and right scapula from 44 based on burial provenience, similarities in coloration, and age estimation. Of the deciduous dental material for this age group, right mandibular first and second molars from 7 and a left mandibular first molar, lateral incisor, and canine from 44/17, all aged at 6 months, are now associated with this individual on the same grounds. It is also of note that bagged with the dentition from 44/17 was a pair of tiny inner ear ossicles, specifically the incudes, present and fully formed.

*Individual #7.* The third individual, aged 3 to 6 months, is represented by a pair of femora recovered with burial 6. Also associated with this individual based on age and tawny coloration are a right humerus and ulna fragment from burial 3 and its fragmented proximal end from 14, a left humerus from 37, a right ilium and left ischium from burial 3, and a left and right pubis of burial 55. The cranial elements present for this individual include: a right *pars lateralis* from burial 37 and a left *pars lateralis* from burial 3, which are an identical match in size and development; a left *pars petrosa* and fragment of left frontal from burial 6; a left temporal from burial 37, and a left parietal and zygomatic originally assigned to burial 20. These remains were all associated with this individual.
based on corresponding sutures, similarities in coloration, and overall age estimation. Dental material could not be assigned to this individual.

_individual #8_. The fourth individual in the age category, represented by a left femur, is from burial 21 and is 6 to 9 months old. Also present are a left ilium from the same provenience, a left ischium from burial 19, and a distal tibia fragment from burial 37 based on similarities in orange/brown coloration and overall age estimation. Of the crania and dentition, a left and right frontal from burial 63 were reassociated with this individual, as were the right maxilla and teeth from burial 56 and the isolated dentition from burial 21, all on the same bases as the postcranial elements.

_individual #9_. The fifth and final individual is aged to be 9 to 12 months and is represented by a left femur from burial 13, a left ischium from burial 61, as well as a right ilium, a left parietal, the right frontal, and the occipital from designated to burial 13/33, all of which have the same tawny orange coloration. Of the deciduous dental material for this group, a single isolated right second maxillary molar from burial 33 matches this individual in age and burial provenience.

These few remaining isolated cranial and postcranial elements could not with confidence be associated with any of the individuals of this age category: an occipital fragment from 27, a left temporal from 18, a left frontal from 49, a radius fragment from 54, a fragmented fibula from 24, a left clavicle from 14, a right scapula fragment from 67, and a fragmented femur from the burial provenience “above/from ossuary.” Of the dental material, four second maxillary molars are present: one from burial 31 and a second from burial 14; the last two could not be reassigned based on age estimation. Of these, one likely belongs to the individual designated #7, and the other is the sixth identified
individual present in this age category, although not represented by postcranial or cranial remains.

One to Three Year Olds

The 1 to 3 year old age category is comprised of over 85 postcranial elements, the majority of which belonged to bones of the arms and legs, although every postcranial element, including those of the shoulder and pelvic girdle, are well represented for this category. The minimum number of individuals is six based on the presence of six left clavicles, four of which are more than 50% complete, and six right radii, four of which are more than 75% complete. Most of the remaining postcranial element categories follow a similar MNI pattern, with four or five individuals represented by multiple well-preserved same-sided bones. Although not represented by any elements included in the minimum number of individuals, on the basis of significant variation in level of preservation and representation of elements, two more individuals were added to the minimum for this age category, for a total of eight 1 to 3 year olds.

Individual #10. This individual is represented by twelve postcranial elements which were originally commingled within burial 19: a left and right clavicle, humerus, and ischium, as well as a left scapula, left ilium, right ulna, right radius, a left tibia, and an unsided fibula, which age the infant to be 1 to 2 years old. A right tibia from burial 64 and a left and right pubis from burial 25 were associated based on similarities in coloration and size. The cranial material for this individual includes the frontal, occipital, left and right parietales and zygomatics, as well as the left pars petrosa and right temporal pars squama from burial 19. It is of note that the exterior table of the frontal bone displays an active lesion as well as interior remodeling; the zygomatics also exhibit
considerable lesions, and the remaining vault elements display significant porosity at the sutures and the same infectious remodeling of the inner table. Dental material for this individual could not be definitively identified.

*Individual #11.* A second infant, aged to be 1 to 2 years old, found within burial 14, is represented by the left and right humerus, the left and right clavicle, the right radius, and the right scapula. Based on similarities in coloration, age, and provenience information, cranial material for this individual is also found in burial 14, and includes the left and right frontal, parietals, temporals, and zygomatics. On the basis of age estimation, coloration, or provenience information, dental material for this infant could not be conclusively identified.

*Individual #12.* From burial 47, a 1 to 2 year old child is represented by a left clavicle, and is also associated with a distal radius fragment and an unsided femur diaphysis from burial 7, two fragments of the same left ulna from burials 7 and 34, and a right radius fragment from burial 7. These elements were joined based on similarities in age estimation, a very distinct level of poor preservation and coloration, and burial provenience. Cranial and dental material for this individual was not represented.

*Individual #13.* Based on coloration and preservation alone, it was determined that another 1 to 2 year old individual must be included within this category, although not initially included in the MNI. Burial 19 yielded a right tibia, two right ilia, and a fibula fragment, all of which display a distinct darker coloration and poor level of preservation. This particular taphonomic damage was also found in a right pubis and left ischium from burial 4, a left pubis from burial 32, a left scapula fragment from burial 19, and a
proximal humerus fragment from burial 8. All elements were consistent in age estimation. Cranial and dental material could not be associated with this individual.

*Individual #14.* A second individual, based on significant cranial material and associated postcranial remains, could be deciphered but was not included in the postcranial minimum number of individuals. The cranium within burial 3 appears to be 1 to 1.5 years of age and is represented by a fusing frontal bone and a left parietal. The dentition from burial 3 includes a mandible and six lower molars. Fragments of the left maxilla as well as four teeth from burial 14 were assigned to this individual based on the left lateral incisor, which fits into its root socket in the mandible of burial 3. All of these elements have the same light gray/brown coloration and display similarities in taphonomic preservation. Based on burial provenience and similarities in coloration, a left femur from burial 37/3/20, paired with a right femur from burial 34, was associated with the cranial material from burial 3, as well as two fibula fragments from burials 37 and 3.

*Individual #15.* The most complete individual of this age category is burial 62, which has thirteen postcranial elements and the highest number of complete left and right pairs within a single burial number, all of which are original to the burial provenience except for a right ulna, which was assigned to 60/62 based on coloration and preservation. The age estimations for this individual’s long bones are all in congruence at 1 to 2 years of age, although the size of the ilia suggests a slightly older infant at 1.5 to 2 years, and the scapula even older at 2 to 3 years old; however, all of the elements are consistent in their tawny yellow color and high quality preservation. This discrepancy in age is potentially an indication of slowed linear growth within the long bones due to poor
nutrition or, although seemingly less likely, a bias created by the minimal linear growth in the shoulder and pelvic girdle compared to the long bones. It is also possible that this inconsistency in age is due to an overall difference in growth patterns between this population of prehistoric Native Americans and the individuals represented in growth studies and the skeletal casts used as standards for age determination. The cranial vault of this individual is well represented and includes a fused frontal with sutural remnants, the right and left parietals and temporals, the right *pars lateralis* unfused from the occipital, the right zygomatic, and fragments of the sphenoid. The dentition is also near complete, and includes left and right portions of the maxilla and mandible, as well as permanent and deciduous teeth; dental development indicates this individual is more likely to be closer to 2 to 2.5 years of age.

*Individual #16.* The individual originally found with burial 46 has other burial numbers associated with its bones and is not so cleanly contained within a single provenience unit. In addition to a right clavicle, a left humerus, which displays significant cortical thickening, a left ilium, and a left and right radius, this individual is comprised by a left clavicle from burial 24/46, a left ischium from burial 55/46, estimated to be around two years of age, and a left tibia with a refitted fragment from burial 25, aged at 2 to 3 years old. The cranial material for this individual has pin-prick sized level 1 porosity (Buikstra and Ubelaker 1994), and includes the right and left parietals, the occipital unfused to the left *pars lateralis*, the right *pars petrosa*, the right zygomatic, fragments of the frontal bone, the mandible, and dentition from burial 46, all of which correlate with an age of 2 to 3 years.
Individual #17. Comprised of five isolated commingled elements, a second individual was identified from within burial 47 and is represented by a left and right clavicle, a left radius, a left scapula, and a right ilium, all of which were aged to be 1 to 2 years old. The cranial vault for this individual is comprised of elements from two different burial proveniences, is therefore nearly complete, and ages this individual from 2 to 3 years old. Found with burial 14 is the right pars lateralis, the left zygomatic, the sphenoid body with right greater wing, and the left temporal, which match at the squamosal suture to the left parietal from burial 47. Also included from 47 are the right parietal, a fused frontal with sutural remnants, and the left sphenoid greater wing. The dental material for this individual includes the left and right maxilla halves from burial 14, with four deciduous and two permanent molars. Originally assigned to burial 47, a deciduous left maxillary central incisor re-fits to its socket. The dental and cranial material ages this individual to be closer to 2 to 3 years of age, rather than 1 to 2 years as the postcranial elements suggest.

Of the skeletal material for the 1 to 3 year category, many isolated postcranial elements could not be definitively reassociated with one of the established individuals based on coloration, age estimation, or element distribution. These include: a right and left humerus pair from burial 19, a proximal right humerus from burial 25, a right humerus diaphysis from burial 44, a left radius fragment from burial 47, a right and left femur pair from burial 24, and a right femur from burial 32. These elements are also unassociated: two small scapula fragments from burials 29 and 61, four distal humerus fragments displaying the olecranon fossa, three rights and one left, from 4, 6, 67, and 24;
Three pelvic girdle fragments are unassociated: a right ilium from burial 31/35, an unsided ilium from 8, and a left ischium from burial 60.

