SKELETAL EVIDENCE OF THE TREATMENT OF THE ELDERLY
IN THE ARCHAIC AND MISSISSIPPIAN PERIODS
IN THE SOUTHEASTERN UNITED STATES

by

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ABSTRACT

One of the primary goals in the discipline of anthropology is to explain the changes that accompany major transitions in human life. One very important transition that has occurred worldwide was the transition from a foraging existence where humans depended solely on wild food resources to an agricultural way of life with humans growing and manipulating certain staple crops. Changes that accompanied the shift to agriculture in the region of what is now the state of Alabama include increased sedentarism, increased social stratification, and poorer health and nutrition. As human groups adopted agriculture people also had to work harder to produce the food they needed to survive. This study looks to see if these changes affected the elderly in prehistoric Alabama in the same ways it affected the rest of the population.

Two sites were chosen for this study. The Perry site in northwestern Alabama represents the pre-agricultural Archaic period and Moundville in west central Alabama represents the agricultural Mississippian period. Previous studies in Alabama have found a general increase in workload and trauma with the introduction of agriculture by looking at changes in osteoarthritis, bone strength and density, fractures, and dislocations, so it was expected that similar trends would be found in the oldest segment of these populations.

Contrary to the results of previous studies, this study found that evidence of activity actually decreased among the elderly from the Archaic period to the Mississippian period in Alabama. This could be due to the small sample size available for this study, but if these results are in fact accurate, they reflect the excellent treatment of the elderly as reported in ethnohistoric accounts of the Southeast.
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<th>Description</th>
</tr>
</thead>
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<td>$\chi^2$</td>
<td>Chi-square</td>
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<td>$m$</td>
<td>Mean: the sum of a set of measurements divided by the number of measurements in the set</td>
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<td>$sd$</td>
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## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS AND SYMBOLS</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. BACKGROUND</td>
<td>7</td>
</tr>
<tr>
<td>a. Purpose</td>
<td>10</td>
</tr>
<tr>
<td>b. Trauma</td>
<td>12</td>
</tr>
<tr>
<td>c. Osteoarthritis</td>
<td>16</td>
</tr>
<tr>
<td>d. Osteoporosis</td>
<td>18</td>
</tr>
<tr>
<td>e. Ethnographic evidence of the treatment of the elderly in the Southeast</td>
<td>20</td>
</tr>
<tr>
<td>f. The elderly in Southeastern Native American myths</td>
<td>26</td>
</tr>
<tr>
<td>g. Ethnographic evidence of the treatment of the elderly worldwide</td>
<td>28</td>
</tr>
<tr>
<td>h. The elderly in burial ceremonies</td>
<td>39</td>
</tr>
<tr>
<td>3. MATERIALS AND METHODS</td>
<td>48</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>55</td>
</tr>
<tr>
<td>5. RESULTS DISCUSSION</td>
<td>63</td>
</tr>
<tr>
<td>6. CONCLUSION</td>
<td>70</td>
</tr>
<tr>
<td>REFERENCES CITED</td>
<td>74</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Osteoarthritis Present in Males and Females by Age……………………………………56

2. Number of Individuals that were Missing Bones for Each Joint
   and the Percentage of Individuals with each Joint Present…………………………57

3. Joints that were Most Severely Affected by Osteoarthritis
   for Males and Females in Each Time Period………………………………………..57

4. Number of Joints Affected by Osteoarthritis by Time Period
   and the Percentage of Affected Joints……………………………………………59

5. Differences in the Means of the Total Osteoarthritis Scores by Time Period……..60
LIST OF FIGURES

1. The location of Moundville in the Black Warrior River Valley..........................4

2a. Right humerus illustrating an osteoarthritis score of zero............................50

2b. Superior view of a lumbar vertebra illustrating an osteoarthritis score of one......50

2c. Lateral view of the articular surface of a right scapula illustrating an osteoarthritis
   score of two...........................................................................................................50

2d. Posteriolateral view of a right tibia illustrating an osteoarthritis score of three.....50

2e. Superior view of a lumbar vertebra illustrating an osteoarthritis score of four.......50

2f. Anterior view of two fused cervical vertebrae illustrating an osteoarthritis score
   of four.......................................................................................................................50
CHAPTER 1

