

SEX ROLES IN PREHISTORIC ALABAMA: A BIOARCHAEOLOGICAL
INVESTIGATION OF THE BLUFF CREEK (1Lu59) SITE USING PALEOPATHOLOGY
AND TRAUMA ANALYSIS

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ABSTRACT

In the 1930's and 1940's the Tennessee Valley Authority conducted excavations of thousands of prehistoric human remains in the Middle Tennessee River Valley of Alabama. This research focuses on the prehistoric site of Bluff Creek (1Lu59) and uses a stratified random sample to study how sex roles might be recognized through analysis of the skeleton. The Bluff Creek site was chosen because the occupation of the site spans from the Archaic through the Mississippian periods allowing for an extended look at possible specified sex roles, or changes in those roles, in prehistoric Alabama.

The skeletal sample ($n=70$) consists of those individuals who could have sex and age assessed. Pathologies and trauma noted on the remains were examined macroscopically for location, severity, and side of the body. Chi-Square and Fisher's Exact tests were run on the collected data. There were no statistically significant results derived from any of those tests. The research hypothesis that there were defined sex roles at the Bluff Creek site in prehistoric northwestern Alabama was not supported.

LIST OF ABBREVIATIONS

NAGPRA- Native American Graves Protection and Repatriation Act

AO- Arbeitsgemeinschaft für Osteosynthesefragen

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CHAPTER 1

Introduction

Archaeological research focusing on concepts pertaining to abstract ideas like sex roles became popular in the 1970's (Trigger, 2006). This ideological shift occurred in response to Processualism, which instituted an attempt to convert archaeology into a more scientifically driven discipline (Binford, 1962; Trigger 2006). Lewis Binford (1962) wanted to move archaeology into a more rigorous system of analysis that was based in scientific methodology and to steer it away from the traditional cultural history approach. Researchers were not asking questions in a manner that spurred the discipline forward. Binford has been credited with creating the “New Archaeology”, or Processualism, in the 1960’s. His attempts at creating this new direction for archaeology lasted approximately 10 to 15 years, when Post-Processualism came to the forefront in direct opposition (Trigger, 2006). This reaction to the “New Archaeology” came from individuals like Jim Deetz (1977), and later Ian Hodder, who had issues with the limited scientific direction that had been created. Deetz’s *In Small Things Forgotten* (1977), thoroughly documents what historic archaeologists can do in comparison to those who study prehistory. He asserts that archaeologists can answer questions that address concepts that are abstract, as opposed to strictly logical. Hodder, who was a proponent of Processualism originally, went on to stipulate that Binford’s middle-range theory had never successfully worked and that the purely scientific and functionalistic research goals were severely limited and immensely flawed (Hodder, 1984; Trigger, 2006; Shanks and Hodder,

2007). He wanted to expand past those restrictions and encouraged the exploration of abstract ideas, like identity and experiences, instead of strict materialistic pursuits (Eastman and Rodning, 2001; Pauketat, 2001; Knudson and Stojanowski, 2008; Geller, 2009; Rodning, 2011; Sullivan and Rodning, 2011, White, 2015). Since that paradigm shift the field of archaeology has maintained a focus on both pursuits of science and society in a combined manner. This hybrid orientation allows for research into concepts like sex roles via scientific means and fits into the agenda of bioarcheology, which is essentially to use human skeletal remains in conjunction with archaeological material to help say something about past life.

For this thesis project, I plan to investigate sex roles in prehistoric northwestern Alabama. This interest in social inequality and how it can manifest itself osteologically, comes out of a previous interest in nutritional deficiencies and discrepancies that appear between elite and commoners within a population. I decided to pursue a project that asked questions about how sex roles were established in prehistory, and I chose to answer this question by comparing the presence, frequency, type, and severity of pathologies and traumatic injuries manifested in males and females. There are many publications that discuss the division of labor in Native American groups as was noted by the Europeans who contacted them (Swanton, 1928; Swanton, 1952; Gibson, 1971; Hudson, 1976; Dowd, 1987; Knight, 1990; Swanton, 1993; Bird, 1999; Romans, 1999; LeMaster, 2014). These writings, some of which will be expanded upon in chapter two, helped inform what I was looking for during data collection. My research hypothesis for this study is that there will be significant differences in pathology and trauma that reflect roles between the sexes at the Bluff Creek site (1Lu59) in northwestern Alabama.

In Chapter two, I will demonstrate how ethnographic accounts and previous studies within the Southeast have shown differences in divisions of labor and potentially sex roles as

well. These accounts will help lay out the foundation for why this topic was chosen to steer this research, and how the data were collected to address the research question.

In Chapter three, I will discuss the significance of the Bluff Creek site and the temporal periods it spans. The chapter will discuss the location of the site on the Tennessee River, and what the material culture tells us about the living conditions during the time of the multiple occupations.

In Chapter four, I will discuss how paleopathology can be used to measure sex roles. The etiologies of the most common pathologies, osteoarthritis and periosteal reactions will be discussed. In addition, other common pathologies, like those associated with nutritional deficiencies, will be discussed because they provide further evidence of differential treatment between the sexes.

Chapter five will focus on traumatic injuries and how they can potentially help delineate the possible sex roles present in prehistoric groups and the Bluff Creek site. The different types of trauma, which are focused on in this thesis, will be explained whether it be due to violence, accident, or occupation.

Materials and methods used to complete this research will be outlined in Chapter six. I specifically will address how data were collected and include explanations for sample selection, pathology identification and scoring, traumatic injury assessment, and other measures of health. I also will explain what my criteria were for distinguishing the differing levels of severity, healing, and activity.

Chapter seven presents the analysis and the results of the data collected for this project. First, general demographic information will be given for the sample population. This allows for a basic understanding of what is in the data sample and what can be answered from the data.

Second, pathologies with scores for preservation, location, and type will be displayed. Traumatic injuries will be analyzed in a similar manner as pathology. Overall severity scores, which will combine the abovementioned categories will be calculated as well. Stature, which is commonly understood to be a good measure of overall health for an individual, will be addressed in order to help obtain a more general look at health at the Bluff Creek site.

The final chapter will be structured around a discussion of the results, what potential significance the research has, and what future avenues of research could be for the site and the question of sex roles in prehistory. This chapter also will address limitations of the study and how they could be corrected in future projects. Conclusions for the thesis will be included in the final chapter.

CHAPTER 2

Prehistoric and Ethnohistoric Evidence for Sex Roles

Ethnohistory Review

When Europeans contacted Native Americans, they were compelled to document their opinions and moral judgements of these “savage” people. Native Americans are still trying to fight the negative, stereotypical images that were created and subsequently perpetuated by Europeans upon contact (Bird, 1999; LeMaster, 2014). However, there was a benefit of the Europeans fascination with Native Americans; they documented their interactions and customs thoroughly and religiously. These documentations have allowed ethnohistorians to piece together rough understandings of how Native Americans conducted themselves prior to European contact. The most important documentations came from individuals like James Adair (1930) and George Catlin (1842) who had unique access to tribes throughout the process of contact. Catlin, who was an artist, managed to capture many customs, activities, and sex/gender differences through his paintings and drawings. Catlin was quite prolific and influential in his depictions and writings (Catlin, 1842). He was able to write, paint and draw about activities like hunting, warfare, torture, politics, land cultivation, and animal hide processing. It should be noted that Catlin is most known for his interactions with Plains Indians, and while they have a different social structure to Southeastern Indians certain aspects of daily life could be similar between the two groups. Catlin’s contributions to ethnohistory can be used to retroactively establish sex roles and daily life for specific groups of Native Americans. Another key figure specific to the Southeast was James Adair, a trader who produced important documents pertaining to southeastern tribes

(Adair, 1930). His work, which documented everything from biological traits, European influence, and language has been important to ethnohistorians. John R. Swanton relied heavily on Adair's, and many others, work for his major works concerning the Chickasaw (Swanton, 1928). Swanton was one of the first anthropologists to adopt ethnohistory as a tool for studying Native Americans, because of this many scholars have taken to criticizing his efforts. His work *Chickasaw Society and Religion* (1928), has been used as a benchmark work that inspired future studies and better approaches (Gibson, 1971). *Chickasaw Society and Religion* (1928) included topics like grieving rituals, divisions of labor, politics, linguistics, and religion. Swanton's other influential works, *The Indian Tribes of North America* (1952) and *Source Material for the Social and Ceremonial Life of the Choctaw Indians* (1999), also helped shape the scope of this thesis. For example, the following quote from *Source Material for the Social and Ceremonial Life of the Choctaw Indians* (1999), demonstrates some of the firsthand accounts of sex based labor roles; “Their women...are like slaves to their husbands. They do everything in the home, work the ground, sow, and harvest the crop. The men...only occupy themselves with hunting (Swanton, 1999: 139)”. This quote suggests clear distinctions between the sexes and what they contributed to society. Chickasaw, Choctaw, and Creek ethnohistoric accounts were highlighted in this thesis because the tribes were historically, and prehistorically, located near the area of the Bluff Creek site. Specifically, the “early Chickasaw domain extended from the Tennessee-Cumberland divide north to the Ohio River...northern Alabama and Mississippi. Their first settlements....were situated near the Tennessee River in Madison County, Alabama (Gibson, 1971: 100)”. The Chickasaws were reported as being the “Spartans” of the lower Mississippi Valley, and consequently had seemingly defined sex roles. Chickasaw men were “hunters and fighters first and agriculturalists only on occasion (Gibson, 1971: 101)”. Men were described as excellent

hunters, swimmers, and fierce warriors. Women, on the other hand, were tasked with clearing land, caring for crops, and gathering firewood. Further divisions between the sexes can be observed in the games they played. Men were allowed to partake in all three of the main games: toli, chunkey, and akabatle (Adair, 1930; Gibson, 1971). Women, however, only were allowed to participate in akabatle, which consisted of trying to strike an effigy at the top of centrally located pole with a ball. Toli was their ball game, and resembles lacrosse, whereas chunkey consisted of men throwing lances at a rolled, round stone (Gibson, 1971: 108). All of the games played by the Chickasaw seem to reinforce important hunting and warfare skills like accuracy and agility, which coincides with what was considered important within their society. These values of Chickasaw society become especially important when trying to study sex roles, because they point to a very ingrained tradition of what each sex was contributing to the success of the tribe (Swanton, 1928; Swanton, 1952; Gibson, 1971; Hudson, 1976; Swanton, 1993; Romans, 1999). Swanton's documentation of the Chickasaw, and other groups, coupled with Adair's and Catlin's contributions lend themselves to supporting interpretations of bioarchaeological studies dedicated to subsistence and the changes that occur with shifting paradigms.