_Cranial and Dental Material._ Of the eight established individuals within this age category, two did not have cranial material, and four did not have dental material. Additionally, four individuals were well represented by cranial material alone, two of which also had dental elements. None of them could be confidently associated with the postcranial remains of one of the previously identified infants.

The first unassigned cranium is from burial 67. It contains the nearly complete skull of a 2 to 3 year old, which consists of the frontal, the occipital, the left and right parietals, temporals, zygomatics, and sphenoid greater wings, as well as the _pars basilaris_, the left _pars lateralis_, and the left portion of the mandible. It is very important to note that the inner table of the cranial vault displays severe infection and active remodeling. This pathology is possibly related to iron-deficiency anemia, or chronic fever occurring with illness and disease, such as tuberculosis or meningitis (Lewis 2007:141-3).

Burial 68 includes fragments of the frontal bone, an unfused occipital, right and left parietals, and right and left temporals, and is estimated to be 2 to 3 years of age.

Burial 20 is a 2 to 3 year old, with the cranial vault minimally represented by only the left parietal and left temporal. The dental material associated with this infant includes a mandible, all four lower deciduous molars, and two permanent lower central incisors from burial 53. Also present are two deciduous upper lateral incisors originally from 7, and a lower deciduous right lateral incisor from 20, which fits into its socket in the mandible. All of these elements, including the teeth, have the same distinct multi-colored
discoloration and poor level of preservation. The interior table of the parietal shows similar lesion activity to the cranial material from burial 67, although much less severe.

The last individual represented by cranial and dental material is aged at 2 years old and is assigned to burial 20. This individual consists of the mandible and its dentition, as well as a left maxilla from the burial designation “ossuary”, and two isolated teeth, a molar from burial 3 and a twinned incisor from 25, both of which re-fit into their sockets within the mandible. The cranial material for this individual was originally assigned to 3 and aged at around 2 years. It includes the left *pars lateralis*, the right *pars petrosa*, the left temporal, and left sphenoid pterygoid plate, all of which have the same orange/brown coloration as the mandible from burial 20.

Of the remaining cranial material, two isolated unfused occipitals from burials 7 and 74, and two duplicating left lateral frontal fragments from burials 6/10 and 61 were not associated with a specific individual. It is noteworthy that the fragment from 6/10 displays a periosteal lesion on the orbital surface.

The remaining dental material was comprised of many isolated teeth, mainly first and second deciduous molars, which could not be associated with an already established individual. This includes nine non-duplicating teeth from five burial proveniences aged to be 1 to 1.5 years; nine teeth with one duplication from five burial proveniences, aged at 2 years old; thirteen teeth without replication from six burial proveniences, as well as three significant mandibular fragments and one maxillary fragment, all estimated to be 2 to 3 years of age.
Ages Three to Five Years

The next age group is comprised of nearly 50 postcranial elements estimated to be 3 to 5 years of age, and the minimum number of individuals represented here is five based on the presence of right femora. Four of the femora are very similar in size and age and can only be estimated at 3 to 5 years, although the fifth is a small bit larger than the others and was estimated to be a little older at 4 to 5 years. The individuals represented by these femora are as follows:

Individual #18. This individual, assigned to burial 67, is aged at 3 to 5 years and is well represented by the presence of the right and left femur, the right and left humerus, the right radius, and left ulna. The left humerus also has a refitted fragment from burial 25. Other elements include the right tibia, left scapula, and the left and right ilia from burial 25. All elements are very similar in tawny coloration and are well preserved. The dental material for this individual is aged at 3.5 years and is limited to a right maxilla from burial 25 with both deciduous molars present, as well as a right central incisor originally from burial 61, which fit into its maxillary socket. Cranial material of the vault could not be definitively determined based on age estimation, burial provenience, or coloration.

Individual #19. Within burial 42/32 is a 3 to 5 year old, represented by poorly preserved fragments of a right femur, a right and left humerus, a right and left ulna, a right radius, and a right scapula. All of these elements are very similar in light yellow/brown coloration and overall level of taphonomic damage. Cranially, this individual is only represented by the occipital, a small right parietal fragment, and the left half of the frontal bone, which are also poorly preserved. Of the dentition, twelve isolated
teeth are attributed to this burial provenience and refine the age of this individual to be 4 years old.

**Individual #20.** This juvenile consists only of a right femur and humerus from burial 36, aged to be 3 to 5 years old. No other material, cranial, postcranial, or dental, were reassigned with this individual based on similarities in age or coloration.

**Individual #21.** A second 3 to 5 year old child from burial 36 is poorly represented by a right and left femur. No other material, cranial, postcranial, or dental, were reassigned with this individual based on similarities in age or coloration.

**Individual #22.** The oldest and most well represented child within this age category, represented by a right femur from burial 4, has significantly larger bones than other individuals within the age category and was aged to be 4 to 5 years old. This is also singularly the most highly commingled individual within the entire ossuary burial, with confirmed associations from 16 different burial proveniences based on matched pairs and ten refitted fragments from across the ossuary. These proveniences include burials 3, 4, 11/15, 16/17/42, 20, 24, 25, 25, 27, 30, 38, 47, 53, 64, and 67. All postcranial elements except a right scapula are present, including five long bone epiphyses, although ribs and vertebrae could not be conclusively identified. The cranial and dental material for this individual are consistent in age. The cranial material includes the occipital, frontal, *pars basilaris*, as well as the left and right parietals, zygomatics, temporals, *pars lateralis*, and both greater wings of the sphenoid, which all display level 1-2 porosity at the sutures (Buikstra and Ubelaker 1994). The dentition is comprised of a near complete mandible, a maxillary fragment, and five teeth.
From this age category, only these six postcranial elements could not be assigned to a specific individual: left ischium (31/35), right ischium (27), left ilium (57), left ulna (27), and two right clavicles (20 and 14).

*Cranial and Dental Material.* Among the five 3 to 5 year old individuals, three lacked significant cranial bones and two lack dentition. Of the remaining cranial and dental material, seven individuals were well represented but could not be definitively associated with one of the established 3 to 5 year olds based on similarities in age estimation, coloration, and preservation. With the inclusion of the cranial material, the initial MNI of individuals between the age of 3 to 5 years old increased from five to eight.

Three individuals are represented by a minimal number of elements. Assigned to the provenience 25 are the *pars basilaris*, left *pars lateralis*, right and left *pars petrosa* with temporal squamous fragments of a 2 to 4 year old. Also found within the burial 25 is the cranial material of a 3 to 4 year old, including the frontal, the occipital, and the right and left parietals and temporals. A third individual aged at 5 years is represented cranially within burial 25 and includes the occipital, the right and left temporal, the right zygomatic, and fragments of the frontal bone, as well as two inner ear ossicles and a well preserved vomer. The left and right halves of the maxilla, with full dentition, are also present and congruent in age.

Three other individuals have more cranial elements associated with them. The vault material from burial 11 has refitted fragments from 15 and 27 and includes the occipital, the left *pars lateralis*, right zygomatic, frontal, and left and right *pars petrosa*, aged to be 3 years old. This individual displays significant porosity on the cranial vault in
addition to severe cribra orbitalia in the frontal bone. Found in burial 32 was a nearly complete skull, including an occipital, frontal, right parietal, and left greater wing of the sphenoid, as well as right and left zygomatics, temporals, and fusing nasal bones. From burial 41, the cranium of a 3 to 4 year old individual is nearly complete and represented by right and left parietals and temporals, and a left zygomatic. Also present are fragments of the frontal bone, which has level 2 porosity (Buikstra and Ubelaker 1994) in the left orbit and is unfused at nasion. Also included is a left maxilla with three molars present in their sockets.

Although much less represented comparatively, cranial material from burial 31 aged at 4 years yielded two significant fragments of the right and left frontal, a nearly complete mandible with a full dentition, as well as one fragment of the maxilla and the sphenoid. The right zygomatic is also present and has level 2 porosity (Buikstra and Ubelaker 1994) on the anterior surface.

The remaining cranial material for the 3 to 5 year age category includes an isolated left parietal from burial 74; a left and right maxilla, aged 3.5 years assigned to burial 19; a left and right maxilla, aged 3 to 4 years, from 67; a right maxilla, aged 4 to 4.5 years, from burial 68; and a left maxilla of a 4 year old assigned to burial 69. Also unassociated with any identified individual are many isolated teeth and near complete sets of dentition. This includes thirteen isolated teeth from eight burial proveniences, estimated at 3 to 4, or 3.5 years of age. Of the remaining dentition estimated to be 4 to 5 years old, an almost complete set is assigned to burial 32, four teeth were found with burial 57, and one molar was assigned to 30/33. The dentition aged at 5 years includes seven isolated teeth from three burial numbers and one nearly complete set with fifteen
teeth from burial 25. The most developed teeth were estimated to be 5 to 6 years of age: four were associated with burial 32 and four with burial 73.

*Six to Twelve Year Olds*

The 6 to 12 year age interval includes the fewest bones and is comprised of only fifteen elements. Representing a formal minimum and maximum of two individuals are two right femora of different sizes. Although, based on the presence of a much larger, more developed left humerus, the more practical MNI for this age category is three.