INTRODUCTION

One of the major goals in anthropology throughout most of its history has been to explain the characteristics of human groups as they go through major transformations. One such transformation occurred as people went from hunting and gathering to an agricultural way of life. Many changes occurred during this transition, including people settling down in a more sedentary lifestyle, forming larger communities, and forming status and wealth differences. Accompanying these social changes were physical changes in the human body, many of which can be seen in the skeletal remains of prehistoric populations. It has been shown that the adoption of agriculture was accompanied by a decline in general health, a shorter life expectancy, an increase in workload, and an increase in conflict and warfare (Larsen 1995). The goal of this study is to determine if any of these changes affected the treatment of the elderly as populations shifted from hunting and gathering to agriculture in the Southeastern United States. It was hypothesized that elderly individuals would show less severe signs of physical activity and mistreatment during the pre-agricultural Archaic period than elderly individuals during the agricultural Mississippian period in Alabama.

The two sites chosen to represent these time periods were the Perry site, a shell mound site in the Pickwick Basin of northwestern Alabama and Moundville, the large center of flattop earthen mounds in the Black Warrior River Valley of west central Alabama. The Perry Site was excavated in the 1930s as part of a TVA salvage project prior to the damming of the Tennessee
The shell mound at the Perry Site was found to represent two major occupancies, the earliest was called the Shell Mound Complex and the later occupancy was the Koger’s Island or Moundville Complex (Webb & DeJarnette 1948:23). The Shell Mound Complex represented a hunting-and-gathering society which, in its early stages, was a non-pottery making group of people. These Archaic Indians began the site by laying down layers of shell on top of water-laid silt on the river bank, creating a shell midden. Burials that were sometimes placed in this shell midden were characterized by tightly flexed skeletons in small pits, usually interred without artifacts. The mortuary record indicated that this method of burial gave rise to at least three burial forms: the “round grave” type, “fully flexed” burials, and “sitting burials” (Webb & DeJarnette 1948:23). All three forms were the result of the practice of tightly flexing the body that was then probably tied with ropes and covered with either skins or textiles in preparation for burial.

The first of the burial forms was the “round grave” burial. This type of burial resulted when the body was placed on its side, back, or face down in a circular pit dug into the existing ground surface. The burial was then covered with shells. The second type of burial was the “fully flexed” burial, which was the result of the flexed body being laid on the midden surface and covered over with shells. No pit was dug for this type of burial. The final burial form was the “sitting burial.” This type of burial resulted when a very small pit was dug and the bundle was placed “on end” as if the person was sitting up in the grave (Webb & DeJarnette 1948:23-26). All three modes of burial were found throughout the shell midden, indicating that they were all used during the entire length of occupancy of the site. Furthermore, physical anthropological studies were conducted and showed no distinction in skeletal remains from the different types of
burial. From this evidence it was determined that all three of these burial types were used by the same people (Webb & DeJarnette 1948:26).

The second occupancy at the Perry site was called the Koger’s Island or Moundville Complex because it had characteristics similar to both Koger’s Island and Moundville, mainly shell-tempered pottery within many of the burials (Webb and DeJarnette 1948:26). This occupation of the site occurred much later than the earlier Shell Mound Complex and represents an agricultural people of the Mississippian period. Many of the burials from this later time period were intrusive into the earlier graves. The burials were usually either extended or partially flexed and most were accompanied by at least one shell-tempered pottery vessel and other artifacts. Many of these later burials also consisted of more than one individual, lending to the possibility that the individuals were victims of some sort of violent death. This is also supported by the discovery of stone projectile points imbedded in bone or within the chest cavity of several of the individuals (Webb and DeJarnette 1948:26). The differences between the two complexes found at the Perry Site make the differentiation of the skeletal remains rather easy and illustrate the vast differences between the two time periods.