More generally, as laid out in Charles Hudson's *The Southeastern Indians* (1976), there are clearly defined sex differences throughout the Southeast. "The Southeastern Indians conceived of men and women as two radically different forms of humanity, and they consequently assigned to them contrasting roles in subsistence activities (Hudson, 1976: 259)". Women were responsible for providing vegetable-based food and, therefore, were in charge of cultivating domesticated plant life as well as collecting wild food. Women fully took control of households and were further responsible for pottery, firewood, preparing and cooking food, as well as use of mortar and pestle (Hudson, 1976: 239-313). Women were required to work

practically non-stop and were not given much leisure time as a consequence. Men, on the other hand, were responsible for meat via hunting and fishing (Hudson, 1976: 239-313). They also were required to perform the more labor intensive jobs of clearing land and constructing buildings, and participating in warfare which required considerable strength and endurance. Men enjoyed leisure time and partook in social events like politics and the ball game (Hudson, 1976: 239-313). This layout for the general group of southeastern Native Americans is in accordance with the specific, ethnohistoric accounts for the Chickasaw and Choctaw tribes (Swanton, 1928; Adair, 1930; Swanton, 1952; Swanton, 1993; Romans, 1999). These divisions of labor, being fundamental to southeastern Native American beliefs, should potentially be identifiable bioarchaeologically.

Review of prehistoric studies

Investigations into subsistence strategies and the activities that define them have been popular themes of study for archaeology. Specifically, studies that focused on topics pertaining to what effect shifting strategies had on past peoples, particularly osteologically, became extremely popular in the late 1980's to early 1990's (Larsen, 1987; Bridges, 1989; Isçan and Kennedy, 1989; Bridges 1991a,b). These studies became part of the blueprint for how bioarchaeological investigations were conducted. Patricia Bridges features heavily in this literature review because she was asking similar questions in the same geographic location of the Pickwick Basin. The most important work featured by Bridges, *Changes in Activities with the Shift to Agriculture in the Southeastern United States* (1989), was especially useful for the setup of this project. Bridges looked at the strength of long bones via remodeling and reconfiguring on compact bone, between the sexes, at two different time periods that had differing subsistence strategies (Bridges, 1989). The two strategies were hunting and gathering in the Late Archaic

sample and maize agriculture in the Mississippian. Bridges found that both sexes were effectively more robust in the long bones in the Mississippian period. However, it can be noted that there were sex-related discrepancies (Bridges, 1989). Females were on a whole stronger in their long bones than their Late Archaic counterparts, but the changes were less drastic than in the males. Males, were definitely more robust and stronger in the femur and not significantly different in the humerus. These differences imply that both sexes were put under more physical stress in the Mississippian period (Bridges, 1989). However, males seem to have had more of a shift in activity than females, as can be noted by the lack of upper arm growth. Other scholars have investigated and commented on what can be learned from these types of studies. A specific example comes from a chapter in *A Companion to Paleopathology* (Grauer, 2012) which was contributed by Robert Jurmain and colleagues that discussed the allure and pitfalls for studies that tried to reconstruct day to day activities from skeletal remains (Jurmain et al, 2012: 531-552). Jurmain stipulates that there also has been an inclination from bioarchaeologists to conduct these types of studies, and how they have become increasingly popular again (Jurmain et al, 2012: 531-552). He also states that activity-based research can be very well done and useful, but that researchers need to be cautious with their research design and conclusions (Jurmain et al, 2012: 531-552). They also have stressed the pitfalls of dealing with skeletal remains and the challenge of acquiring a representative sample (Larsen, 1987; Larsen 2002, Jurmain et al, 2012).

Another important source that this project relies on is Isçan and Kennedy (1989). *Reconstruction of Life from the Skeleton* is a comprehensive look at what scholars at the time were trying to accomplish with studies pertaining to daily activities and the skeletal markers they left behind. This book contains a very important chart that depicts what are essentially one-to-one correlations between actions, stresses, and activities that produce predictable skeletal

markers (Isçan and Kennedy, 1989). These markers, like seamstress's fingers, miner's knee, and atlatl elbow, are all byproducts of repetitive motion and were used to paint pictures as to what individuals were doing in their daily lives (Isçan and Kennedy, 1989; Capasso et al, 1999). However, while this chart is a good guideline for particular activities and can be used to shape projects, one has to be careful to not take them as fact. One-to-one correlations between activities and skeletal indicators are very hard to predict confidently due to the prehistoric nature of the remains (Jurmain et al, 2012: 531-552). Nevertheless, these are highly specific activities that are being described and they are still useful for establishing a framework for present and future research. The next chapters are going to breakdown further why I chose paleopathology and trauma as acceptable measures for sex roles and distinctive divisions within a multi-component site that spans from the Late Archaic to the Mississippian.

CHAPTER 3

The Bluff Creek Site (1Lu59)

Archaic Period in the Southeastern United States

The Archaic period spans from the calibrated years of 11,500- 3,200 B.P., and is broken up into three smaller time frames (Anderson, 1995; Anderson and Sassaman, 2012). These time periods include: Early (11,500-8900 B.P.), Middle (8900-5800 B.P.), and Late (5800-3200 B.P.). During these three periods, there are obvious changes in subsistence technology, environment, and demographics (Anderson and Sassaman, 2012; McNutt, 2008). The Early Archaic period is marked by a drastic increase in global temperature (Anderson et al 1995; Little 2003; Anderson et al 2007). Major characteristics of the Early Archaic include increased human populations, hardwood forests, and use of rock shelters by individuals (Charles and Buikstra, 1983; Walthall, 1998; Walker, 2000; Emerson et al, 2009; Anderson and Sassaman, 2012). During the Early Archaic there is a switch from hunting large animals to smaller game, and a heavier reliance on foraging. Early Archaic people also started to organize themselves into bands in response to the warming environment and changing availability of resources (Anderson and Sassaman, 2012).

The Middle Archaic, which also is referred to as the Altithermal climatic interval; saw even more substantial environmental changes by continuing the trends from the Early Archaic (McNutt, 2008; Anderson and Sassaman, 2012). Compared to our present climate, the Middle Archaic had seasons that were hotter and dryer (McNutt, 2008). This climatic shift reduced available vegetation and promoted erosion and flooding (Styles and Klipper, 1996; Walthall,

1998; Crothers, 1999; Walker, 2000; Carmody, 2009; Anderson and Sassaman, 2012). These hotter temperatures and reduced vegetation led to a decreased population in the Southeast and resulted in the abandonment of upland locations by individuals as they moved to riverine environments to subsist on freshwater shellfish (Claassen, 1991; Claassen, 1992; Claassen, 1996; Dye, 1996; Crothers, 1999; McNutt, 2008; Carmody, 2009). McNutt's publication on the "Benton Phenomenon" discusses the Perry site (1Lu25) in northwestern Alabama, and the proximity to the Bluff Creek site (McNutt, 2008). Both sites are located within Lauderdale County and they have an Archaic temporal component. It was during the Archaic in the southeastern United States that there was an expansion of pine forests instead of hardwood forests (Anderson, 1995; Anderson et al, 1995; Anderson and Sassaman, 2012). Great culture change comes during the Middle Archaic (8900-5800 B.P) with long-distance trade networks flourishing, the erecting of earthen mounds, and the everyday presence of interpersonal violence (Emerson et al, 2009; Bissett, 2010; Anderson and Sassaman, 2012).

The Late Archaic period in the southeastern United States had been marked in the archaeological record by four trends: 1) the adoption of cultivated plants; 2) the appearance of large, dense middens with evidence of dwelling and storage pits; 3) the first usage of heavy containers made of pottery or stone; and 4) intensification of long-distance exchange (Steponaitis, 1986: 373). All of these trends can be explained, to a degree, by an increase in human populations during this temporal period. Climatic conditions in the Late Archaic period were very similar to present day, and this allowed for a spike in population (Steponaitis, 1986; Anderson and Sassaman, 2012). The aforementioned trends can be explained by an increase in sedentism that accompanies increased populations and changing subsistence strategies (Cohen, 1977). This increase in population is indicated by an increase in archaeological sites by roughly

40 percent (Anderson and Sassaman, 2012). Shell mounds like Bluff Creek, for example, became quite common in both coastal and riverine environments (Cohen, 1977). The Late Archaic period also has provided the first evidence for year-long occupations along the Gulf Coast (Cohen, 1977; Anderson et al, 2007; Anderson and Sassaman, 2012). In addition to increased sedentism and trade relations, archaeologists can see evidence of alliance formations and social complexity (Waggoner, 2009). All of these trends and characteristics can help shape our understanding of sex roles at the Bluff Creek site and, potentially, in the surrounding region.