*Individual #23.* This child consists only of a right femur and left humerus head from burial 3 and a right distal humerus fragment from burial 22, all aged 6 to 8 years.

*Individual #24.* Assigned to this individual are a right femur from burial 29 and left femur from 42/32, both estimated to be 9 to 10 years old. These elements are significantly larger in size and cortical thickness compared to those from individual #22.

*Individual #25.* The oldest individual in this age category is from burial 32/36 and aged to be 10 to 12 years old. The left humerus for this individual is in two large fragments: the distal third, which is missing the end, and the proximal half, missing the head, but still displays an unfused metaphyseal surface.

The following additional postcranial elements were unable to definitively be assigned to any of these individuals on the basis of coloration and preservation: a left femur aged 10 to 12 years (69), a right ilium and right ischium aged 10 to 11 years (31), a right fibula (14), a left clavicle (19), a right ischium and left tibia fragment (42/32), a right ulna (24/25), a right scapula (31), and unsided ulna fragments (8/45).

*Cranial and Dental Material.* Cranial material for this age category is limited, but coincidentally, the minimum number of individuals is increased to five based on the
presence of one mandible aged 6 to 7 years from burial 4 with refits to 30/33; a second
mandible with maxilla fragments aged 6 to 7 years from burial 67; a third mandible from
burial 71 aged 10 years old; a right maxillary fragment with dentition from burial 32
estimated to be 7 to 8 years old; and a left and right maxilla aged at 8 to 9 years assigned
to burial 64. Seven isolated teeth from four burial proveniences were also not assigned.

Adolescents, Twelve to Eighteen Year Olds

In the adolescent age category (ages 12 to 18), over 100 postcranial elements were
inventoried, most of them nearly complete, which created a minimum of seven
individuals, based on left humeri.

Individual #26. Although poorly preserved and in a fragmented state, the distal
deep of a left humerus is assigned to burial 64. It displays an unfused medial epicondyle,
estimated to be 14 to 16 years, and is light gray/brown in color. Also present from 64 is a
significant fragment of the left pubis in a similar state of poor preservation and
coloration.

Individual #27. Assigned to burial 50 is a second left humerus fragment. Only the
distal half is present, and the end is missing. Therefore, the level of fusion cannot be
determined, but it is smaller than the humerus from individual #27 or #29 and is similar
in size to that of individual #30. Also present is a left femur with an unfused proximal
head, a perfect match to the left proximal epiphysis from burial 7, which is also now
associated with this individual. In addition, the left and right tibia diaphysis, unfused
proximally, is associated with this burial. The age estimation for this individual is 14 to
15 years old.
Individual #28. The individual, found with burial 64, is represented by a left humerus with near perfect preservation, a medium tawny brown in coloration, and a proximally fused epiphysis, although not completely as line is still visible. It is very similar in its level of fusion to the humerus from individual #29, except it is 25 mm longer and more developed. Associated with this individual based on similarities in size, overall robusticity, and coloration is a nearly complete right femur from burial 68, which is unfused at both ends and aged at 15 years +/- 1 year.

Individual #29. Burial 2 is a very well preserved adolescent, aged to be 15 to 16 years old, represented by left and right femur, tibia, fibula, humerus, radius, and clavicle, as well as a left ulna associated from burial 3 based on color, age, and burial proximity. Also included are a left and right innominate, the sacrum, and right ischial tuberosity epiphysis from burial 7, which articulates perfectly with the correlating surface on the ischium. This individual is further comprised of the left hand, left scapula, a complete manubrium, a full set of dentition, as well as matching epiphyses for most of long bones.

Individual #30. The individual assigned to burial 69 is represented by a complete left humerus, aged at 14 to 18 years, which has an entirely fused epiphysis at the distal end, but one that is still fusing proximally. This long bone is comparatively larger in overall size, length, and robusticity than that of individual #30. The coloration of these remains is mainly a light tawny golden brown, with poor preservation at the ends, displaying distinct taphonomic erosion of the thin layer of cortical bone and exposure of trabecular bone below, which is not present in any of the other adolescent individuals. Based on this, also included with this individual are a right ulna and left distal femur epiphysis from burial 31, as well as a proximal left tibia fragment assigned to burial 68 in
the process of fusing. Although initially designated 16/17/32/42, an unsided proximal femur epiphysis fragment has been associated with this individual on the basis of preservation and the presence of fused heads on both femora within the original burial provenience.

*Individual #31.* Burial number 16/17/32/42 yielded the sixth adolescent individual, who is represented by a pair of humeri; the right of which is complete and displays a very visible fusion line on proximal end while the distal end is entirely fused and has a very large septal aperture. Also included are a left radius and right tibia from 16/17/32/42, a right radius and left tibia from burial 7, a left ulna from burial 24, a left ischium from burial 42, and a right femur from burial 42/66, all on the basis of identical levels of fusion and light tawny yellow/brown coloration. This individual was estimated to be 17 to 19 years old +/- 1 year.

*Individual #32.* Of all the individuals within the ossuary, the adolescent in burial 60 is the most complete with nearly every cranial and postcranial element represented, including the dentition. With most of the long bone epiphyses entirely unfused except for the proximal ulna, this individual appears to be between 14 to 18 years old, although the dental material more specifically indicates that the individual is 15 years +/- 1 year.

Fourteen postcranial elements were unable to be conclusively associated with one of the eight identified adolescent individuals: a right pubis from burial 8, which displays the fusing of the inferior ramal epiphysis and most likely belongs to individual #30; a right clavicle from burial 19 (17+ years); two left radius fragments, the diaphysis from burial 22 and the distal third from burial 31 (14 to 20 years); a near complete right radius from burial 29 (12 to 13 years); a right ilia from burial 32 (12 to 14 years); a right ilia
from burial 31 (14 to 16 years); fragments from a left ilia from burial 34; three fibula diaphysis fragments from burials 19, 7, and 22, none of which could not be aged; left and right scapula fragments from burial 57/58 (12 to 14 years); and a right femoral head also from burial 57/58 (13 to 16 years).

Cranial and Dental Material. Of the remaining unassociated cranial material, remains from two individuals associated with burials 65 and 32 are well represented by near complete vaults, which include the frontal, occipital, right and left parietals, and one or both of the temporals, although definitive age estimations cannot be made. From burial 32, a right portion of a mandible estimated to be greater than 15 years old is present. One pair of maxillae with dentition from burial 65, aged 12 years, is also present and unassociated, as well as a single third mandibular molar from burial 7 (12 to 13+ years), a right zygomatic from burial 57/58, and a left zygomatic from burial 7.

Indeterminate Material. Although never specifically addressed within each age group, a significant amount of cranial and postcranial material is considered “indeterminate” fragments and cannot be definitively associated with an established individual.

Dental Inventory and Analysis

Of all the skeletal material within the Shady Grove Ossuary, the dental inventory offers the most precise and detailed information, and its analysis yields the most definitive minimum number of individuals. Out of a total of 347 teeth present, a strict minimum of eighteen individuals is represented based on the maxillary second deciduous right molar. A more practical, maximum MNI of 24 was created based on the total highest number of each deciduous molar present in this collection (Table 1).
Table 1

*Distribution of Deciduous Molars across Age Categories and Maximum MNI*

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Similar to the deciduous molars, the permanent molars represent the highest number of teeth present and the most practical, maximum dental MNI for the individuals within the Shady Grove ossuary (Table 2). After combining the practical minimums for both deciduous and permanent molars, a total of 29 individuals are represented within the dental material.

Table 2

*Distribution of Adult Molars across Age Categories and Maximum MNI*

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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Infants &lt;1 year</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>1 to 3 years</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3 to 5 years</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>6 to 12 years</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12 to 18 years</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total:</td>
<td>11</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>17</td>
</tr>
</tbody>
</table>
Of the more than 2,000 subadult bone specimens excavated from the Shady Grove ossuary, 32 individuals were established based strictly on postcranial remains. The skeletal composition of each juvenile, as well as the unassigned material within each age category, has been discussed in detail within this chapter. This MNI is substantially higher than Scott’s (2011) initial assessment, reinforcing the necessity of a “bone-by-bone” inventory when analyzing skeletal collections with this level of commingling and fragmentation. The next chapter addresses the determination of the maximum number of individuals based on the combined minimums of the three skeletal categories: cranial, postcranial, and dental. It also includes a demographic analysis, which compares the Shady Grove collection to expected values (Angel 1969; Weiss and Wobst 1973) and other contemporaneous populations (Blakely 1971; James 2010; Lovejoy et al. 1977; Penton et al. 2015; Powell 1983; Williams and Brain 1983). Finally, the last chapter will discuss in detail the spatial analysis of the juvenile distribution in an attempt to interpret the event that produced the Shady Grove ossuary and the living population that created this mortuary deposit.
CHAPTER V
DISCUSSION AND CONCLUSIONS

This chapter will address the results of the Shady Grove juvenile inventory. First, the collection and its minimum number of individuals by age category will be described in detail. The demographic distribution will then be discussed and compared to values reported for modern non-Western populations, as well as other Native American skeletal populations similar in time or location. Factors that may be affecting the age composition, including mortuary practices and the pathologies present in the Shady Grove juveniles, will be addressed in terms of how they may have helped to shape demographic patterns. Lastly, the spatial organization of the burial will be presented in detail, including the placement of individuals by age category and the distribution of their elements within the ossuary.