The second site used in this study was Moundville, the political center of a large chiefdom living in the Black Warrior River Valley of west central Alabama (Fig. 1). Moundville was supported by maize agriculture and is characterized by other Mississippian features, such as the flattop earthen mounds that surround the central plaza. The occupation at Moundville has been divided into five phases: the pre-Mississippian West Jefferson phase (AD 900-1050), and the Mississippian phases of Moundville I (AD 1050-1250), Moundville II (AD 1250-1400), Moundville III (AD 1400-1550), and Moundville IV (AD 1550-1650) (Steponaitis 1998:26). There is a long history of excavations at Moundville. The earliest extensive excavations were
Fig. 1. The location of Moundville (triangle) in the Black Warrior River Valley of West Central Alabama (from Welch 1991:24 fig.3.1). Area of fig. 3.2 is from Welch and should be disregarded here.

conducted by Clarence B. Moore in 1905 and 1906 which uncovered approximately 800 burials (Powell 1998:103). Unfortunately most of the human remains from these burials have been lost. The largest excavations at Moundville took place during the Great Depression. From 1932 to 1941 excavations at Moundville were funded by the Emergency Conservation Work Program and other federal agencies, such as the Works Progress Administration (WPA), the Civilian Conservation Corps (CCC), and the Tennessee Valley Authority (TVA) (Powell 1988:5). Most of the work during this period was conducted by the Alabama Museum of Natural History under the direction of David L. DeJarnette (Steponaitis 1983:7). These excavations yielded around
2,400 burials, about 1,500 of which are now housed in the Laboratory of Human Osteology in the Department of Anthropology at The University of Alabama in Tuscaloosa.

The history of Moundville’s occupation began with the West Jefferson phase around AD 900 when the site was occupied by a small population of pre-Mississippian people. It did not become differentiated from other sites in the Black Warrior River Valley until the Moundville I phase, during which many of the mounds were built. Moundville II was characterized by an increase in population because there are more burials dating to this time period than the previous phases. During the Moundville III phase the site was virtually abandoned and was primarily used as a burial ground. By the final phase, Moundville IV, the site was solely a necropolis (Steponaitis 1983; 1998). Most of the burials in the collection date to the Moundville II and III phases (Steponaitis 1998:26). Once the pre- Mississippian West Jefferson skeletons were separated out, it was not necessary for skeletons to be separated into the different phases for this study because all of the Moundville phases relied on maize agriculture.

This paper is broken up into six chapters, the first being this introduction. The second chapter gives a background into work that has previously been completed regarding the change from hunting and gathering to an agricultural subsistence. It discusses the way older individuals have typically been left out of these studies and offers some possible solutions to the problems of studying old age in the past. The purpose of this study is given, as well as overviews of the skeletal markers of trauma, osteoarthritis, and osteoporosis. Previous research into these areas is described. The second half of chapter two deals with ethnographic evidence of the treatment of the elderly in both the Southeastern United States and other parts of the world. This section looks at how old people have been perceived in non-industrial societies worldwide and how their perception has affected their lifestyles. Because ethnohistoric data from the Southeast are rather
sparse, sources from further afield have been included to supplement the available information. Finally, chapter two concludes by looking at the roles of the elderly in myths primarily from the Southeast. This analysis gives a unique perspective into the treatment of the elderly in the past.

Chapter three discusses the materials and methods used in this study. It summarizes what types of samples were used and how they were chosen, and what types of methods were used to collect the data and why. It also explains what statistics were used to analyze the data and why they were chosen. Chapter four details the results of data analysis. It gives the results of the statistical tests and explains which results were statistically significant. Chapter five interprets the results given in chapter four and attempts to explain what types of activities may have caused the significant differences observed between groups. Finally, chapter six summarizes the previous chapters and offers suggestions for future research.
CHAPTER 2
BACKGROUND

Numerous studies have been completed concerning the consequences of the shift to agriculture in prehistoric societies worldwide. It was originally held that there was a general improvement in the lifestyle of prehistoric people with the adoption of agriculture. Many scholars however have questioned this assumption. Cohen (1989) and Larsen (1995), for example, found that contrary to popular belief, quality of life likely decreased with the introduction of agriculture in most parts of the world. Larsen (1995) observed a decline in dental health, including an increase in caries, abscesses, and antemortem tooth loss due largely to the consumption of domesticated plants high in carbohydrates. Larsen (1995) also observed a decrease in growth rates, an increase in enamel hypoplasias, and an increase in conflict and warfare as well as infectious disease and anemia. Many of these conditions have been attributed to the eating of less nutritious and less varied domesticated plant foods as opposed to the well rounded diets of hunter-gatherers.