Mississippian Period in the Southeastern United States

The Mississippian period ranges from approximately A.D. 1000 to 1550 (Blitz and Lorenz, 2002; Blitz, 2010; Anderson and Sassaman, 2012). It is characterized as having a heavy reliance on maize production, communities with fortification, mounds, ranked social structures, increased trade relations, and ritualistic overtones (Bridges, 1989; Brown et al, 1990; Knight, 1990; Lipo et al, 1997; Blitz and Lorenz, 2002; Blitz, 2010; Anderson and Sassaman, 2012). Intensive reliance on maize agriculture can be attributed to population sizes surpassing the efficiency of basic horticulture and hunting and gathering (Steponaitis, 1987). Maize agriculture became more cost effective than the previous subsistence strategies because more food could be produced with less labor (Cohen, 1977). Mississippian chiefdoms also became distinctly hierarchical in their social organization, due to surpluses in resources associated with agriculture (Steponaitis, 1987; Blitz, 2010; Anderson and Sassaman, 2012). Another part of the Mississippian period revolves around warfare, which is evident by the increase in fortifications around communities. Warfare became more prevalent in the Mississippian period for a variety of reasons and the most important being a battle for resources. The increased sedentism and reliance on large, cleared fields for subsistence required an investment in protection of those

resources and structures (Cohen, 1977; Steponaitis, 1987, Bridges et al, 2000). A major example of a classic Mississippian site is Moundville. Moundville, which is approximately two hours south of the Bluff Creek site, is the largest Mississippian site south of Cahokia, which is located in southern Illinois. It includes all of the aforementioned distinctive features that are characteristic of the Mississippian period (Peebles, 1971; Mistovich, 1988; Jackson and Scott, 2001; King, 2001; Beck, 2003; Jackson and Scott, 2003; Wilson, 2010). Even though these sites are close to each other geographically and have temporal overlap, I do not expect to see similarities between them outside of social ones. Moundville, being the larger chiefdom with year-round occupation, has more physical Mississippian traits like palisades, a plaza, and a prime location near a river's edge. The two sites could share similarities like differing social structures, subsistence strategy, and warfare practices.

The Mississippian period provides a lot of opportunity for the study of social inequality and sex roles because of its reliance of maize production, political structures, social stratification, and increased monument building. All of these cultural activities contribute to the potential for uncovering evidence for the presence of sex roles through the examination of the skeleton for trauma and resultant pathology.

The Bluff Creek Site

Bluff Creek (1LU59) is located 14 miles west of Florence, Alabama (Webb and DeJarnette, 1942: 93). The shell mound there had a depth that ranged from 10 to 16 feet. Shell mounds were abundant within the Archaic period; especially in riverine environments (Cohen, 1977). The prehistoric site is a small (170 ft N-S by 230 ft E-W) site that sat on a bank of the Tennessee River. The site was occupied by prehistoric Native Americans at various times from the Archaic period through the Mississippian. The occupation mound is situated near an area of

the river high in shoal, which allowed for multiple species of freshwater shellfish to flourish (Webb and DeJarnette, 1942: 93). This source of subsistence most likely accounts for why this site was in use for such a long period of time (Cohen, 1977). Cohen's book *The Food Crisis in Prehistory: Overpopulation and the Origins of Agriculture* discusses the Lauderdale phase that occurred in Alabama, and that coincides with the county where Bluff Creek is situated. Cohen (1977) discusses how this phase shows evidence for long-time or repeated occupations at archaeological sites, which also can be seen with Bluff Creek, the subject of this thesis. He also outlines the trends of broad spectrum use of the environment, Joseph Caldwell's Primary Forest Efficiency, and increasing sedentism, group size, and reoccupation of seasonal sites (Cohen, 1977). Primary Forest Efficiency refers to the idea that hunter-gatherer groups had become highly adapted to living in the forest. There was constant movement with the seasons and groups were efficient at finding foods in specific locations at certain times (Caldwell, 1958; Cohen, 1977). This concept of hunter-gatherers being highly adapted to their environment also lent itself to an understanding of why maize based agriculture took longer to appear in the Southeast. The Bluff Creek site is well-suited for potentially seeing these trends and, consequently, they further influenced the direction of this thesis.

There are 210 human skeletal remains associated with the Bluff Creek Site, and most of them show some trace of pathology or trauma, which is important to the analysis of this study. The site's long occupation, coupled with this large number of individuals exhibiting trauma and pathology, provide enough data and sufficient time depth to examine sex roles and quality of life at the Bluff Creek site.

CHAPTER 4

Pathology as a Measure of Sex Roles

Researchers have used the presence of pathology to establish differences between occupations, health, and social status of individuals for years (Waugh and Fletcher, 1950; Bridges, 1989; Isçan and Kennedy, 1989; Bridges, 1991; Roberts and Manchester, 2005; Rossignol et al, 2005; Wentz, 2006; Kaila-Kanga et al, 2011; Palmer, 2012; Davis, 2015). An important edited book, *Sex and Gender in Paleopathological Perspective*, goes into detail about the challenges surrounding gender studies in paleopathology (Grauer and Stuart-Macadam, 1998). The book starts by reaffirming the difference between sex and gender: sex is biological, while gender is social. However, if sex can be determined, then gender can be addressed archaeologically (Grauer and Stuart-Macadam, 1998). Within the book, a chapter contributed by C.S. Larsen, discusses how sex-based differences like immune response or hormones can be influenced by gender restrictions. Situations pertaining to nutrition, status, and warfare lend themselves to differences between the sexes (Larsen, 1998: 165-187). These articles specify how a researcher can address abstract concepts like sex roles and status using the presence of pathology and how it is directly manifested on the bone. The two most common pathologies noticed in a preliminary investigation of the skeletal remains from Bluff Creek were periostitis and osteoarthritis. In a recent publication, a discussion on the use of the term periostitis was criticized (Weston, 2012: 492-512). Criticism surrounding what periostitis actually means, and what the implications were for using incorrect terminology within paleopathology were established. The author notes that historically, periostitis was used to refer to inflammation to the

periosteum and the subsequent laying of new bone (Weston, 2012: 492-512). However, Weston points out that the suffix -itis is referring to the histiological response of bone, and was not accurately describing the phenomenon being recorded in osteological reports. Weston also notes that a change to the word periostosis was attempted, but the change never took off (Weston, 2012: 492-512). Therefore, Weston puts forth the alternative phrase, periosteal reaction(s), to more accurately describe what osteologists were documenting, and this phrase will be used in this study henceforth. Periosteal reactions, are an inflammation of the periosteum, which is the outer covering of the bone (Roberts and Manchester, 2005; Wentz, 2006; Weston, 2008; Weston, 2012; Davis, 2015). It occurs in three main ways: (1) it is near a soft tissue infection; (2) it is the manifestation of generalized disease; or (3) it involves the presence of osteitis or osteomyelitis (Roberts and Manchester, 2005; Weston, 2008; Aufderheide, 2011; Weston, 2012). Periosteal reactions, however, are not always caused by infection. They can also be a result of repeated small traumas to certain areas of tissue, like the anterior tibial surface (Roberts and Manchester, 2005; Wentz, 2006; Weston, 2008; Aufderheide, 2011; Weston, 2012). Periosteal reactions are not immensely useful on their own, due to the many potential etiologies. However, when used in conjunction with other pathologies or trauma they can help frame an individual's overall health at time of death. This is critical to understanding and answering questions pertaining to labor divisions and sex roles in past societies.

Osteoarthritis falls under the classification of degenerative joint disease (DJD), and is another pathology that does not have a clear etiology. It is a non-inflammatory, progressive, chronic pathological condition (Isçan and Kennedy, 1989; Wright, 1989; Bridges, 1991; Rossignol et al, 2005; Aufderheide, 2011; Kaila-Kangas et al, 2011; Palmer, 2015). DJD is characterized by the loss of cartilage in joints which can cause lesions (Waugh and Fletcher,

1950; Wright, 1989; Bridges, 1991; Aufderheide, 2011; Kaila-Kangas et al, 2011; Palmer, 2015). Osteoarthritis is further identified by three main criteria: 1) deterioration of the surface effected, i.e. lesions; 2) eburnation; and 3) osteophytes (Waugh and Fletcher, 1950; Wright, 1989; Aufderheide, 2011). Eburnation is identified by a shiny appearance that occurs when bone is rubbing on bone due to the loss of cartilage in joints. Osteophytes are bony growths that range in size and can be a source of discomfort for the individual (Waugh and Fletcher, 1950; Wright, 1989; Bridges, 1991; Aufderheide, 2011; Kaila-Kangas et al, 2011; Palmer, 2015). DJD is often identified in skeletal remains by osteologists; however, its description and analysis lack standardization and therefore comparison between researchers is problematic. The most common areas affected by DJD are the pelvis, patella, foot, elbow, and spine (Waugh and Fletcher, 1950; Wright, 1989; Rossignol et al, 2005; Aufderheide, 2011; Kaila-Kangas et al, 2011, Palmer, 2015).

Other possible pathologies expected to appear in the Bluff Creek population are related to nutritional deficiencies and stress. Porotic hyperostosis and cribra orbitalia are two pathologies that are attributed to diets lacking nutrients such as iron or specific vitamins (specifically Vitamin C), and are isolated to the cranium (Roberts and Manchester, 2005; Davis, 2015; Snoddy et al, 2016). Porotic hyperostosis affects the cranial vault, while the presence of cribra orbitalia is isolated to the orbital surface (Aufderheide, 2011; Davis, 2015, Snoddy et al, 2016).

Pathology has been used by many researchers as a manner to address differences between sexes in a given population. These studies show that sex and gender roles can be addressed bioarchaeologically, and they provide frameworks for research designs focusing on paleopathology.

CHAPTER 5

Trauma as a Measure of Sex Roles

Traditionally trauma has been used to answer questions pertaining to violence, accidents, and even occupation (Isçan and Kennedy, 1989; Galloway, 1999; Bridges et al, 2000; Galloway and Mason, 2000; Davidson et all, 2011; Cohen et al, 2016). Using traumatic injuries in order to ascertain the daily activities of prehistoric individuals has its limitations, and should be used with caution. It is not possible to say definitely that a certain injury is caused by any specific daily activity, unless it stems from violent action (Jurmain et al, 2012). General statements about what overarching category, accidental or occupational, they fall into can shed light onto what similarities and differences individuals experienced in prehistory. Therefore, when coupled with pathology, traumatic injuries could help differentiate sex roles. The remainder of this chapter will be dedicated to establishing what constitutes trauma and what specific types will be accounted for in this project.