Demographic Analysis

_Determination of Minimum Number of Individuals_

With over 2,000 identified bone specimens included in the juvenile component, multiple methods were used to evaluate the demographic composition of the Shady Grove population. For initial calculations, the minimum number of individuals was tabulated for each skeletal category (cranial, dental, postcranial) for each age group. A minimum of 32 individuals could be determined based strictly on postcranial remains, whereas the cranial and dental remains suggest that 36 and 31 individuals are present, respectively. After combining the highest MNI from each skeletal and age category, a practical maximum of 43 juveniles are represented within the ossuary (Table 3).
Table 3

*Minimum Number of Individuals by Skeletal Category*

<table>
<thead>
<tr>
<th></th>
<th>Postcranial</th>
<th>Cranial</th>
<th>Dental</th>
<th>Max MNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinates</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>1 to 3 years</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>3 to 5 years</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>6 to 12 years</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>12 to 18 years</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>36</td>
<td>31</td>
<td>43</td>
</tr>
</tbody>
</table>

For the youngest group, four individuals could be established based on postcranial remains; two of those did not have associated cranial material. Of the remaining unassociated cranial material, four more individuals could be established based on four right *pars petrosa* for a combined minimum of six fetal individuals. Dental remains for this group are minimal with only two duplicating molars. For infants under the age of one year, the postcranial remains are the most highly commingled within other burial assignments, and based on fragment refits, are variably distributed throughout the ossuary. Five individuals are represented by left femora, although the dental remains for this age group indicate six individuals are present based on duplication and age estimation.

For the next age category, the 1 to 3 year olds, the postcranial remains represent six individuals based on the presence of six left clavicles and six right radii, although two additional individuals can be discerned on the basis of significant variation in preservation and overall element representation. Of these eight individuals, only two lack cranial material. An additional four individuals are well represented by cranial elements,
for a total of 10 individuals in the 1 to 3 year old group. Cranial and dental remains also more accurately represent the minimum number of children aged 3 to 5 years. The postcranial MNI is five based on right femora. Although, at least eight individuals are represented by substantial cranial material, and nine left first maxillary permanent molars are present.

For the 6 to 12 year olds, only three individuals could be determined based on postcranial elements, but mandibular and maxillary portions of varying ages represent five distinct individuals. The oldest juveniles, the 12 to 18 year olds, have a minimum of three individuals based on cranial and dental material, but left humeri represent a total of seven individuals.

The total of 43 juveniles in the ossuary is much larger than what Scott had earlier estimated (Scott 2010). Based on the right femur diaphysis, Scott’s initial postcranial MNI estimate of the juvenile component was 15 (2011:34), although her cranial estimate included five infants and 17 juveniles for a total of 22 subadult individuals. Although much smaller than the updated total from this study, her figure is comparable to many counts for singular elements in this inventory, such as the upper and lower deciduous molars. Scott’s MNI for adults is comprised of 36 younger individuals (<35 years) and 12 older individuals (>35 years) (Scott 2011:37) for a total of 48. When combined with the juvenile total from the present study, this provides a grand total of 91 individuals within the Shady Grove ossuary (Figure 4).
Comparative Demographic Analysis

In order to interpret the subadult demographic distribution at Shady Grove, it was compared to established life tables for modern undeveloped, urban populations as well as those from other Mississippian populations in the region. The model life tables from the “West” series constructed by Coale and Demeny (1966) are considered the most applicable to many populations because they are derived from the broadest variety of population types and have the largest sample sizes; therefore, they are the most similar to the most common demographic pattern (Coale and Demeny 1966:13). However, in publication, the West model is only shown as the point of origin from which the statistical variance of the three other models is displayed and therefore is incredibly difficult to apply as a comparative to the Shady Grove population. Weiss and Wobst (1973) also present models of life expectancy and mortality for living and skeletal populations from a multitude of times and places. Based on the range of infant mortality and the values for overall juvenile survivorship from these populations, juvenile mortality

Figure 4. Demographic Distribution by Age of the Shady Grove Ossuary.
schedules for model life tables were created (Weiss and Wobst 1973:27). They will therefore serve as the basis of ethnographic demography standards for the present analysis.

According to Weiss and Wobst (1973), the greatest variability among populations in human mortality occurs among subadults specifically among infants under the age of one year old. Among pre-industrial populations, infant mortality data (Weiss and Wobst 1973:27) shows rates from 10 to 40%, while the overall rate of juvenile mortality ranges between 30 and 50% (1973:49). This finding is generally echoed in another survey of demographic patterns from prehistoric and historic skeletal samples compiled by Angel (1969:429) where infant mortality varied from 26 to 36% of the sample total. Based on ethnographic surveys, the general shape of juvenile mortality can be predicted: infant mortality is highest; from ages 1 to 5, mortality levels remain high but decline with each year; and amongst 10 to 15 year olds, mortality levels are the lowest (Weiss and Wobst 1973:26). Therefore, ages 0-1 should have the highest number of deceased individuals, with totals significantly decreasing as the individual’s chances for survival exponentially increase with age and independence. Alas, the cultural changes that often coincide with an individual’s transition into adolescence and then adulthood generate a steady increase in mortality, reaching its maximum height within the oldest age categories and creating a “J-curve” when viewed on a graph.

The Shady Grove sample is comprised of 47.3% juveniles and 13% infants, and although these percentages are within the range of expected values, the youngest individuals, the perinates and infants under one year, appear to be under-represented within the ossuary. Infant skeletal elements are much more vulnerable to taphonomic
processes because of their miniature size and the nature of their still-forming bone composition. For example, the cranial vault bones of a fetus, although more dense, are most similar in size and thickness to a large potato chip. The smallest vertebral centra are half the size of the pinky fingernail. As a preservation bias that applies to most all bioarchaeological samples, their skeletal elements can easily be lost, destroyed, or unidentified during the excavation process (Moore et al. 1975:57; Pinhasi and Bourbou 2008:32-34; Saunders 2000). In addition, with the extra steps in the mortuary process of an ossuary burial, this loss could have also occurred post-mortem during decomposition, transference to the charnel house, or relocation to the burial deposit. However, the presence of many tiny duplicating elements such as ribs, vertebrae, and phalanges, and not just long bones and cranial material, were recorded and reconstructed during this inventory. This could suggest the possibility that a percentage of infants in the Shady Grove population were excluded from burial in the ossuary and not just underrepresented due to taphonomic processes.

Also of interest is the high number of individuals within the 1 to 3 year and 3 to 5 year categories. This seeming increase in mortality for children of 1 to 3 years of age could potentially be attributed to the weaning process as it has been in past research (Blakey and Armelagos 1985; Herring et al. 1998; Katzenberg et al. 1996; Schurr and Powell 2005; Wright and Schwarcz 1998), given that the incorporation of protein deficient maize products into an infant's diet can, and will, significantly affect their nutrition and immune statuses; weaning is therefore usually the most significant health challenge endured during early childhood and has the greatest effect on mortality in children at that age. It is not an immediate assumption for this population, however. The
3 to 5 year old group, the age at which weaning was presumably completed, contains only one fewer individual. One explanation for this high mortality rate among young children might be anemia, which will be addressed further as a part of the discussion of pathologies.

The number of individuals present in the two oldest juvenile groups, when contrasted with the youngest, is as expected for this population. The lowest mortality rate occurs within the 6 to 12 year olds at 5% of the population but increases to 8% in the 12 to 18 year old category as individuals become more involved in dangerous adult activities such as hunting, waging war, or childbirth. The overall adult component for this population appears to be within the expected values at 52.7%, although the proportion of young to old adults is the opposite of anticipated rates and suggests a shortened life expectancy with few individuals reaching old age.

*Comparison with Regional and/or Contemporaneous Populations*

Therefore, at Shady Grove the minimum number of perinatal and infant individuals is much lower than expected, compared to the number of young children which is much higher than expected. The representation of older children for this population appears to be as expected in proportion to the rest of the subadult component. In order to better understand the demographics of this population, it is necessary to compare these results with other sites within the region and time period. With very few ossuary collections from archaeological deposits in the Southeast having been excavated, the site at Carson Mounds in Coahoma County, Mississippi (James 2010:25) offers a worthwhile comparative population for the Shady Grove ossuary due to its proximity in location and time period. It is significantly different in its composition and structure,
however. The Carson Mound ossuary was well organized into bundles of crania and long bones. These remains were placed north to south in two horizontal rows and multiple vertical layers (James 2010:56). The burial contained a total of 36 individuals based on the presence of 27 right adult femora and nine subadult skulls. All nine juvenile individuals within this deposit were aged between 2 and 9 years old.

In order to explain the absence of infants less than two years old and children aged 9 to 18, James (2010:89) cites intentional exclusion of the youngest individuals, as well as poor preservation of epiphyseal material, which caused issues with adolescent age estimation. The incredible integrity of the bundle boundaries and anatomical placement of the adult material suggests an organized and deliberate burial arrangement (James 2010:66). Such intentionality within the ossuary supports the likelihood of infant exclusion. Also, in her descriptions of each bundle area, James repeatedly describes poor preservation of the juvenile individuals, with crania typically being highly fragmented, and age estimation based solely on the dental material. Comparatively, with multiple individuals in each age category and a much larger sample size, it is apparent that total segregation of age-specific remains did not occur during the deposition at Shady Grove. Also, the ossuary displayed much less organization and a much greater degree of fragmentation and commingling than what was seen at Carson Mounds. With only 25% of the ossuary at Carson (9 of 36) represented by juvenile individuals and over half of the subadult age categories unrepresented entirely, including that which should have the highest mortality rate, it must be considered that the size of this sample is too small to be an accurate representation of the living people at Carson, and that many of its dead must be buried elsewhere.
A second site that offers a comparative population based on proximity in location and temporality is that of Lake George, located only 130 miles southwest of Shady Grove in Yazoo County (Williams and Brain 1983:1) and continuously occupied from A.D. 600 to 1600 (Williams and Brain 1983:14). Excavations of Mound C yielded 185 individuals from 77 grouped burials considered part of the Coles Creek tradition, which predates the Mississippian period. In the Lake George population, 80 individuals are adults, 5 are indeterminate, and 100, or 55.6%, are juveniles, which is comparable to that of the 47.3% juvenile population found at the Shady Grove site. The subadult component at Lake George is as follows: 79 infants aged 0 to 3 years (44%), 15 children aged 3 to 6 and 6 to 13 years (8.3%), and 6 adolescents 13 to 18 years old (3.3%) (Williams and Brain 1983:421). In comparison, the Shady Grove subadult population is substantially different: 22 individuals are infants under the age of 3 (24%), 14 are children between 3 and 13 years old (15.3%), and 7 are adolescents between 13 and 18 years (7.7%).