Bridges et al. (2000) also found evidence of increased conflict associated with the rise of agriculture in the Southeast. Evidence of warfare, such as unhealed wounds with embedded projectile points, perimortem fractures, cutmarks on the cranium indicating scalping, and mass graves with at least one individual exhibiting one of these injuries, was more prevalent at the Mississippian site of Koger’s Island in Alabama than the late Archaic component at the Perry site. Both Bridges et al. (2000) and Larsen (1995) stated how these changes occurred non-
uniformly within populations and that not all segments of past societies were affected in the same way.

One segment of the population that has been largely overlooked in previous prehistoric and historic skeletal studies, as well as in Native American cultural studies in general, is the elderly. The primary reason for this gap in the osteological literature is the difficulty in accurately aging the skeletons of older individuals. Estimating age at death for young individuals is rather easy compared to the aging of adults because of the nature of bone growth and bone degradation. Tooth formation and tooth eruption are accurate indicators of subadult age at death because they are biologically programmed patterns of development that vary little from person to person (Hillson 1986). Epiphyseal fusion also can be a reliable indicator of age in young individuals, although not as reliable as tooth formation and eruption (Ubelaker 1999). In contrast, the accurate aging of adults can be quite difficult. This is because the methods for aging older adult individuals rely on degenerative changes in the skeleton because development of the skeleton has long ended. So, changes such as the erosion of the pubic symphysis and auricular surface of the pelvis, suture closure, rib end changes, and tooth wear are used in aging. The processes that cause these skeletal changes can vary greatly within and between populations and, therefore, the accuracy of age estimation for adults suffers (Cohen 1989:111). Age estimation is further complicated by the fact that the archaeological sample and the known-age reference sample may not correspond. They may differ due to both biological and cultural reasons. Degenerative changes of the skeleton may occur at slightly different rates in biologically distinct populations, and the age-sensitive skeletal characteristics vary in terms of lifestyle (e.g. workload and wear and tear), which likely differs between modern and prehistoric
samples (Milner et al. 2008:577). The best course of action in estimating age at death is to combine the different aging techniques.

Although the accurate aging of older adult skeletons is difficult, it is no reason to ignore a substantial part of the human skeletal population. The physical remains of older individuals hold a potential wealth of information simply because they lived longer than individuals who died young and, therefore, the elderly experienced more activity throughout their extended lifetimes. Wear and tear to the skeleton resulting from daily activities is amplified in the elderly because they were exposed to degenerative forces for longer periods of time. The analysis of wear and tear is complicated because of the difficulty in distinguishing between wear caused by daily activities and wear that is simply the result of growing old. Often these can be one and the same thing. Again, this complication is no excuse to ignore questions regarding old age. There are ways to account for this problem.

Glencross and Sawchuk (2003) have identified two important issues in studying health differences between populations: the cumulative impact of skeletal pathology and the effect of population age structure. The first refers to how long a person was exposed to the risk of trauma or disease, which is obviously longer for older individuals. Therefore, populations with more aged individuals will have higher frequencies of these injuries (Glencross and Sawchuk 2003:369). This problem is overcome by comparing only corresponding age groups in the populations. The current study will do just that by dividing the oldest segment of the populations being compared into smaller age groups, for example 40-49, 50-59, 60-69, and so forth. This will reduce the possibility that one population will be skewed toward the older end of the age grade. Glencross and Sawchuk (2003:372) developed the measure of person-years to represent the sum of each individual’s estimated length of risk exposure. This was used as a direct
estimate of the age structure of the population, which allowed them to accurately compare two populations of the same age structure. They also recognized other problems in making cross-population comparisons using archaeological materials, including the problem of accurately defining a fracture or lesion and the problem of missing data due to undetected fractures and differential preservation (Glencross and Sawchuk 200:372-373). Finally, they addressed the problem of imprecision in aging old adults.

**Purpose:**

The purpose of this study was to shed light on the behavior of prehistoric peoples regarding aged individuals, which will be accomplished by observing several characteristics of the skeleton. Among the skeletal markers to be measured are osteoarthritis and osteoporosis, both indicators of activity and workload, and trauma, either violent or accidental, such as fractures and dislocations. Changes in these characteristics have been observed in many populations with the introduction of agriculture, but no study has yet focused exclusively on the elderly. For example, Steinbock (1976) found that the highest rates of fracture among prehistoric Native Americans were found in the earliest Archaic populations at the Indian Knoll site in Kentucky and incidence decreased with time. These changes in the frequency of fractures over time can indicate changes in lifestyle in the overall population, but unless we assume that older individuals went through the same transformation, it tells us nothing of the changes experienced by the elderly.