Trauma is generally understood as injury to living tissue that comes from a force outside of the body (Lovell, 1997; Davidson et al, 2011, Judd and Redfern, 2012: 359-379). However, there has been considerable disagreement as to what injuries are included under the umbrella term of trauma. Most researchers can agree on injuries like fractures, but there is a general lack of standardization on the definition (Judd and Redfern, 2012: 359-379). This makes comparisons between researchers difficult, unless they spell out exactly what they mean when referring to traumatic injuries (Judd and Redfern, 2012: 359-379). Other types of trauma that could be represented in the population being studied for this thesis fall under violent action, such as

scalping or mutilation. I chose not to focus on this type of trauma for this project, but it should be addressed in other studies as it pertains to what differences, if any, the sex of an individual played in violence related trauma. The main types of trauma being discussed in this study are fractures, because they can provide vital information about the daily life on an individual. For example, a common fracture used in trauma analysis is the “parry” fracture (Smith, 1996; Judd and Redfern, 2012). A parry fracture occurs from a direct blow to the ulna, resulting in a transverse fracture that has no radial involvement and minimal misalignment (Judd and Redfern, 2012). This particular fracture is usually associated as a defensive injury, because the thought is a victim will raise his/her arm up to defend a blow aimed at their head (Smith, 1996; Judd and Redfern, 2012). However, it is important to note that this is not the only way to achieve this type of fracture, and so using it alone as a sign of interpersonal violence would be erroneous (Smith, 1996; Judd and Redfern, 2012). As an example, the parry fracture illustrates how fractures can help assess sex roles in prehistory when used in conjunction with other measures. Fractures occur when the continuity of a bone is broken and can offer information about what roles people were filling in prehistory (Lovell, 1997).

There are many different types of fractures that are caused by varying traumas. Transverse, spiral, oblique, and crush fractures are the most common in the archaeological record (Court-Brown and Pennig, 1997; Lovell, 1997; Galloway and Mason, 2000; McQueen and Jupiter, 2000; Roberts and Manchester, 2005; Davidson et al, 2011; Wedel and Galloway, 2014). In order to understand what kind of force and impact is needed to cause different fractures, one needs to understand the mechanics of trauma. There are two types of trauma: direct and indirect. Direct trauma refers to a fracture that occurs at the point of impact, i.e. the parry fracture discussed earlier (Court-Brown and Pennig, 1997; Lovell, 1997; McQueen and Jupiter, 2000).

Indirect trauma, on the other hand, occurs away from the point of impact. In other words, a force is applied to a bone and a less structurally sound portion will fracture consequently (Court-Brown and Pennig, 1997; Lovell, 1997; McQueen and Jupiter, 2000). These two general categories are important to remember when assessing types of fractures and how they relate to force, impact, and activities.

The following section of this thesis breaks down how different fractures are created. Transverse fractures appear as a line across the perpendicular plane of the longitudinal axis (Lovell, 1997; Rockwood, 2010; AO Foundation, 2014). Crush fractures occur when direct force is applied to bone, usually compact and the underlying cancellous, and it collapses in on itself. This fracture is divided into three types: depression, compression, and pressure (Lovell, 1997; Davidson et al, 2011; AO Foundation, 2014). Depression fractures occur when direct force is applied to one side of the bone (Lovell, 1997; Roberts and Manchester, 2005). Compression fractures occur when direct pressure is applied to both sides of a bone (Isçan and Kennedy, 1989; Lovell, 1997; Davidson et al, 2011; AO Foundation, 2014). Pressure fractures affect developing bone and occur when cultural alteration is desired, like foot binding (Lovell, 1997). Oblique fractures appear as angled lines across the longitudinal axis and are caused by simultaneous angulated and rotated force (Isçan and Kennedy, 1989; Roberts and Manchester, 2005; AO Foundation, 2014). Spiral fractures wind down or actually spiral the shaft of long bones because of a rotational and downward loading stress (Isçan and Kennedy, 1989; Lovell, 1997; Rockwood, 2010; AO Foundation, 2014). One other type of fracture is the burst fracture, which is located in the spine and occurs when vertical compression ruptures the intervertebral disc between vertebrae. A mild case of this causes a small, circular depression commonly referred to as a “Schmorl’s node” (Lovell, 1997). The Schmorl’s node is an important trauma to recognize

because it is associated with certain types of movement and is indicative of what trauma can say about past peoples. These movements are usually associated with the “lift and twist” motion that is indicative of hoisting something over one’s shoulder (Isçan and Kennedy, 1989).

Healing is an important factor when assessing fractures. Bone begins to repair itself immediately after a trauma event occurs, and different bones have different healing rates. Usually within three weeks after the initial injury, woven bone has started to create the foundation for a callus (Isçan and Kennedy, 1989; Lovell, 1997; Nyary and Scammell, 2015). Lower limb long bones (femur, tibia, and fibula) tend to take upwards of five months to form fully the callus, while upper limb long bones (humerus, radius, and ulna) heal in closer to three months (Isçan and Kennedy, 1989; Lovell, 1997; Nyary and Scammell, 2015). Differentiating between perimortem (around death) and postmortem (after death) fractures is essential for making sure that one’s analysis is not skewed by taphonomic damages, like rodent gnawing or excavation techniques, which would not reflect an individual’s life history (Roberts and Manchester, 2005). Perimortem fractures can be identified by five characteristics that include: (1) any evidence of healing; (2) uniform staining indicative of blood hemorrhaging; (3) the presence of other fractures like spiral or oblique; (4) fracture edges with oblique angles; and/or includes (5) a pattern of concentric circular or radiating fracture lines (Lovell, 1997: 145; Roberts and Manchester, 2005: 115). Postmortem fractures can similarly be identified by: (1) smaller fragments; (2) non-uniform staining; (3) squared fracture edges; and/or (4) absence of fracture patterning because dry bone is brittle and prone to shattering on impact (Lovell, 1997: 145; Roberts and Manchester, 2005: 115). These distinctions help eliminate injuries that occur taphonomically, which would potentially inflate trauma rates in the data set.

Traumatic injuries that result in fractures can be vital in reconstructing past lifeways. They can offer both general and potentially very specific ideas as to what an individual went through in his/her life. Fractures can help answer questions pertaining to sex and gender roles by comparing type, location, and frequencies. However, it has to be stressed that one-to-one correlations between actions and resulting trauma, or pathology, cannot be stated definitively.

CHAPTER 6

Materials and Methods

This project involves the analysis of 70 out of a possible 210 individuals from the Bluff Creek Site. A stratified random sample, which was utilized for this project, ensures that there are an equal number of values for a particular variable. Consequently, the distribution of the sex variable is equal between female and male. There are 35 individuals within each group for an overall total sample of 70. These skeletal remains are housed at the Laboratory for Human Osteology at The University of Alabama. All of the remains are slated to be repatriated due to the Native American Graves Protection Repatriation Act (NAGPRA). No invasive analysis was undertaken on the remains. The skeletal remains were examined macroscopically observing pathology and trauma for potential differences in prehistoric sex roles. The method of analysis follows a one-shot case study design. In order to quantify the data, both variables, pathology and trauma, were coded for location, type, and severity. Location as a variable was coded for region of the body, such as ulna or patella, and preservation. Bone was coded for preservation and those preservation scores ranged from: 1 complete; 2 incomplete; and 3 fragmentary. This system of scoring was adopted from osteological inventory forms already being used in the lab. Type scores for pathology were created in a similar manner as preservation, with each number corresponding to a particular pathology. The coded pathologies are as follows: 1) Osteoarthritis; 2) Periosteal Reaction; 3) Osteochondritis Dissecans; 4) Osteomyelitis; 5) Schmorl's node; 6) Dental Abscess; 7) Treponemal Infection; 8) General Infection; and 9) Osteoarthritis with Schmorl's Node. Number nine was needed to code for a skeletal element that had more than one

pathology present. Traumatic injuries also coded in the manner of pathology with each number code receiving a specific fracture type. The coded traumas are as follows: 1) Healed; 2) Unhealed; 3) Oblique; 4) Spiral; 5) Non-Union; 6) Compression; and 7) Transverse. Severity, for pathological conditions, was given as an overall score for each individual. The scores were coded as: 1) mild; 2) moderate; and 3) severe. Scoring of severity and location were evaluated using the standards established by Buikstra and Ubelaker (1994). A missing value was created for skeletal elements that were absent. A “not applicable” value was created for skeletal material that was highly fragmentary or unaffected.

Sex was an independent nominal variable that served as the main focus of this research. In order to be in the sample, individuals had to have an assigned sex. Sex was established using standard methods including cranial morphology, pelvic morphology, and humeral/femoral head measurement (Buikstra and Ubelaker, 1994; White and Folkens, 2005). Age range functioned as an independent ordinal variable, and was determined by assessing suture closure, dental wear, epiphyseal fusion, and the auricular surface (Buikstra and Ubelaker, 1994; White and Folkens, 2005). Type of fracture was a dependent nominal variable. Location of fracture was a dependent nominal variable. Pathology type was an independent nominal variable. The location of the pathology was a dependent nominal variable. Severity was a dependent nominal variable. Stature was estimated by measuring complete long bones and imputing those numbers into the standard formula (White and Folkens, 2005). Stature is a continuous variable. The body was broken down into thirteen anatomical regions: cranium, vertebrae, ribs, humerus/clavicle, ulna, radius, pelvis, femur, patella, tibia, fibula, hand/wrist, and ankle/foot (Bridges et al, 2000). Fractures were assessed macroscopically using the AO’s (2014), Lovell’s (1997) and Rockwood’s (2010) guides to type by force and mechanism.

Statistical analysis was conducted using chi-square and Fisher's Exact tests where applicable. A t-test was performed for comparing stature against the sex variable. The ultimate goals of these tests were to establish whether there were significant differences between type, location, or severity between the two sexes that would support or refute the hypothesis of the existences of established sex roles.