A possible explanation for the heightened levels of infant deaths at Lake George can be found in the style of mortuary deposit practiced at this site. One particular burial of interest contained one adult male surrounded by 13 infants (1983:47). Such intentional placement together is suggestive of infant sacrifice. In prehistoric Southeastern chiefdoms, following the death of an elite, like the Sun of Natchez, as duty to their chief or as an act of devotion, spouses, servants, and community members would choose to give themselves as tribute for burial inclusion; prisoners of war, slaves, and the infants of commoners served as sacrificial victims, representative of the deceased’s position in life (Driver 1961:374; Hudson 1976:328, 330-331). Health factors may also explain the large number of juveniles at the Lake George site; adult interments were largely individual,
while children and infants were most commonly found buried together in mass burials (Williams and Brain 1983:421-423). These deposits often contained at least five to seven infants contorted and overcrowded, literally crammed into burials together. Williams and Brain suggest this is indicative of endemic or epidemic disease, which resulted in an increase in contemporaneous infant deaths and hasty burials to avoid the spread of infection (1983:422-423, 436, 447-448).

The Mangum site (22CB584) offers a third comparative population and is located on a natural knoll along the Natchez Trace Parkway in Claiborne County, Mississippi. The site is classified as a Mississippian-Plaquemine necropolis, dating to A.D. 1400-1500. Plaquemine culture is similar to Mississippian culture at other sites to the north in the Lower Mississippi River Valley, but instead of being characterized by shell-tempered pottery, it is set apart by its ceramics tempered with a mixture of grog and vegetable matter, shell, or bone (Hensley and Penton 2006:1-2; Penton et al. 2015; Peregrine 1996:xx-xxi). A total of 24 burials containing 103 individuals were excavated (Hensley and Penton 2006:6-7; Penton et al. 2015:). Of those, 32 individuals are subadult (31%), with nine infants under the age of 2 years (8.7%), 14 children between 2 and 5 years old (13.6%), six juveniles from 6 to 10 years (5.8%), two individuals aged 11 to 15 (1.9%), and one adolescent aged 16 to 20 years old (.97%). A closer examination of the bioarchaeological analysis of the Mangum site remains reveals an unhealthy population, with generally poor dental health and a high frequency of iron deficiency and infection. Just over 30% of the sample suffered from at least one stress indicator in varying degrees of severity (Penton 2006:9; Penton et al. 2015). With 69% adult mortality and 31% juvenile mortality, this population falls within the range of expected rates. However,
considering the relatively high occurrence of paleopathological stressors, it seems likely that this sample should be comprised of more juveniles, potentially buried elsewhere, and is not an accurate representation of the living population.

The fourth comparative population was excavated, according to Morse (1973:71), from two locations on the Nodena Plantation in northeast Arkansas and yielded over 1,775 individuals, dating to the Late Mississippian period (Powell 1983:1-5). Unfortunately, many factors severely impacted the final state of the collection and its overall demographic profile (Powell 1983:5-6). The goals and methodology of the excavators, which during this time period focused on the removal of whole artifacts and intact crania rather than overall cultural or biological adaptation, left the sample heavily biased and incomplete. A mere 228 individuals remain, although more than 70% of those are represented solely by cranial material (n=165) and many others only by a single postcranial element. After removal, Dr. James Hampson, the plantation’s owner, an avid excavator and the collection’s curator, presumably reburied a great majority of the skeletal remains, citing a lack of adequate display space in his private museum (Powell 1983:6). Therefore, this series offers a fourth, and very different, comparative population.

Of the 228 individuals still present in the collection, only 10 individuals, or 4.4%, are juveniles under the age of 18 years old. Two of those are infants under the age of 2, and the remaining eight are between 3 and 11 years old. It is of significance that this population yielded virtually no adolescent individuals aged 13 to 17 years (Powell 1983:15). The subadult component of the Nodena series, very likely, seriously under-represents the original contribution to the burial population due to excavation biases of that time.
The Libben Site provides another comparative burial population, but one much larger, more complete and from an earlier period than those considered thus far. Over 1300 individuals were excavated from the site near Lake Erie, Ohio, dating to A.D. 800 to 1100 (Howell 1982:263; Lovejoy et al. 1977). Lovejoy et al. (1977) report the conditions at the site were excellent for skeletal preservation and the remains were excavated and analyzed with great thoroughness. Based on the life table created by Lovejoy et al. (1977), among the 1289 individuals that could be aged, 226 (17.5%) are infants who did not survive their first year of life: 145 individuals (11.2%) are children between the ages of 1 and 3 years, and 142 individuals (11.0%) are juveniles between the age of 4 and 5 years old. A significant decrease in mortality is seen by age 10, with only 94 individuals (7.3%) present, and then a slight decrease into adolescence, with 92 individuals (7.2%) from age 10 to 15 years present, for a total number of 699 individuals (54.2%) within the subadult component of the Libben site. In comparison, the adult component of the population is comprised by a total of 590 individuals, although none of them are over the age of 50 years. Based on this information, Lovejoy et al. (1977) concluded that the people of Libben had low infant mortality and high adult mortality, which, although contradictory to most anthropological demographic information (Weiss and Wobst 1973), is similar to many other skeletal samples (Lovejoy et al. 1977:198). However, this distribution has been largely credited to the biases of archaeological methods as the remains of infants and children are most often lost (Pinhasi and Bourbou 2008:32-34) or culturally interred elsewhere (Pinhasi and Bourbou 2008:35-36).

Lovejoy et al.’s assessment of the Libben demographic distribution has been challenged over the years. In order for the living population of Libben to comply with
established ethnographic standards, there would have to have been an unnoticed loss of 225 children during excavation, and with such detailed removal, this scenario is very unlikely. Howell’s (1982) analysis of the Libben demography, when compared to historical and contemporary life tables, suggests a very young living population, with many orphans, few grandparents, and a hard working adult generation (1982:268). Howell argues that this cultural reconstruction is unrealistic and very improbable, and likely the better explanation is relative to errors and biases of life table analysis (Howell 1982:269), a warning that bioarchaeologists do not always keep in mind.

The skeletal series from Dickson Mounds, a Middle Mississippian site located in Fulton County, Illinois, is comprised of 479 individuals (Blakely 1971:43; Blakely and Walker 1968) and has an average age at death of 24 years (Blakely 1971:46). The subadult component of this population represents 44% of the sample. Among the 215 juveniles, 169 (35%) are individuals under the age of 10, and 46 others (9%) are between 10 and 19 years old (Blakely 1971:47). The distribution of the youngest individuals is as follows: 71 infants (14.8%) under the age of 1 year, 49 individuals (10%) between 1 and 3 years, 27 subadults (5.6%) from 3 to 5 years, and 22 juveniles (4.6%) aged 6 to 10 years old (Blakely 1971:48). Of the 71 infants in this collection, ten are fetal, 13 are considered neonates, or babies who died at birth or in the first two weeks of life, and 48 are infants under the age of 1 year old (Blakely and Walker 1968:104). The mortality profile for this population displays the highest peak at birth, with some decrease after the first month, and then more so after the first six months. According to his analysis, the next generalized peak in deaths occurs at 22, 24, and 30 months, with eight individuals each, and nine children at the age of 3 years old. This increase in frequency is cited as the
result of an infant’s inability to survive the weaning process (Blakely and Walker 1968:107), similar to many other analyses as discussed earlier.

Without the employment of multiple skeletal populations as comparatives, the demographic distribution of Shady Grove cannot be placed within an appropriate context. The utilization of six different collections, all of which vary greatly in composition and circumstance but are similar in location and temporality to that of Shady Grove, offers a method to accurate interpretation of the skeletal remains and subsequent inferences about the living population that created this mass burial. Each one of the six exhibits a very different demographic pattern, offering a variety of contrasting circumstances with which to evaluate the age distribution of the Shady Grove population, which had 47.3% juvenile representation. With such extreme variance in juvenile representation from 4.4% at Nodena to 55.6% at Lake George, it is impossible to declare what is average or “typical” for Mississippian peoples, except that infants are generally poorly represented due to excavation and taphonomic biases. However, it is relatively easy to determine that these two sites in particular represent outliers, Nodena being less representative because of the incompleteness of the sample and Lake George being over represented because of sacrificial inclusion or high rates of disease and pathologies. In comparison, except for the obvious under representation of infants common for bioarchaeological collections, the Shady Grove collection appears to be somewhat representative of the living population. However, it is also important to note that the representation of individuals aged 1 to 5 years old appears to vary substantially from the comparative groups and is much higher than the expected values, likely due to poor nutrition and health at that age. The Shady Grove juvenile component is most similar in distribution and overall representation to
that of the Dickson Mounds collection, the only comparative to actually follow the predicted j-shaped mortality curve. It seems most likely that this deposit, as the second burial of its type to be excavated from the Shady Grove site, served as the final resting place for a local kin group, and the likelihood that there are more deposits similar to it remaining at the site. The creation of an ossuary burial is a corporate behavior, which as a communal activity, represents and reaffirms an established kinship network among family members (Goldstein 1980, 1995:116, 2000:194).