The results of Bridges et al. (2000) conflict with Steinbock’s (1976). Bridges et al. (2000) found an increase in trauma from the Archaic period to the Mississippian period in the Pickwick Basin of northern Alabama. This trauma has been credited to interpersonal violence because of the nature of the evidence. Unhealed embedded projectile points, perimortem
fractures, and scalping cutmarks all increased with the introduction of agriculture in the Tennessee River Valley of the Southeast. These criteria for interpersonal trauma have continued to be used by more recent scholars, including Smith (2003), who also included blunt force trauma to the cranium, and Steadman (2008).

Other studies by Bridges (1989a; 1991) have shown an increase in physical activity from the Archaic to the Mississippian period in the Tennessee River Valley of northern Alabama. Bridges (1989a; 1991) concluded that bone strength increased with the introduction of agriculture, especially in females, presumably as the result of working in the fields and grinding corn. Bone strength was measured by the size of the bone, specifically the diameter of the diaphysis, and the amount of cortical bone. Bridges (1989a; 1991) found that maize agriculture in the Southeastern United States was more physically demanding than hunting and gathering.

Not all studies have supported this conclusion. Agarwal (2008:393-395), using bone density as an indicator of workload, found a decline in workload with domestication. It is obvious from the various data that changes in daily activities brought about by the introduction of agriculture were variable with possible increases in workload in some regions and decreases in workload in other regions. One of the regions of interest in this study is the Tennessee River Valley of northern Alabama which was also the focus of many of Bridges’s studies. Because Bridges found an increase in both trauma and evidence of workload, it seems likely that prehistoric populations living in this area during the agricultural transition experienced an increase in the intensity of daily activities as well as an increase in conflict. The concern of the present study is whether these changes are evident in the physical remains of the elderly.

Another important change accompanying the shift to an agricultural subsistence system was the change in diet. Contrary to popular belief, the prehistoric diet actually suffered from the
adoption of domesticated plants and animals (Cohen 1989). Hunter-gatherers enjoyed a much more nutritious and well-balanced diet than did intensive agriculturalists. This is because agriculturalists rely heavily on only a few domesticated plants while hunter-gatherers took advantage of an extensive variety of wild plants and animals. Hunter-gatherers were also less likely to suffer from famine because if wild resources became depleted, the group could simply move to another area. If agriculturalists’ crops failed, they were not able to move easily to a more abundant or fertile area. As a result of the decline in the quality of diet due to increased competition for those good resources available among agriculturalists, individuals were generally weaker and more susceptible to illness and injury. In many cases this is visible in the skeletal remains of prehistoric farmers. This is a likely cause of the decrease in bone strength in many parts of the world associated with the rise of agriculture. It may not be that individuals were working less intensively; rather, they were not getting the proper nutrition needed to maintain strong bones. An added disadvantage of the diet of early agriculturalists was that many grain crops, including corn, are high in phytates (Weaver 1998:34). Phytates are calcium binding compounds that inhibit calcium absorption in the body. Larger grain components in the diet in some agricultural settings could have led to a decrease in calcium absorption and, consequently, to an increase in osteoporosis.

**Trauma:**

The increase in fracture rates observed with the origin of agriculture in some areas could be the result of either poorer nutrition and weaker bones or an increase in social conflict brought about by increased social complexity, or both. Torres-Rouff and Junqueira (2006) attributed trauma to an increase in violence during periods of great social change. The introduction of agriculture in the Southeast allowed for formerly mobile groups of hunter and gatherers to settle
down into larger permanent villages. With the aggregation of larger numbers of people into smaller spaces, social patterns invariably changed as societies became more complex. The social changes that resulted could have easily led to an increase in conflict and violence, and indeed this has been supported by many studies which have found a significant increase in traumatic injuries of the skeleton in prehistoric agricultural populations, particularly in males (Bridges 1996; Bridges et al. 2000; Paine et al. 2007).