CHAPTER 7

Analysis of Data

Results

In this section I provide the statistical analysis performed for this data set. The first group of tables will present descriptive statistics including frequencies. Then chi-square and Fisher's Exact tests of selected portions of the data are highlighted because none of the tests were statistically significant. Those anatomical regions that are highlighted include the following: cranium, vertebrae, ulna, tibia, and ankle/foot. Finally, the last test that is described is a t-test pertaining to stature and sex.

Tables 1 through 3 address basic demographic and frequency breakdowns. Table 1 shows how the sample population is distributed for the age variable. Tables 2 and 3 display the frequency of pathology and trauma present within the sample respectively.

Table 1 Age distribution for Population.

Age	Frequency
10-20	10
21-30	13
31-40	17
41-50	19
51-60	9
61+	2
Total	70

The only age related restriction for entry into the sample was that the individual be considered an adult. This simply means that an individual had to be old enough for sex to be determined to be included in the study. The distribution of this sample is as expected with more people falling into the middle adult ranges with a slant towards younger ages.

Table 2 demonstrates that most individuals have some degree of pathology present. This measure does not represent type, severity, or location. It only states that an individual had an observable pathology.

Table 2 Presence of Pathology Throughout the Sample.

	Frequency	Percent
Yes	59	84.3
No	11	15.7
Total	70	100.0

Table 3 Presence of Trauma Throughout the Sample.

	Frequency	Percent
Yes	33	47.1
No	37	52.9
Total	70	100.0

This table, much like Table 2, demonstrates how many individuals had evidence for trauma pertaining to occupation or accidents. As a reminder, trauma that was determined to be interpersonal or violent in nature was not collected for this study.

The following tables provide frequencies for the variables discussed in Chapter 5. They will be providing frequencies for the highlighted anatomical regions established earlier in the chapter.

Table 4 Preservation Distribution for the Cranium.

	Frequency	Percent
Complete	6	8.6
Incomplete	30	74.3
Fragmentary	16	22.4
Missing	18	25.7
Total	70	100.0

These categories were established by adopting the standards being used by the Laboratory for Human Osteology. A cranium was considered “complete” if 75% or more of it was present. A complete cranium would be one where all measurement points were present. It was incomplete if it was 75 to 25 percent present, with a fragmentary cranium being below 25 percent present. Missing values were determined for burials missing the cranium. Table 4 shows that less than complete scores are most predominant, as would be expected from the percentage breakdown.

Table 5 Frequency of Porotic Hyperostosis Within the Population.

	Frequency	Percent
Present	26	37.1
Not Present	23	32.9
Not Applicable	3	4.3
Missing	18	25.7
Total	70	100.0

This table shows the distribution of porotic hyperostosis within the population. This does not account for its severity or detail its location. The not applicable category refers to any bone that was highly fragmentary and unable to be classified as having or not having a pathology present.

Table 6 Cribra Orbitalia Within the Population.

	Frequency	Percent
Present	7	10.0
Not Present	41	58.6
Not Applicable	4	5.7
Missing	18	25.7
Total	70	100.0

Table 6 is offering the same information as Table 5, but focuses on cribra orbitalia. Cribra orbitalia is a pathology that can be indicative of nutritional deficiencies and is isolated to

the orbital surface. A “not applicable” category was created for those skulls who were either highly fragmented or simply missing the orbit section of the frontal bone. Cribra orbitalia is not highly represented within this population.

Table 7 Other Types of Infectious Cranial Pathology.

	Frequency	Percent
Dental Abscess	4	5.7
Treponemal Infection	1	1.4
General Infection	1	1.4
Not Applicable	46	65.7
Missing	18	25.7
Total	70	100.0

Most crania had no other pathological manifestations. Dental abscesses were the only dental pathologies highlighted in this study because they are indicative of moderate to severe infection. The overall dental health within the sample was fair to poor, and consequently other pathologies were not documented for this thesis. General infection refers to one case of increased vascularization that appeared to be caused from a different etiology. There were no observed traumatic injuries that would have occurred outside of violent action on the crania, which is not the focus of this study.

Tables 8 through 17 will follow the same breakdowns for each of the remaining anatomical regions highlighted previously.

Table 8 Preservation of Vertebrae.

	Frequency	Percent
Complete	13	18.6
Incomplete	25	35.7
Fragmentary	26	37.1
Missing	6	8.6
Total	70	100.0

Vertebrae were present in most of the burials, with only six individuals missing them. It is important to note that there are high levels of fragmentary vertebral remains, but usually there was some portion of a vertebra present. While the vertebral column is highly important for this study, the fragmentary nature of the remains lowers the weight of the findings because so much of the vertebral column is missing. However, with the low number of burials missing vertebral elements, it is one of the more constant variables allowing for more direct comparisons, between the sexes.

Table 9a Vertebral Pathologies.

	Frequency	Percent
Osteoarthritis	26	37.1
Periosteal Reaction	1	1.4
Schmorl's Node	3	4.3
Osteoarthritis and Schmorl's Node	5	7.1
Not Applicable	29	41.4
Missing	6	8.6
Total	70	100.0

Table 9b Vertebral Pathologies by Sex.

	Osteoarthritis	Periosteal Reaction	Schmorl's Node	Osteoarthritis and Schmorl's Node	Total
Female	13	0	2	1	16
Male	13	1	1	4	19
Total	26	1	3	5	35

Osteoarthritis is the main pathology afflicting vertebrae in this population. Schmorl's nodes, which are technically traumatic in nature, are the second highest affliction. The number 9 is coding for a combination of osteoarthritis and Schmorl's nodes in the same individual, but this does not mean the two are necessarily correlated with each other. There were only a few instances of individuals manifesting more than one pathology on one anatomical region; therefore, a combination was needed within the data.

Table 10 Vertebral Trauma.

	Frequency	Percent
Compression	3	4.3
Not Applicable	61	87.1
Missing	6	8.6
Total	70	100.0

I included this table to discuss my only instances of compression fracture related trauma.

These three cases are associated with severe levels of osteoarthritis and a result from the accompanying deterioration of the bone.

Table 11 Ulna Preservation.

	Frequency	Percent
Complete	24	34.3
Incomplete	31	44.3
Fragmentary	4	5.7
Missing	11	15.7
Total	70	100.0

Ulnae were well preserved overall at this site. Seventy-nine percent of the sample falls within the complete and incomplete categories. This would allow for good comparisons of pathology and trauma between the sexes, should either affliction be present.

Table 12a Ulna Pathologies.

	Frequency	Percent
Osteoarthritis	3	4.3
Periosteal Reaction	4	5.7
Osteomyelitis	1	1.4
General Infection	1	1.4
Not Applicable	50	71.4
Missing	11	15.7
Total	70	100.0

The above table shows the number and percentage of each pathology found at the ulna in this sample.

Table 12b Ulna Pathologies by Sex.

	Osteoarthritis	Periosteal Reaction	Osteomyelitis	General Infection	Total
Female	1	2	1	1	5
Male	2	2	0	0	4
Total	3	4	1	1	9

This table shows that most ulnae were free of pathology, with only nine having an occurrence. However, one of the few instances of osteomyelitis was present on an ulna. A few instances of osteoarthritis and periosteal reaction were present on the ulnae.

Table 13a Ulna Trauma.

	Frequency	Percent
Healed	2	2.9
Oblique	1	1.4
Non-Union	2	2.9
Not Applicable	54	77.1
Missing	11	15.7
Total	70	100.0

Table 13b Ulna Trauma by Sex.

	Healed	Oblique	Non-Union	Total
Female	1	0	2	3
Male	1	1	0	2
Total	2	1	2	5

The ulnae had five out of 33 instances of fracture-related trauma. The healed category refers to any fracture that was well healed antemortem, but unable to be specifically placed into any of the fracture categories like oblique or transverse.

Table 14 Tibia Preservation.

	Frequency	Percent
Complete	19	27.1
Incomplete	29	41.4
Fragmentary	7	10.0
Missing	15	21.4
Total	70	100.0

Tibiae followed the expected trajectory of being mostly in the incomplete section for preservation.

Table 15a Tibia Pathologies.

	Frequency	Percent
Osteoarthritis	2	2.9
Periosteal Reaction	17	24.3
Osteomyelitis	1	1.4
Treponemal Infection	1	1.4
Not Present	34	48.6
Missing	15	21.4
Total	70	100.0

Table 15b Tibia Pathologies by Sex.

	Osteoarthritis	Periosteal Reaction	Osteomyelitis	Treponemal	Total
Female	0	7	1	0	8
Male	2	10	0	1	13
Total	2	17	1	1	21

It is important to notice that approximately 50 percent of the tibiae showed no signs of pathology. Periosteal reaction was present in close to 25 percent of the individuals. The tibiae also have the other instances of osteomyelitis and treponemal infection that were noted in the sample.

There were no fractures associated with any of the tibiae in the sample. However, it is important to remember that periosteal reactions can be caused by small traumas, which result in corresponding infection at the location, even every day bumps and bruises.

Table 16 Ankle/Foot Preservation.

	Frequency	Percent
Complete	14	20.0
Incomplete	17	24.3
Fragmentary	18	25.7
Missing	21	30.0
Total	70	100.0

The ankle and foot category had even distribution among the three preservation score. However, there is a slant towards fragmentary and missing scores due to the number of small bone elements associated with the ankle and foot.

Table 17a Ankle/Foot Pathologies.

	Frequency	Percent
Osteoarthritis	3	4.3
Periosteal Reaction	1	1.4
Osteochondritis Dissecans	1	1.4
Not Applicable	44	62.9
Missing	21	30.0
Total	70	100.0

Table 17b Ankle/Foot Pathologies by Sex.

	Osteoarthritis	Periosteal Reaction	Osteochondritis Dissecans	Total
Female	1	1	0	2
Male	2	0	1	3
Total	3	1	1	5

Most of this category did not exhibit pathology and/or was missing bone elements. The three pathologies that were present include: osteoarthritis, periosteal reaction, and osteochondritis dissecans. There was only one case of a traumatic fracture to the first phalange, or big toe, on the right foot of an individual. It was a healed fracture with no discernable type.