Factors Affecting Demographic Distribution

Although it is considered representative when compared to established standards and other contemporaneous populations, it is still likely that pre-depositional mortuary practices, taphonomic damage, and increased rates of pathologies have considerably affected and shaped the demographic distribution of the population excavated from the Shady Grove ossuary. The under-representation of infants less than 1 year old and the increased representation of individuals between 3 and 5 years old can be justified with a brief discussion of these various factors which created the composition of the ossuary.

With this particular burial style, many additional steps were taken by the living after an individual died. This involved a certain level of handling, as well as relocation from the place of death to a scaffold for decomposition, followed by collection and movement from the scaffold to the mortuary facility for storage, and finally transportation to the deposit for burial. Considering the imperfections of human nature and life’s uncontrollable accidents, it is not improbable that bits and pieces of the remains could have been dropped, damaged, broken, mixed up with others, or easily lost to nature. With such an under-representation of infants within the Shady Grove ossuary, in
addition to the wide variability in preservation and weighted element distribution for this age group, mortuary practices and taphonomic processes significantly affected this population’s demographic representation. The particular spatial distribution of individuals, the commingling of bundles, and the overall scatter for age groups created during deposition will be discussed in detail within the next section.

Another variable likely affecting the Shady Grove demographic distribution is health. Cranial and postcranial lesions were found at relatively low frequencies compared to the Libben juveniles (Mensforth et al. 1978). However, the cranial material of three individuals, all 1 to 3 years of age, display significant lesions on the interior of the cranial vault with active remodeling, indicative of chronic hemorrhaging around the brain and inflammation of the meningeal vessels and likely related to transmittable diseases such as tuberculosis, or systemic infection (Lewis 2007:141-143; Mensforth et al. 1978). Identical cranial lesions on both the endo- and ectocranial surfaces were recorded by Mensforth et al. (1978:33) for the Libben population, but at a much higher frequency than Shady Grove. Of the 86 analyzed juvenile crania from Libben, 55 individuals, or 64%, displayed endocranial lesions, and 13 individuals, or 15.1% exhibited ectocranial reactions, whereas of the Shady Grove children, only 7% and 2% show evidence of these cranial lesions, respectively. These particular pathologies are restricted to only the 1 to 3 year age group. Within the 3 to 5 year olds, four out of eight individuals displayed level 1-2 porosity on the exterior vault, indicative of porotic hyperostosis most likely attributed to iron-deficiency anemia given that the interior table was not affected. The osteological paradox must be considered at this junction. Based on their bones, these children were very likely to have been much less healthy than others; but in order for cranial bone to
remodel, an extended amount of time is required, which suggest these individuals were also strong enough to live with their condition (Wood et al. 1992).

Of the inventoried postcranial elements at Shady Grove, 13 bone elements display evidence of infection, all of which belong to individuals less than 2 years of age, and include multiple occurrences of osteomyelitis, periostitis, and cortical thickening. Three of those elements have both osteomyelitis and cortical thickening and are therefore so warped by their pathologies that they are no longer identifiable long bones and must be classified as indeterminable. Also an indication of the subadult health at Shady Grove are the discrepancies between long bone and dental age estimation for two individuals from the 1 to 3 year old group that suggest slowed linear growth due to vitamin deficiency and malnutrition. Although the skeletal pathologies were documented during this inventory, a paleopathological analysis for Shady Grove is an entire thesis in and of itself and should be completed in much more detail as a part of future research on this population.

Spatial Distribution and Discussion

With the presence of multiple individuals found within single burial numbers, nearly all of the individuals represented by the postcranial MNI are comprised of several burial proveniences and cannot be easily untangled or explained (Table 4). However, through refit fragments, paired elements, and associations based on similarities in coloration and preservation, the spatial distribution and deposition of the ossuary can be better understood.
Table 4

*Juvenile Individuals Represented within the Postcranial MNI*

<table>
<thead>
<tr>
<th>Ind. #</th>
<th>Burial Provenience(s)</th>
<th>Age Estimation</th>
<th>Material Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60, 57/58</td>
<td>20-24 wks.</td>
<td>PC/C</td>
</tr>
<tr>
<td>2</td>
<td>60, 54-R-56</td>
<td>36-38 wks.</td>
<td>PC</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>36-38 wks.</td>
<td>PC/D</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>38-40 wks.</td>
<td>PC/C</td>
</tr>
<tr>
<td>5</td>
<td>21, 20, 26, 60</td>
<td>0-3 mos.</td>
<td>PC/C/D</td>
</tr>
<tr>
<td>6</td>
<td>7, 7, 19-R-44/17, 24, 42, 44</td>
<td>3-6 mos.</td>
<td>PC/C/D</td>
</tr>
<tr>
<td>7</td>
<td>6, 3, 3, 14, 20, 37, 55</td>
<td>3-6 mos.</td>
<td>PC/C</td>
</tr>
<tr>
<td>8</td>
<td>19, 21, 37, 56, 63</td>
<td>6-9 mos.</td>
<td>PC/C/D</td>
</tr>
<tr>
<td>9</td>
<td>13, 13/33, 33, 61</td>
<td>9-12 mos.</td>
<td>PC/C/D</td>
</tr>
<tr>
<td>10</td>
<td>19, 25, 64</td>
<td>1-2 yrs.</td>
<td>PC/C</td>
</tr>
<tr>
<td>11</td>
<td>14</td>
<td>1-2 yrs.</td>
<td>PC/C</td>
</tr>
<tr>
<td>12</td>
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Note. R = refitted fragments; PC = postcranial; C = cranial; D = dental. **Nearly all refitted fragments

It must be addressed that the map presented here (Figure 5), created by Scott based on field records, represents the numbered adult skulls and surrounding long bones
as they were mapped \textit{in situ}; the specific location of juvenile remains within each burial number is not precisely known. Therefore, the statistical variation in age and element distribution cannot be measured with any amount of scientific accuracy. Only generalizations can be made as to the depositional event and the distribution of singular individuals within the ossuary. Also, burial numbers 1, 28, 48, and 70 were not assigned. Numbers 16, 35, 37, and 66 appear twice within the ossuary, and number 63 is the same individual assigned to burial 62.

\textit{Figure 5.} Map of the Shady Grove (22WU525) Ossuary, Burial 43. Taken from Scott (2010:xx).

Each age category, as well as each specific individual, displays a very different pattern of distribution within the ossuary, which is expected with this type of multi-step mortuary ritual. This can be attributed to the depositional event: the location where, and the energy with which the remains were tossed in, how broken they became, and the resulting scattering across the deposit. It is also very possible that individuals became fragmented and commingled after decomposition, but before their burial, on the way to or
within the charnel house. Commingling of individuals may have been purely accidental, while the thought lingers that intentional commingling may have also played a part in the Mississippian mortuary culture. Similar to our mourning processes, nuclear and extended family members of the deceased may have desired their own role in an individual’s burial, especially something so traumatic as the loss of a child. Like throwing flowers into the grave at the closing of a funeral, a child’s remains may have been divided amongst family and friends so that each person could participate and feel connected to the ritual, as well as given the opportunity to say farewell to their dearly departed. It is also just as likely that the remains were tossed in with no intentionality at all, creating the scattered distribution. These scenarios are only hypotheses; it is impossible to know for sure what events created the disorganized distribution of juvenile remains throughout the Shady Grove ossuary.

During laboratory analysis, fragmented elements literally meters apart were reconnected, and burials with multiple individuals were untangled bone by bone, all to reveal a chaotic and intricate puzzle comprised of more than 2,000 pieces. Of the 69 proveniences plotted in the ossuary map, 58 of those contained juvenile elements (84.1%), while a mere 11 burials exclusively included only adult remains (15.9%). Burial information for the remains from the four duplicated proveniences (16, 35, 37, and 66) did not indicate from which bundle they originated, so their proveniences were only counted once, not twice. Of the 58 burials containing juvenile material, 17 proveniences were comprised of elements from a single age group (29.3%), while 20 others had two categories represented (34.5%); 11 burials had elements from three different age groups (18.9%), and 5 proveniences represented individuals from four different age groups
(8.6%) (Table 5). Three proveniences, 3, 19, and 67, have individuals from five age categories (5.2%), while two others, 24 and 31, contain elements representing all six different age groups (3.4%). Based on this, these five bundles are considered the most commingled and, excluding burial 35, are all clustered in the most central part of the ossuary. With such high levels of commingling, it is not surprising that the Shady Grove ossuary also displayed extensive scattering and fragmentation of individuals, firmly supported by reconstructed cranial and postcranial elements.

In the following discussion, the overall distribution for each age categories are discussed, including the greatest distance between burial proveniences and isolated unassigned elements, as well as each specific individual and the distribution of their remains.

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For visualization, each age category has its own color coded map, in which the proveniences of represented individuals and unassignable elements are highlighted (Table 6).