Another explanation for the increase in violent trauma is related to the increase in conflict and warfare. It is well known from the ethnographic record that many Native American groups, including those in the Southeast, played a ball game that was extremely physically demanding and, at times, violent. James Adair and George Catlin are two of the more well known travelers who witnessed the ball game and reported on the vigor with which the participants played (Vennum, Jr. 1994:121). Adair described the ball game as Southeastern Indians’ “chief and most favorite game: and is such severe exercise, as to shew it was originally calculated for a hardy and expert race of people,…Once, indeed, I saw some break the legs and arms of their opponents, by hurling them down, when on a descent, and running at full speed.” (Adair 2005:392-393). Catlin, too, described the rough nature of the game when he recorded that in an effort to prevent someone from gaining the ball opponents “often meet desperate individual resistance, which terminates in a violent scuffle, and sometimes in fisticuffs; when their sticks are dropped, and the parties are unmolested, whilst they are settling it between themselves,” (Vernum, Jr. 1994:154-155). The game was played with two netted sticks that were used not only to catch and pass a ball made primarily out of animal skin, but also were used to hit and immobilize the players of the opposing team. The prehistoric ball game can most easily be compared to modern lacrosse,
but it was much more violent and less structured than the popular game today (Vernnum, Jr. 1994:145).

It is not surprising that a game that was so strenuous and violent was often used as an analogy for war for the Indians who played it. The rituals of Indian lacrosse were very similar to rituals of warfare, such as the use of conjurers to manipulate the outcome of the match and the ceremonial march on the field (Vernnum, Jr. 1994:213). Lacrosse sticks were equated to war clubs and were usually painted red, an important color in Native American warfare (Vernnum, Jr. 1994:214-125). Terminology for the two activities were interchangeable, and even the various names of the game illustrated their relationship to warfare. For example, the Creek called Indian lacrosse “hōtı icósi,” or “younger brother of war,” (Vernnum, Jr. 1994:213).

Severe injuries were not uncommon for participants in the ball game. Because the game of lacrosse mimicked the activities of warfare, from a bioarchaeological perspective it would be nearly impossible to differentiate between trauma inflicted during warfare and trauma inflicted during the ball game. Indian lacrosse players wore no protective gear or padding, so they would have been constantly susceptible to broken bones and dislocated joints. Based on modern players of traditional Indian lacrosse, the collarbone was the bone most often broken during a game (Vernnum, Jr. 1994:225). This information is relevant because many of the wounds attributed to warfare and interpersonal violence in the bioarchaeological record could, in fact, be the result of playing lacrosse. The implications of these cases of mistaken identity, however, should be relatively minor because the ball game was usually played in communities where warfare was prevalent. It served two simultaneous purposes, that of providing a practice ground for warriors and dissipating potentially devastating conflict within communities.
Changes in other types of trauma, either accidental or occupational, also have been observed in populations in transition. These types of trauma are discernable from inflicted trauma by the number and location of the fractures. Evidence of violence is mostly found on cranial and facial bones and is often characterized by more than one fracture per individual (Torres-Rouf et al. 2006:64). Parry fractures are often cited as evidence of interpersonal violence; however, it has proved difficult to separate accidental fractures of the forearm from defensive wounds. Judd (2008) offers a list of criteria useful in identifying parry fractures, but uncertainty remains over whether or not some parry fractures are the result of a violent attack or an accidental fall. Clinical data show that accident is the most common cause of forearm trauma (Smith 1996:84). The high frequency of females with parry fractures in the archaeological record could be due to factors other than abuse, such as the fact that female radii and ulnae are generally more gracile than males’, and females may have participated in certain gender specific subsistence activities that carried greater risk of injury (Smith 1996:84-85). It seems that inflicted violence is more likely if coupled with craniofacial injuries (Domett and Tayles 2006:195). For this reason, in the absence of other violent trauma of the cranium, face, or ribs, fractures of the ulna shaft are at best classified as “possible” parry fractures. Accidental trauma, on the other hand, is commonly an isolated event that results in a single fracture usually in the appendicular skeleton (Standen and Arriaza 2000). An increase in accidental trauma would be expected to accompany an increase in workload, and if people were working longer into old age there would be higher rates of accidental trauma among the elderly.

Another form of physical trauma found in skeletal remains is joint dislocation. Joints can be either completely dislocated, called a luxation, or partially dislocated, called a subluxation (Lovell 2008:345). Dislocations are most often observed in the shoulder and hip joints, are
usually caused by trauma, and are often associated with a fracture. Clinical studies have discovered that dislocations are not often found in older adults because the traumatic force is more likely to cause fracture in fragile bones (Lovell 2008:345). This may not be true of archaeological remains because osteoporosis, which leads to fragile bones, was relatively rare prehistorically (Mays 2006:415; Agarwal and Grynpas 1996).