The last basic table demonstrates the distribution of severity scores. Severity scores were done individually per the pathologies specifications and then all of them were assessed for an overall value.

Table 18 Severity Score Distribution.

	Frequency	Percent
Mild	32	45.7
Moderate	14	20.0
Severe	10	14.3
Not Applicable	14	20.0
Total	70	100.0

It is obvious that while much of the population had presence of some pathology, it was predominately mild or moderate in severity. Fewer of the individuals are classified as severe.

In this section of the results specific chi-square and Fisher's Exact tests are given to show if any significant relationships were present in the analyzed data. The chi-square statistic was chosen because most of the variables are nominal.

Table 19 Chi-Square of Sex and Porotic Hyperostosis.

	Present	Not Present	Total
Female	14 (53.8%)	11 (47.8%)	25 (51%)
Male	12 (46.2 %)	12 (52.2%)	24 (49%)
Total	26	23	49

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.177	1	.674m

The above test, with a significance of .674, was not statistically significant at the .05 level. Both sexes had practically even amounts of porotic hyperostosis present, with females having two more. Fisher's Exact tests for sex against cribra orbitalia and cranial pathology were both not significant. There were so few cases of cribra orbitalia and other pathologies that these results are not surprising.

Table 20 Chi-Square for Vertebral Pathology and Sex.

	Present	Not Present	Total
Female	16 (45.7%)	16 (55.2%)	32 (50.0%)
Male	19 (54.3 %)	13 (44.8%)	32 (50.0%)
Total	35	29	64

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.567	1	.451

The above table shows the breakdown of vertebral pathology against sex for a chi-square test. Vertebral pathologies were not statistically significant at the .05 level with a value of .451. It should be noted that there are only six individuals within the sample that did not

have any vertebral column material present.

Table 21 Fisher's Exact for Ulna Pathology and Sex.

	Present	Not Present	Total
Female	5 (55.6%)	25 (50.0%)	30 (50.8%)
Male	4 (44.4%)	25 (50.0%)	29 (49.2%)
Total	9	50	59
		Exact Sig. (2-sided)	Exact Sig. (1-sided)
Fisher's Exact Test	1.000		.522

The above Fisher's Exact test, with a value of .522, shows that the variable for ulna and pathology were not significant at the .05 level. The ulna variable was broken up into present or not present to run the Fisher's Exact. This result is not surprising given the low number of instances within the sample.

Table 22 Fisher's Exact for Ulna Trauma and Sex.

	Present	Not Present	Total
Female	3 (60.0%)	27 (50.0%)	30 (50.8%)
Male	2 (40.0%)	27 (50.0%)	29 (49.2%)
Total	5	54	59

	Exact Significance (2-sided)	Exact Significance (1-sided)
Fisher's Exact	1.000	.516

Trauma is going to have even less significance given the very low number of instances scattered throughout the sample. The above table shows no significance with a test value of .516.

Table 23 Chi-Square for Tibia Pathology and Sex.

	Present	Not Present	Total
Female	8 (40.0%)	19 (54.3%)	27 (49.1%)
Male	12 (60.0%)	16 (45.7%)	28 (50.9%)
Total	20	35	55

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.039	1	.308

Sex differences were not significant at the .05 level for pathology at the tibia with a value of .308. There were 17 cases of periosteal reaction at the tibia; which accounts for most of the pathology found on this skeletal element. There was no fracture trauma recorded for the tibia, so no chi-square was generated.

Table 24 Fisher's Exact for Ankle/Foot Pathology and Sex.

	Present	Not Present	Total
Female	2 (40.0%)	21 (47.7%)	23 (46.9%)
Male	3 (60.0%)	23 (52.3%)	26 (53.1%)
Total	5	44	49

	Exact Significance (1-sided)
Fisher's Exact	.560

Table 24 shows the breakdown of pathology at the ankle and foot against the variable for sex. The Fisher's Exact value of .560 is not significant.

Table 25 Chi-Square for Severity and Sex.

	Mild	Moderate	Severe	Total
Female	15 (46.9%)	5 (35.7%)	6 (60.0%)	26 (46.4%)
Male	17 (57.1%)	9 (64.3%)	4 (40.0%)	30 (53.6%)
Total	32	14	10	56

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.389	2	.499

Severity is not significant at the .05 level between the sexes. Although there is a clear bias towards mild severity for both sexes it is not statistically significant. Men were slightly more likely to have pathology present, but women were slightly more likely to have severe cases. However, these are probably associated with the small sample size and not an actual trend.

Table 26 T-test for Stature and Sex.

Sex	Number of cases	Mean
Female	14	162.99
Male	16	165.38

Stature in Centimeters	Equal Variances Assumed	F .661	Sig. .423	T -1.109	Df 28	Sig. (2-tailed) .277
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There is no significant difference between the means for females and males as it pertains to stature. However, it is interesting to note that the mean differences in stature are so close together. The means suggest that the average male in prehistoric northwestern Alabama was approximately 5'4", while female height averaged around 5'3", which is not significant.

Analysis of the data has shown that the individuals at Bluff Creek did not have distinct sex roles insofar as they are manifested osteologically. The frequencies, severity, and types of traumatic injuries and pathologies were not significantly different between the sexes. Stature, which is a good measure of overall health of an individual, also was not significantly different. However, there are trends within the data that suggest a larger sample size or multiple samples from the region could show significance in the differences of day to day life between the sexes. These trends will be discussed further in the following chapter.

CHAPTER 8

Discussion, Limitations, and Conclusion

The research hypothesis for this paper posited that there would be differences in the frequencies and severity of pathologies and traumas between the sexes that were indicative of distinctive sex roles. After conducting Chi-Square tests, and Fisher's Exact tests when appropriate, no statistically significant differences between the sexes was found, and the hypothesis was rejected. Pathology and trauma were essentially evenly distributed between the sexes and there was no significant difference in severity. The results support the idea that the individuals at Bluff Creek might have been more egalitarian than would be expected.

There were clear distinctions between the sexes according to subsistence strategies and social interactions per Swanton (1928), Adair (1930), Gibson (1971), and Hudson (1976). Hudson spoke to the southeastern Native American in general and had distinctive roles for each sex thoroughly outlined. He pointed out that “the Southeastern Indians conceived of men and women as two radically different forms of humanity, and they consequently assigned to them contrasting roles in subsistence activities” (Hudson, 1976). Women were responsible for the homestead and vegetable based food. This required them to cultivate domesticated plants, harvest wild foods, make pottery, prepare and cook food, and raise children. Men were responsible for warfare, politics, land clearing, building construction, and the procurement of meat by hunting and fishing (Hudson, 1976). These divisions clearly defined by Hudson for the general southeastern Native American, can be seen in the ethnographic accounts specific to tribes like the Chickasaw and Choctaw (Swanton, 1928; Adair, 1930; Swanton, 1952; Gibson, 1971;

Swanton, 1993; Romans, 1999). Therefore, it is mildly surprising that there was no significant difference between the sexes in terms of pathology and trauma. However, the trends discussed below could indicate a few potential differences between the sexes that would be in line with these defined roles.

The first trend deals with trauma to the forearm and hand/wrist. Radius and hand/wrist data were not specifically discussed in the results section because they had low frequencies on their own, but their combined contribution accounts for 13, or over a third of all fractures documented. Ulnae were responsible for five of the traumatic injuries. Oblique, non-union, and healed fractures were most commonly seen in the radius and ulna. These types of fractures are commonly associated with falls, trips, and other accident related causes (Davidson et al, 2012). It should also be mentioned that the ulnae fractures could also be linked to interpersonal violence. A “parry” fracture features the ulna, does not have radial involvement, and rarely causes misalignment (Smith, 1996; Judd and Redfern, 2012). They are a result of direct force and usually produce transverse fractures at the point of impact. They have been commonly used to establish interpersonal violence because of individual instinct to raise the forearm to protect him/herselves. However, recent criticism has cautioned using this as the only evidence for interpersonal violence because there are other ways to achieve similar traumatic injuries (Smith, 1996; Judd and Redfern, 2012). I was reasonably confident that most of the ulnae fractures I saw were not associated with intrapersonal violence because some had radial involvement, were misaligned, and had different fracture types than was normally expected for a parry fracture. The injuries sustained could also be from ball game participation, but that was a predominantly male activity and there was even distribution between the sexes (Swanton, 1928; Adair, 1930; Swanton, 1952; Gibson, 1971; Hudson, 1976; Swanton, 1993; Romans; 1999). The second trend

was associated with age, and while there were no significant differences, two age ranges appeared of interest. Females were overrepresented in the 21-30 category 10 (female) to 3 (male), while males were prevalent from 31-40 with 11 (male) to 6 (female). The differences are not drastic by any means but when approximately a third of the subsample is in one range it is of note. Females were potentially dying slightly earlier due to child birth complications (Armelagos, 1998: 3). On the other hand, men were slightly more likely to have some manifestation of pathology, but its manifestation was less severe. These points mean very little on their own due to the sample size, but they potentially point to the differences in labor intensive work being done by the sexes, such as men doing more labor-intensive work but women having to work for longer periods.

The presence of infectious diseases, such as treponemal infection, could be discussed, but these instances do not specifically pertain to the question being asked in this thesis. Future researchers could address the amount of violent trauma found in the Bluff Creek population, because those instances were not relevant to this study. Other researchers could expand the question of sex roles to other sites in an effort to establish a baseline for all of northwestern Alabama. Any studies pertaining to daily life, activities, and violence within this area would be beneficial.