Table 6

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<tr>
<td>25</td>
<td>32/36</td>
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Figure 6. Spatial Distribution of Perinate Individuals within the Shady Grove Ossuary.
From the perinate category (Figure 5), Individuals #1, 2, and 3 were excavated from the southern central border of the ossuary, while #4 was commingled among many individuals isolated within burial 24. Individual #1 (red line) was one of three babies included in burial 60 and has been associated with the youngest sphenoid assigned to burial 57/58, at a distance of .77 meters away. Individual #2 (yellow line), also buried within 60, is now associated with a reconstructed left femur excavated from burials 54 and 56, which were initially .67 meters away from one another, and .58 meters from their bundle of origin. These infants were obviously placed at the southernmost point of the ossuary and exhibited relatively minimal scatter. In contrast, many isolated, unassignable, perinate cranial and postcranial elements (green) were found widely distributed over 1.5 meters, although only throughout the eastern half of the ossuary. Individual #3 (purple fill) was found with a nearly complete adolescent individual within burial 60. It is difficult to discern a general pattern of distribution for this age group since the majority of the remains are located on the southern boundary, although the average scatter for individuals is .51 meters, while the isolated elements triangulated within the eastern unit have a much wider distribution at an average of 1.33 meters apart.
Of the next group of individuals, aged 0 to 1 years old, four babies were distributed in a lineal pattern from north to south, three from within the central part of the ossuary (individuals #5, 7, and 8), the fourth from the eastern unit (#9), while the fifth individual links these two areas together, clustered in the northeastern corner (#6). The distribution of isolated elements from this age category span 2.96 meters east to west from burial 31 to 27.

Individual #5 (blue line) includes four elements, which were scattered just over 1 meter apart, from three burial proveniences, as well as one molar from burial 60. Bundles 20 and 21 both contained one other individual within this age group, as well as elements from older infants, at only .19 meters away from one another and easily commingled. Individual #6 (yellow line) is distributed amongst six proveniences in the northeastern half of the ossuary. The lower limbs were close in proximity within 7, 19, and 24, only .55 meters at the furthest point, but are connected to burial 17/44 by a conjoined femur 1.49 meters away, which also contained the individual’s cranial and dental material. The
scatter of this infant at its widest, from east to west (burial 42 to 19), was 1.73 meters, and implies they were tossed west from the northeastern corner. Individual #7 (lime green line) is scattered throughout six burial proveniences at a distance of just over 2 meters apart. A higher concentration of elements were found within burials 6, 3, and 37, while few came from burials 55 and 14, implying the possibility that the infant was thrown southeast from the northwestern border, although the distribution of elements display no reasonable pattern, and both femora were excavated from the most central bundle within the ossuary units. Individual #8 (orange line) is distributed among five burial proveniences, although the postcranial material is clustered in the northern three bundles and the cranial material in the southern two. The maximum scatter for this infant is 2 meters from north to south. The majority of individual #9 was clustered in the southeastern corner within burials 13 and 33, while a single postcranial element was excavated from burial 61, 1.27 meters away. The major pattern for this age group is the distribution of individuals across the burial from north to south, at an average scatter of 1.29 meters, except for individual #6 which was scattered east to west. Although the unassignable elements span nearly three meters across the burial, the average proximity to the closest assigned provenience is .37 meters.
Figure 8. Spatial Distribution of 1 to 3 Year Olds within the Shady Grove Ossuary.

Similar to the first year infants, the eight 1 to 3 year old individuals found in the Shady Grove ossuary were also scattered throughout the central, southern, and eastern portions of the burial pit, while now including elements from a western bundle, although the group lacks a discernable pattern based on overall distribution. The greatest distance between bundles that contained elements from this age group is 2.98 meters, east to west, from burial 8 to 4. Similarly, the greatest distance between isolated, unassigned elements distributed between proveniences 53 and 74 is just over 3 meters.

The cranial and postcranial material for individual #10 (red line) is concentrated within burial 19, while only the left and right pubis were excavated from burial 25, and a single tibia from burial 64, which was 1.92 meters from the bundle of origin. Individual #11 (purple fill) was represented only by upper body limbs and cranial material, and exclusively found within burial 14, which also contained elements from two other individuals within this age group, although easily distinguishable based on differences in age and coloration. Individual #12 (blue line) is a poorly represented infant
whose remains were probably highly fragmented and damaged before burial in the ossuary, as well as possibly laid to rest in multiple places, by multiple people, rather than concentrated in a single bundle. The two pieces of left ulna excavated from burials 7 and 34 were just over 1 meter apart, while the greatest distance between this infant’s elements was 1.65 meters, although with no real organization. Individual #13 (dark green line) is another example of an individual who remains were likely damaged before burial based on the distinct dark coloration and poor level of preservation. The greatest distance in distribution for the 1 to 3 year old group of 2.98 meters was based on this individual and the location of paired left and right pubis from opposite ends of the deposit. Individual #14 (pink line) was clustered just west of the center of the ossuary, and its scatter spanned 2 meters northwest to southeast. Although burial 3 contained the majority of the individual’s crania including the mandible, burial 14 over 1.6 meters away contained the individual’s maxilla fragment, isolated dentition, and a mandibular incisor, which refit perfectly back into its alveolar root. It appears this infant was deposited along with many others from the northern boundary of the ossuary pit, and that elements traveled southward, commingling with the remains of other individuals. Individual #15 (yellow line) was very nearly complete within burial 62, except for the right ulna, which was originally assigned to 60/62. This individual was obviously placed very carefully within the ossuary at the southernmost point with little to no scatter. Alternatively, individual #16 (light blue line) is another in this age group clustered within the center of the pit and distributed amongst multi-bundle proveniences. From burial 25, the refitted tibia fragment for this infant was only .3 meters away from the concentration of elements assigned to burials 46, 55/46, and 24/46. The last individual of this age category, #17
(orange line), was excavated from only two bundles, 14 and 47, on the southernmost boundary of the ossuary. Refitted cranial material for this infant was found in both proveniences, only .54 meters away from one another, although the postcranial elements were exclusive to burial 47, the more eastern bundle and the likely location for the individual’s original deposit.

Overall, the distribution of the 1 to 3 year old group lacks a distinct pattern. Some individuals are carefully placed and very minimally scattered, while others stretch the length of the ossuary as if two individuals positioned the elements standing directly across from one another. The average distance for these individuals is 1.168 meters. The unassignable isolated elements also reveal no pattern of placement, scattered 2.96 meters across the deposit; however, most are within relative proximity to assigned proveniences for this age group.

Figure 9. Spatial Distribution of 3 to 5 Year Olds within the Shady Grove Ossuary.

The next age group is interesting because although it only contains five individuals, two are minimally represented but excavated from the same bundle, while
one of which is the most scattered and commingled individual within the Shady Grove ossuary, while still being the best-represented child in the 3 to 5 year old group. Skeletal material for these individuals were distributed the full length of the ossuary, just over 4 meters from east to west and 2.48 meters north to south, while isolated unassigned elements were mainly scattered around the eastern boundary of the deposit.

Individual #18 (red line) was primarily found within burials 67 and 25 in the central bundle cluster, although postcranial refit fragments from burial 27 were almost 2 meters northwest of the concentration, and the isolated incisor from burial 61 was 1 meter northeast of its maxillary origin. The distribution of this individual is therefore not conclusive to any particular direction. Individual #19’s (yellow line) original provenience information included two numbers, 42/32, which signifies that the location of the remains occurred between the bundles and could not be assigned with confidence to a particular one, while its poor level of preservation suggests the remains were damaged before deposition, although carefully placed from the northeastern boundary based on the limited scatter. Individuals #20 and #21, both represented by pink fill, were excavated from a single bundle, burial 36 in the northeastern corner of the ossuary, and are each very poorly represented by only two long bones, although not poorly preserved. Due to the level of incompleteness, the majority of their remains were very likely lost before deposition, but obviously intentionally placed together at the most northeastern region of the ossuary.

The most significantly distributed and commingled individual is #22 (lime green fill), comprised of elements from 16 different burial proveniences based on paired epiphyses and ten refit fragments. Postcranial elements from the left side of the body are
clustered in the most northwestern bundle, burial 27, while the right side, less than one meter south, was found in burial 4 and is much more complete. To demonstrate the elaborate distribution of this individual, the left and right femora were excavated from seven proveniences (Figure 9). The left diaphysis was located in burial 25, in the center of the ossuary, while the right diaphysis was located 1.73 meters west in burial 4. Furthermore, the left proximal epiphysis was .77 meters from the proximal portion in burial 27, which was 1.92 meters away from its diaphysis in burial 25. The distal epiphyses, which were identical in size and coloration, and therefore paired, were found in bundles 53 and 47, 2.29 meters apart from one another. A small fragment from the left distal end assigned to 16/17/42 refitted to its diaphysis from 1.25 meters away. Measured from northwest to southeast and northeast to southwest, the greatest scatter distance for these femora is 2.88 meters and for the whole individual is 3.37 meters. Although the clustering of postcranial material in the western area suggests its entrance point, the scatter of elements is extensive enough that a pattern of distribution for this individual is inconclusive without considering pre-depositional separation or the involvement of multiple handlers.

A pattern of distribution for this age group is unclear. Many of the individuals are minimally represented and relatively isolated. The average distance of scatter is .61 meters, excluding individual #22, which is considerably dispersed across the ossuary at an average of 3.125 meters. Unassignable isolated elements reveal a possible pattern, as nearly all of them come from bundles around the southeastern perimeter of the ossuary over a distance of nearly 3 meters.
Figure 10. Paired Left and Right Femora of Individual #22.