**Osteoarthritis:**

Occupational trauma may include stress fractures, but the most common form is osteoarthritis. Osteoarthritis, also called Degenerative Joint Disease, is a non-inflammatory disease of the joints which is characterized by deterioration and abrasion of articular cartilage, as well as by formation of new bone at the joint surfaces (Sokoloff 1972:1009). This degeneration of joints is primarily an effect of wear and tear and is highly correlated with aging and, according to Bridges (1992:69), it was very common in prehistory. Increased osteoarthritis may be an indicator of an increase in physical activity, but interpretations should be made with caution. Epidemiological studies have consistently found an almost exponential increase in the prevalence of osteoarthritis with increasing age (Lohmander 1993:100). For example, there was zero osteoarthritis found in the knees of individuals in the age range 25-34, but by the ages 65-74, that number increased to 13.8%. The same researchers also found that osteoarthritic changes were more common in women than in men. Lohmander (1993) also stated that there was good evidence for the association of occupational risk factors with osteoarthritis. Farmers and soccer players were observed to have an increased risk of osteoarthritis of the hip, and occupations with excessive knee loading had an increased risk of osteoarthritis of the knee (Lohmander 1993:101). Despite many attempts to link specific habitual activities with certain patterns of osteoarthritis in an archaeological context (e.g. Angel 1966; Kelley and Angel 1987), numerous studies have
shown that it is not possible to determine exactly which activities caused joint deterioration in the past (Bridges 1992). What is possible, however, is to determine a general increase or decrease in the level or type of physical activity, and this is exactly what the present study is attempting to do. The most productive approach to using osteoarthritis as an indicator of habitual activities is to look at the overall patterning of osteoarthritis in multiple joints rather than looking at the prevalence of osteoarthritis at individual joints (Pearson and Buikstra 2006:216). It can be difficult to infer repetitive activities from the skeleton because different activities can produce similar bony changes. The key to making differential diagnoses is to look at the entire skeleton rather than at selected parts (Hershkavitz et al. 1996:177). It is known that osteoarthritis of some joints is more highly correlated with the effects of aging than others. The deterioration of the shoulder and hip joints is thought to be very closely associated with age which makes them weak indicators of activity, but osteoarthritis of the elbow and, to a lesser extent, the knee is only loosely correlated with age so they are more likely to reflect changes in the level of physical activity (Bridges 1992:83).

One possible reason for the difficulty in extrapolating data on daily activities of prehistoric people using osteoarthritis is the inconsistency in how osteoarthritis is defined by physical anthropologists and clinicians. Clinical reports on osteoarthritis define it as “erosion of the cartilage in joints, damage to subchondral bone, and narrowing of the joint capsule” (Pearson and Buikstra 2006:217). These characteristics are admittedly not useful in assessing physical activity because they can be influenced by a number of factors, including genetic predisposition and infection, in addition to level of activity. Because physical anthropologists do not have the luxury of observing the effect of osteoarthritis on soft tissue, they are restricted to defining osteoarthritis as simply the presence of osteophytes around the joint capsule (Pearson and
Buikstra 2006:217), something which is usually ignored by clinicians. According to this definition, some of the osteoarthritis that has been attributed to levels of activity by physical anthropologists has in fact been the result of habitual activities practiced throughout the life span. From this information, it seems that osteoarthritis may be a better indicator of activities in the past than has traditionally been believed.

Another skeletal mark of physical activity, and one that may be loosely linked with osteoarthritis, is spondylolysis. Spondylolysis is a stress fracture that disconnects the spinous process from the body of the vertebra and is typically found in the lumbar region of the vertebral column (Bridges 1989b:321). It may be caused by physical forces associated with walking upright, but the fact that men and women are affected at different ages indicates that there are other factors involved. Bridges (1989b:321) discovered that spondylolysis occurred early in adult males, but typically did not occur until after the age of 40 in females among the Archaic Indians of northwestern Alabama. Among males this may be related to activities necessitating a high level of mobility in the lumbar spines of young males. The late occurrence of the condition in females, rather than indicating an increase in mobility later in life, is likely the result of osteoporosis which increased the fragility of the neural arch. This explanation alone does not account for such an increase in spondylolysis in adult females. The effects of osteoporosis combined with levels of activity remaining high into later adulthood both contributed to the late onset of spondylolysis in Archaic females (Bridges 1989b:327).