There were a few limitations to this study that should be addressed and could be corrected for future studies. The first limitation involves not being able to easily separate all the burials into a specific period. Artifact description from Webb and DeJarnette (1942) includes a few burials that are specifically discussed. Those can be placed easily within a temporal framework based upon pottery types. However, this represents only a very small number of the burials and not all of them for this study ended up in the randomly selected sample. If one could

separate the burials into their respective temporal ranges, then it would be possible to add an additional grouping variable to the data. The second limitation is sample size. I had originally figured that a sample of approximately 126 individuals would ensure a .05 p-value for statistical analysis. This number, 126, was calculated using an equation that determines what size sample is required to meet a .05 significance level for a population. Research design and researcher error, specifically in the identification of traumatic injuries and the initial data collection, presented other problems for this project. Throughout the data collection process, I realized there were ways to make the project more streamlined and coherent. The first thing I would do in hindsight would be to focus on specific joints of the skeleton as opposed to anatomic regions. This would allow for more detailed analysis of specific activities and actions.

In conclusion, the hypothesis that there would be distinct differences between the frequencies and severity of pathologies and traumas between the sexes indicative of sex roles was not supported. It is highly probable that this lack of significance is due to a small sample size and an inadequate research design. Other studies, most notably that of Bridges, (1989, 1991a,b) have found sex differences based on subsistence and daily activities. Ethnographic accounts (Swanton, 1928; Adair, 1930; Swanton; 1952; Gibson 1971; Hudson, 1976; Swanton, 1993; Romans, 1999) also describe distinct differences in the jobs and amount of labor associated with both sexes in the southeast. Therefore, if the limitations of this study were corrected there might be a chance of finding significant sex differences that would make more apparent social division and sex roles.

REFERENCES

- AO/OTA Fracture and Dislocation Classification. (2014). Switzerland: AO Foundation.
- Adair, James. (1930). *History of the American Indians*. Ed. Samuel C. Williams. Johnson City, Tennessee: The Watauga Press.
- Anderson, DG. (1995). Recent Advances in Paleoindian and Archaic Period Research in the Southeastern United States. *Archaeology of Eastern North America* 23:145-176.
- Anderson, DG., Stahle, DW., and Cleaveland, MK. (1995). Paleoclimate and the Potential Food Reserves of Mississippian Societies: A Case Study from the Savannah River Valley. *American Antiquity* 60 (2): 258-286.
- Anderson, DG., Maasch, KA., Sandweiss, DH., Mayewski, PA. (2007). Climate and Culture Change: Exploring Holocene Transitions. In Climate Change and Cultural Dynamics: A Global Perspective on Mid-Holocene Transitions: 1-23. Amsterdam, The Netherlands: Academic Press.
- Anderson, DG., Sassaman, KE. (2012). *Recent Developments in Southeastern Archaeology*. Washington, D.C.: Society for American Archaeology.
- Armegalos, GJ. (1998). Introduction: sex, gender and health status in prehistoric and contemporary populations. In: Anne Grauer and Patricia Stuart-Macadam (eds.), *Sex and Gender in Paleopathological Perspective*. Cambridge University Press. Pp. 1-10.
- Aufderheide, AC., Rodríguez-Martin, Conrado. (2011). *The Cambridge Encyclopedia of Human Paleopathology*. New York: Cambridge University Press.
- Beck, RA. (2003). Consolidation and Hierarchy: Chiefdom Variability in the Mississippian Southeast. *American Antiquity* 68 (4): 641-661.
- Binford, LR. (1962). Archaeology as Anthropology. *American Antiquity* 28 (2): 217-225.
- Bird, ES. (1999). Gendered Construction of the American Indian in Popular Media. *Journal of Communication* 49 (3): 61-83.
- Bissett, T. (2010). Linking Resource Abundance, Population, and the Rise of Regional Exchange Networks in the Middle Archaic Midsouth and Lower Midwest. Paper presented at the 67th Annual Meeting of the Southeastern Archaeological Conference, Lexington, KY.

- Blitz, JH. (2010). New Perspectives in Mississippian Archaeology. *Journal of Archaeological Research* 18 (1): 1-39.
- Blitz, JH., Lorenz, KG. (2002). The Early Mississippian Frontier in the Lower Chattahoocheeapalachicola River Valley. *Southeastern Archaeology* 21 (2): 117-135.
- Bridges, P. (1989). Changes in Activities with the Shift to Agriculture in the Southeastern United States. *Current Anthropology* 30 (3): 385-394.
- Bridges, P. (1991a). Degenerative Joint Disease in Hunter-Gatherers and Agriculturalists from the Southeastern United States. *American Journal of Physical Anthropology* 85: 375-391.
- Bridges, Patricia. (1991b). Vertebral Arthritis and Physical Activities in the Prehistoric Southeastern United States. *American Journal of Physical Anthropology* 93 (1): 83-93.
- Bridges, PS., Jacobi, KP., Powell, ML. (2000). Warfare-related trauma in the late prehistory of Alabama. In: PM Lambert (ed); *Bioarchaeological Studies of Life in the Age of Agriculture: A View from the Southeast*. Pp. 35-62. Tuscaloosa, AL: The University of Alabama Press.
- Brown, JA., Kerber, RA., Winters, HD. (1990). Trade and the Evolution of Exchange Relations at the Beginning of the Mississippian Period. In: BD Smith (ed); *The Mississippian Emergence*. Smithsonian Institution Press, Washington.
- Buikstra, J.E., Ubelaker, D.H. (1994). Standards for data collection from human skeletal remains: Proceedings of a seminar at the field museum of natural history (Arkansas archaeological report research series). Arkansas: Arkansas Archaeological Survey.
- Caldwell, JR. (1958). Trend and Tradition in the Prehistory of the Eastern United States. American Anthropological Association Memoir 88. Menasha, Wisconsin.
- Capasso, L., Kennedy, KAR., Wilczak, CA. (1998). *Atlas of Occupational Markers on Human Remains*. Teramo: Edigrafital S.p.A.
- Carmody, SB. (2009). Hunter-Gatherer Foraging Adaptations During the Middle Archaic Period at Dust Cave, Alabama. MA Thesis, University of Tennessee.
- Catlin, G. (1842). *Letters and Notes on the Manners, Customs, and Condition of the North American Indians*. Tilt and Bogue: Fleet Street.
- Charles, DK., Buikstra, JE. (1983). Archaic Mortuary Sites in the Central Mississippi Drainage: Distribution, Structure, and Behavioral Implications. In: JL Phillips and JA Brown (eds); *Archaic Hunter-Gatherers in the American Midwest*. Pp. 117-145. New York: Academic Press.

- Claassen, CP. (1991). Gender, Shellfishing, and the Shell Mound Archaic. In: JM Gero and MW Conkey (eds); *Engendering Archaeology*. Pp. 276-300. Oxford: Basil Blackwell.
- Claassen, CP. (1992). Shell Mounds as Burial Mounds: A Revision of the Shell Mound Archaic. *Current Archaeological Research in Kentucky* 2: 1-12. Frankfort: Kentucky Heritage Council.
- Claassen, CP. (1996). A Consideration of the Social Organization of the Shell Mound Archaic. In: KE Sassaman and DG Anderson (eds); *Archaeology of the Mid-Holocene Southeast*. Pp. 235-258. Gainesville: University Press of Florida.
- Cohen, MN. (1977). *The Food Crisis in Prehistory: Overpopulation and the Origins of Agriculture*. New Haven and London: Yale University Press.
- Cohen, H., Kugel, C., May, H., Medlej, B., Stein, D., Slon, V., Hershkovitz, I., and Brosh, T. (2016). The Impact Velocity and Bone Fracture Pattern: Forensic Perspective. *Forensic Science International* 266: 54-62.
- Court-Brown, C., Pennig, D. (1997). *Muscloskeletal Trauma Series: Tibia & Fibula*. CRC Press.
- Crothers, GM. (1999). Archaic Period Subsistence and Economy: The Green River Shell Midden Sites of Kentucky. Dissertation, University of Kansas.
- Davidson, K., Davies, C., Randolph-Quinney, P. (2011) Skeletal Trauma. In: Sue Black and Eilidh Ferguson (eds); *Forensic Anthropology: 2000 to 2010*. University of Dundee: CRC Press.
- Davis, CB. (2015). Paleopathology at the Shady Grove Site (22QU525): A Study of Health in the Upper Yazoo Basin During the Middle Mississippian Period. MA Thesis, University of Southern Mississippi.
- Deetz, J. (1977). *In Small Things Forgotten: The Archaeology of Everyday Life in Early America*. New York: Anchor Books.
- Dowd, GE. (1987). North American Indian Slaveholding and the Colonization of Gender: The Southeast Before Removal. *Critical Matrix* 3 (2): 1
- Dye, DH. (1996). Initial Riverine Adaptation in the Midsouth: An Examination of Three Middle Holocene Shell Middens. In: KC Carstens and PJ Watson (eds); *Of Caves and Shell Mounds*. Pp. 140-158. Tuscaloosa, AL: University of Alabama Press.
- Eastman, JM., Rodning, CB. (2001). *Archaeological Studies of Gender in the Southeastern United States*. Gainesville: University of Florida Press.
- Emerson, TE., McElrath, DL., Fortier, AC. (2009). *Archaic Societies: Diversity and Complexity Across the Midcontinent*. Albany: State University of New York Press.