For the next group of juveniles, individuals are poorly represented and highly fragmented, with only five adolescents present based strictly on dental remains. The 6 to 12 year old group contains the least amount of individuals and the least amount of representative skeletal material. Distinct mandibular and maxillary portions were excavated from six bundles in five varying locations, up to 4.33 meters apart. Only three individuals could be determined based on 15 postcranial elements scattered throughout the eastern unit of the ossuary, although primarily on the easternmost boundary related to burial 32, as if placed there together intentionally from that specific location on the edge of the burial deposit. Two individuals were found commingled amongst proveniences 42/32 and 32/36, surrounded by bundles containing isolated unassignable postcranial elements from this age group. The distribution and lack of representation for these individuals suggest that many of the remains were damaged and lost before deposition, potentially during an extended amount of time spent stored in a charnel house.
Figure 11. Spatial Distribution of 6 to 12 Year Olds within the Shady Grove Ossuary.

Individual #23 (yellow line) is the youngest child in this age group and distinctly different based on size. Represented by only three postcranial elements, the right femur and left humerus head were both excavated from burial 3, while the right humerus fragment was 2.5 meters northeast in burial 22, all estimated to be 6 to 8 years old and similar in color. Individual #24 (red/black line) is represented by a pair of femora, the right from burial 29 and the left from 42/32, .83 meters apart, estimated to be 9 to 10 years of age and significantly larger in size and cortical thickness. Individual #25 (black line) is the oldest juvenile in this age category, but the least represented, with only two left humerus fragments from burial 32/36, estimated to be 10 to 12 years of age.

Based on proximity, age estimation, and dissimilarity in color, the five individuals represented by cranial and dental material (light blue circles) could not be assigned to any of the established 6 to 12 year old juveniles. One mandible from burial 4, aged 6 to 7 years, refit to a fragment .6 meters west in burial 30/33, and was totally isolated from all of the other skeletal material from this age group. A second mandible with maxilla
fragments, aged 6 to 7 years, was found within burial 67 in the central part of the ossuary, while a third mandible, aged 10 years old, from burial 71 was excavated from the most northeastern corner of the deposit. A right maxillary fragment with dentition from burial 32, estimated to be 7 to 8 years old, could not be assigned to either individual found within that commingled provenience, and finally, a left and right maxilla estimated to be 8 to 9 years of age was excavated from burial 64.

Similar to the previous age groups, the 6 to 12 year olds lack a distinguishable pattern of distribution except for overall placement. Of the three identified postcranial individuals, two are associated through multi-burial proveniences with burial 32 and have minimal scatter. These individuals have a mean distribution of 1.4 meters within the northeastern corner of the burial. Of the five individuals identified only by cranial material, four are also contained within the northeastern corner, although the last is 4.33 meters away at the western boundary.

The final age group contains two well-represented individuals, although, as with the majority of the Shady Gove remains, most individuals in this category are poorly represented by isolated and fragmented elements, which is suggestive of pre-depositional taphonomic damage and commingling within the charnel house. The distribution of these individuals within the ossuary yields no distinct pattern, as individuals and unassigned elements are spread the entire length and width of the deposit.
Figure 12. Spatial Distribution of 12 to 18 Year Olds within the Shady Grove Ossuary.

Individual #26 (purple fill), a 14 to 16 year old, is represented by two elements, a distal left humerus and a left pubis, both in poor states of preservation and similar in color, and was excavated from burial 64 on the southeastern boundary of the deposit. Individual #27 (red line) is comprised of four postcranial elements from burial 50, estimated to be 14 to 15 years old, one of which is an unfused left femur. The proximal epiphysis for this element was excavated from burial 7, just shy of 2 meters north of the rest of this individual’s remains. It seems unlikely that this solitary epiphyseal cap traveled that extensive distance just as a result of gravity; instead, it seems more plausible that this element was accidentally commingled with individual #29 before deposition. Individual #28 (yellow line) is represented by only two postcranial elements: the second left humerus from burial 64 and the right femur from burial 68. These elements were slightly over 1 meter apart but were associated based on distinct tawny coloration, high level of preservation, and age estimation of 15 years +/- 1 year. Individual #29 (lime green line) is a well-represented, well-preserved 15 to 16 year old individual, contained
mainly within burial 2, but joined by a left ulna from burial 3, which was excavated .63 meters southeast of the bundle of origin, as well as an ischial tuberosity from burial 7, 1.4 meters east of the individual’s postcranial remains. The great preservation and representation of this individual is likely indicative of a more recent death resulting in less storage time and taphonomic damage, while the concentrated placement in the northwestern corner appears incredibly intentional and the scatter eastward accidental.

Individual #30 (light blue/black line) is a partially represented 14 to 18 year old comprised of a left humerus from burial 69, a right ulna and left distal femur epiphysis from burial 31 only .67 meters away, and a left proximal tibia fragment from burial 68, .77 meters from burial 31. On the basis of preservation, a small proximal femur epiphysis fragment from burial 16/17/32/42 has been associated with this individual. With such a complicated provenience, the exact location of these remains cannot be determined, although the proximity of burials 42 and 32 suggest a likely origin. This individual, like many others of this age category, is minimally represented by a few solitary elements and accidentally commingled with other individuals in the ossuary. Individual #31 (purple/black line) is a partially represented 17 to 19 year old comprised of a left radius, a right tibia, and a pair of humeri from burial 16/13/32/42. Obviously very commingled and difficult to untangle in the field, burial 42 also contains the left ischium, while the right femur was assigned to 42/66. Now also associated with this individual based on coloration and levels of fusion is the right radius and left tibia from burial 7, 1.3 meters west of its bundle of origin, and the left ulna from burial 24, 1.5 meters away. It appears this individual was placed in the northeastern corner, although the exact location of such a complicated provenience is unknown, and that the isolated elements scattered west. It is
also possible, with elements from two other individuals from this age group assigned to burial 7, that these individuals could have been commingled before the deposition into the ossuary and were placed there intentionally by the living. Individual #32 is from burial 60 and is the most complete individual within the ossuary.

Once more, like the age categories before it, this group displays a clear lack of distributional patterns. Individuals appear to be more concentrated within the northeastern corner and eastern boundary, although not isolated there. The average distance between elements representing a single individual is just over 1 meter, and although they are spread across the ossuary, unassignable isolated elements are always found in close proximity to assigned proveniences. Overall, the Shady Grove juvenile categories lack any semblance of scatter pattern or primary location within the burial, displaying no visible intentional arrangement or design. Therefore, the only conclusion that can be drawn from this exercise in spatial distribution is that the ossuary at Shady Grove was likely a burial area for a corporate group, in that an individual’s placement in the mortuary deposit related to belonging to the family network and the kindred bond created from that inclusion. This hypothesis is support by the mortuary pattern found at Moundville in which smaller burial mounds situated adjacent to larger, residential mounds have been interpreted as representations of a corporate kin group, paired with on the landscape with the larger mound, where each family’s members could be buried (Knight 1998:51).

Through the application of visual aids, the distribution of fragmented and commingled juvenile individuals, as well as each age category represented within the Shady Grove ossuary, can be easily viewed and deciphered. Of the 69 proveniences
plotted in the Shady Grove ossuary map, only 11 burials exclusively included adult remains (15.9%), while 58 (84.1%) bundles contained the skeletal remains of 43 juveniles, some of which placed carefully with obvious intention, and others scattered directionally as if tossed out of a basket into the deposit. These maps, in conjunction with refitted fragments and new associations, display the amazing affect that mortuary practices and taphonomic processes can have on skeletal remains, and the impossibility of ever reconnecting an individual without a detailed inventory.

Conclusions

Based on the comprehensive skeletal inventory completed for this study, the juvenile component of the Shady Grove population is comprised of over 2,000 identified specimens and a minimum of 43 individuals. When combined with the established number of adult individuals from Scott’s (2011) inventory, a total of 91 individuals are present within this single mortuary deposit. The demographic distribution of the subadult component, when compared to established ethnographic standards, as well as contemporaneous comparative populations, appears relatively representative and somewhat typical of Mississippian populations at 47.3%. The under-representation of infants is common in many bioarchaeological collections, and at the Shady Grove site, is likely related to the particular multi-step mortuary style and damaging taphonomic processes. The over-representation of children aged 1 to 5 years old is potentially the result of increased rates of anemia and infection, and the completion of a pathological analysis for this population is imperative to better understanding the Shady Grove people. The spatial distribution for each age category yields a dramatic visual aid, displaying the lack of any intentional pattern or placement design, as well as the high level of
commingling and fragmentation within the ossuary possibly comprised of a family kinship network.

The Shady Grove collection features great preservation due to the shell midden in which the ossuary was encased, and this quality offers a relatively complete sample of juveniles. Although a great wealth of information about the living population was revealed from this research, one limitation of this study was the unintentional bias created during the ossuary’s hasty excavation, which was completed during unbearably cold weather, hampering the ability to map the burial with great detail. Future investigations of the Shady Grove population should integrate the demographic information from this study with a more comprehensive pathological analysis in order to further our understanding of the Mississippian people living at Shady Grove.

As a unique mortuary style in the Mississippian period, the ossuary excavated from the Shady Grove site in Marks, Mississippi represents a valuable opportunity to understand the lifeways of prehistoric peoples living in the southeast. The inventory and analysis of the juvenile individuals completed during this study proves the importance of the subadult component to a population’s demographic interpretation, as well as its application to other bioarchaeological studies in the future.
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