- Galloway, A. (1999). *Broken bones: Anthropological analysis of blunt force trauma*. Springfield, IL: Thomas.
- Galloway, A., and Mason, RT. (2000). Forensic impact injuries in skeletal material. *American Journal of Physical Anthropology*: 154–155.
- Geller, PL. (2009) Identity and Difference: Complicating Gender in Archaeology. *Annual Review of Anthropology* 38: 65-81.
- Gibson, AM. (1971). Chickasaw Ethnography: An Ethnohistorical Reconstruction. *Ethnohistory* 18: 99-118.
- Grauer, AL. (2012). *A Companion to Paleopathology*. John Wiley and Sons, Ltd.
- Grauer, AL, Stuart-Macadam, P. (1998). *Sex and Gender in Paleopathological Perspective*. Cambridge University Press.
- Hodder, I. (1984). Archaeology in 1984. *Antiquity* 58 (222): 25-32.
- Hudson, C. (1976). *The Southeastern Indians*. The University of Tennessee Press.
- Isçan, MY, Kennedy, KAR. (1989). *Reconstruction of Life from The Skeleton*. Alan R. Liss, Inc.
- Jackson, EH., Scott, SL. (2001). Archaic Faunal Utilization in the Louisiana Bottomlands. *Southeastern Archaeology* 20: 187-196.
- Jackson, EH., Scott, SL. (2003). Patterns of Elite Faunal Utilization at Moundville, Alabama. *American Antiquity* 68 (3): 552-572.
- Johnson, JK, Yearous, JD., Ross-Stallings, N. (1994). Ethnohistory, Archaeology, and Chickasaw Burial Mode during the Eighteenth Century. *Ethnohistory* 41 (3): 431-446.
- Judd, MA., Redfern, R. (2012). Trauma. In: Anne Grauer (ed); *A Companion to Paleopathology*. John Wiley and Sons, Ltd.
- Jurmain, R., Cardoso, FA., Henderson, C., Villotte, S. (2012). Bioarchaeology's Holy Grail: The Reconstruction of Activity. In: Anne, Grauer (ed); *A Companion to Paleopathology*. John Wiley and Sons, Ltd.
- Kaila-Kangas, L., Arokoski, J., Impivaara, O., Viikari-Juntura, E., Leino-Arjas, P., Luukkonen, R., Heliovaara, M. (2011). Associations of Hip Osteoarthritis with History of Recurrent Exposure to Manual Handling of Loads over 20 kg and Work Participation: a Population-based Study of Men and Women. *Occupational and Environmental Medicine* 68 (10): 734-738.

- King, A. (2001). Long-term Histories of Mississippian Centers: The Developmental Sequence of Etowah and Its Comparison to Moundville and Cahokia. *Southeastern Archaeology* 20 (1): 1-17.
- Knight, VJ. (1990). Social Organization and the Evolution of Hierarchy in Southeastern Chiefdoms. *Journal of Anthropological Research* 46: 1-23.
- Knudson, KJ., Stojanowski, CM. (2008). New Directions in Bioarchaeology: Recent Contributions to the Study of Human Social Identities. *Journal of Archaeological Research* 16 (4): 397-432.
- Larsen, CS. (1987). Bioarchaeological Interpretations of Subsistence Economy and Behavior from Human Skeletal Remains. *Advances in Archaeological Method and Theory* 10: 339-445.
- Larsen, CS. (1998). Gender, Health, and Activity in Foragers and Farmers in the American Southeast: implications for social organization in the Georgia Bight. In: Grauer, Anne, and Stuart-Macadam, Patricia (eds.); *Sex and Gender in a Paleopathological Perspective*. Cambridge University Press: 165-187.
- Larsen, CS. (2002). Bioarchaeology: The Lives and Lifestyles of Past People. *Journal of Archaeological Research* 10 (2): 119-166.
- LeMaster, M. (2014). Pocahontas Doesn't Live Here Anymore: Women and Gender in the Native South before Removal. *Native South* 7: 1-32.
- Lipo, CP, Madsen, ME, Dunnell, RC, Hunt, T. (1997). Population Structure, Cultural Transmission, and Frequency Seriation. *Journal of Anthropological Archaeology* 16: 301-333.
- Little, KJ. (2003). Late Holocene Climate Fluctuations and Culture Change in Southeastern America. *Southeastern Archaeology* 22 (1): 9-32.
- Lovell, NC. (1997). Trauma Analysis in Paleopathology. *Yearbook of Physical Anthropology* 40: 139-170.
- McNutt, CH. (2008). The Benton Phenomenon and Middle Archaic Chronology in Adjacent Portions of Tennessee, Mississippi, and Alabama. *Southeastern Archaeology* 27 (1): 45-60.
- McQueen, MM., Jupiter, JB. (2000). *Musculoskeletal Trauma Series: Radius & Ulna*. CRC Press.
- Mistovich, TS. (1988). Early Mississippian in the Black Warrior Valley: The Pace of Transition. *Southeastern Archaeology* 7 (1): 21-38.

- Nyary, T., Scammell, BE. (2015). Principles of Bone and Joint Injuries and Their Healing. *Surgery* 33 (1): 7-14.
- Palmer, J. (2012). Busy Bones: Osteoarthritis and Musculoskeletal Markers as Evidence of Physical Activity and Social Differentiation in Post-Medieval the Netherlands. MA Thesis, Leiden University.
- Pauketat, TR. (2001). Practice and History in Archaeology: An Emerging Paradigm. *Anthropological Theory* 1: 73-98.
- Peebles, CS. (1971). Moundville and Surrounding Sites: Some Structural Considerations of Mortuary Practices II. *American Archaeology* 25: 68-91.
- Roberts, C., Manchester, K. (2005). *The Archaeology of Disease* (3rd edition). New York: Cornell University Press Ithaca.
- Rockwood Jr., CA., Green, DP., Bucholz, RW. (2010). *Rockwood and Green's fractures in adults* (7th edition). Philadelphia, PA: J.B. Lippincott Company.
- Rodning, CB. (2011). Mortuary Practices, Gender Ideology, and the Cherokee Town at the Coweeta Creek Site. *Journal of Anthropological Archaeology* 30: 145-173.
- Romans, B. (1999). *A Concise Natural History of East and West Florida*. Ed. By Kathryn E. Holland Braund. Tuscaloosa and London: The University of Alabama Press.
- Rossignol, M., Leclerc, A., Allaert, FA., Rozenberg, S., Valat, JP., Avouac, B., Coste, P., Litvak., Hillquin,P. (2005). Primary Osteoarthritis of Hip, Knee, and Hand in Relation to Occupational Exposure. *Occupational and Environmental Medicine* 62 (11): 772-777.
- Shanks, M., Hodder, I. (2007). Processual, Postprocessual and Interpretive Archaeologies. *Museums in the Material World*: 144.
- Smith, MO. (1996). ‘Parry’ Fractures and Female-directed Interpersonal Violence: Implications from the Late Archaic Period of West Tennessee. *International Journal of Osteoarchaeology* 6: 84-91.
- Snoddy, AME., Buckley, HR., Halcrow, SE. (2016). More than Metabolic: Considering the Broader Paleoepidemiological Impact of Vitamin D Deficiency in Bioarchaeology. *American Journal of Physical Anthropology* 160: 183-196.
- Steponaitis, VP. (1986). Prehistoric Archaeology in the Southeastern United States, 1970-1985. *Annual Review of Anthropology* 15: 363-404.
- Styles, BW., Klipper, WK. (1996). Mid-Holocene Faunal Exploitation in the Southeastern United States. In: KE Sassaman and DG Anderson (eds); *Archaeology of the Mid-Holocene Southeast*. Pp. 115-133. Gainesville: University Press of Florida.

- Sullivan, LP., Rodning, CB. (2011) Residential Burial, Gender Roles, and Political Development in Late Prehistoric and Early Cherokee Cultures of the Southern Appalachians. *Archeological Papers of the American Anthropological Association* 20 (1): 79-97.
- Swanton, JR. (1928). *Chickasaw Society and Religion*. University of Nebraska Press.
- Swanton, JR. (1952). *The Indian Tribes of North America*. Smithsonian Institution Bureau of American Ethnology.
- Swanton, JR. (1993). *Source Material for the Social and Ceremonial Life of the Choctaw Indians*. Birmingham, Alabama: Birmingham Public Library Press.
- Trigger, BG. (2006). *A History of Archaeological Thought* (2nd edition). Cambridge University Press.
- Waggoner, JC. (2009). Fiber-Tempered Pottery, Soapstone Vessels, and Shifting Alliances in the Interior Coastal Plain of the Late Archaic Southeast. *Southeastern Archaeology* 28 (2): 137-147.
- Walker, RB. (2000). Subsistence Strategies at Dust Cave: Changes from the Late Paleoindian through Middle Archaic Occupations. *Report of Investigations* 78. Tuscaloosa: University of Alabama, Office of Archaeological Services.
- Walther, JA. (1998). Rockshelters and Hunter-Gatherer Adaptation to the Pleistocene/Holocene Transition. *American Antiquity* 63: 223-238.
- Waugh, GW., Fletcher, E. (1950). Osteoarthritis and Occupation. *The British Medical Journal* 2 (4685): 948.
- Webb, WS., DeJarnette, D. (1942). An Archaeological Survey of the Pickwick Basin in the Adjacent Portions of the States of Alabama, Mississippi and Tennessee. Bulletin 129. Washington D.C.: Bureau of American Ethnology.
- Wedel, VL., Galloway, A. (2014). *Broken Bones: Anthropological Analysis of Blunt Force Trauma* (2nd Edition). Springfield, IL: Charles C. Thomas.
- Wentz, RK. (2006). A Bioarchaeological Assessment of Health from Florida's Archaic: Application of the Western Hemisphere Health Index to the Remains from Windover (8Br246). Ph.D. Dissertation, Florida State University.
- Weston, DA. (2008). Investigating the Specificity of Periosteal Reactions in Pathology Museum Specimens. *American Journal of Physical Anthropology* 137: 48-59.

- Weston, DA. (2012). Nonspecific Infection in Paleopathology: Interpreting Periosteal Reactions. In: Anne Grauer (ed); *A Companion to Paleopathology*. John Wiley and Sons, Ltd: 492-512.
- Wilson, GD. (2010). Community, Identity, and Social Memory at Moundville. *American Antiquity* 75 (1): 3-18.
- White, TD., and Folkens, PA. (2005). *The Human Bone Manual*. New York: Elsevier Academic Press.
- White, N. (2015). What I Believe about the Useful Diversity of Theory in Southeastern Archaeology. *Southeastern Archaeology* 33 (2): 255-268.
- Wright, V. (1989). Osteoarthritis: Diagnosis is not as Simple as it Seems. *British Medical Journal* 299 (6714): 1476-1477.