**Osteoporosis:**

A final indicator of the level of physical activity experienced by people in the past is bone strength. Bridges (1989a:392) observed that bone strength increased with the introduction of agriculture in the Southeastern United States, which suggests that maize agriculture was more
physically demanding than hunting and gathering. Similar studies in other regions of the U.S. have resulted in the opposite conclusion (Larsen 1995), making it likely that the consequences of an agricultural subsistence strategy varied from place to place for either ecological or cultural reasons. The sample used for the current study is the same used by Bridges (1989a); therefore, it is expected that an increase in bone strength will be found among the elderly that will be manifested as a decrease in the prevalence and severity of osteoporosis. This is because individuals who have stronger bones earlier in life are less likely to suffer from low bone density in old age (Agarwal 2008).

Osteoporosis is clinically defined as increased porosity of bone and is used only to describe diffuse rather than localized bone atrophy (Howell 1972:1190). It is clear from clinical data that peak bone mass and the subsequent risk of osteoporosis is affected largely by physical activity (Weaver 1998:35). Admittedly, most skeletal adaptations to work demands occur earlier in life, but the skeleton also adapts later in life within narrower limits. Those limits are set by bone growth and peak bone mass, so it is possible that physical activity can prevent or at least delay bone loss in older individuals (Weaver 1998:35). The most common locations for osteoporotic fractures are the hip, wrist, and spine, however hip fractures were rare in the past compared with modern populations (Mays 2006:415; Agarwal and Grynpas 1996). This is probably because most individuals did not live long enough in prehistory to suffer these injuries (Mays 2006:415). In modern populations fractures of the neck of the femur increase with age in both men and women and are the most common fracture among the elderly (Knowelden et al. 1964:135; Melton 1996:1215). Colles’ fractures, or fractures of the distal radius, occurred much more frequently in cases of osteoporosis in ancient populations than fractures of the hip. Vertebral fractures are the most common osteoporosis-related trauma observed in the
archaeological record (Brickley 2002). Low bone mass and osteoporosis-related trauma in the archaeological record, unfortunately, cannot be attributed to any specific cause, but they can be interpreted as the result of general stressors (Weaver 1998:36).

**Ethnographic evidence of the treatment of the elderly in the Southeast:**

The goal of this study is to determine if the elderly were treated differently between a hunting and gathering way of life and an agricultural way of life by looking at certain skeletal characteristics of the physical remains. There is a large amount of ethnographic data on the lifeways of Southeastern Native Americans at the time of contact (Adair 2005; Bartram 1928; Hudson 1976; Swanton 1979), but very few mention anything about the treatment of the elderly in any detail. The trader James Adair lived among many Southeastern tribes during the middle of the eighteenth century and recorded much of what he saw. He observed that the elderly were often referred to as “old beloved men” and “old beloved women,” and they were instrumental in both politics and rituals. Old men were active in politics and helped resolve disputes among the people (Adair 2005:275). These old men were considered very powerful because of their success as warriors earlier in life. As they aged they were unable to continue performing the duties of a warrior and were promoted to political office. According to Hudson (1976:225), they also were valued for their wisdom and knowledge. Bartram (1928:388) adds, elderly men made up the council of chiefs in which the supreme and executive power resided, and they were respected for their wisdom, virtue, and valor. They would often speak of their exploits and accomplishments of earlier days in order to inspire young men (Waselkov and Braund 1995:85). Thomas Nairne, in his *Muskhoget Journals*, stated that the chief rarely made important decisions without consulting his *Istechagoes*. Many of these *Istechagos* (advisers) were born to
this rank, but others were old officers who were taken into the order specifically because of their merit (Moore 1988:32).

Axtell (1973:34) speaks of Southeastern Native American society as a system in which “age confers rank and wisdom gives power.” Children in the Southeast were taught at a very young age to respect their elders, and the older an individual was, the more respect he or she deserved. Old age was respected because the elderly were believed to have reached such an advanced age through the protection of the Great Spirit (Axtell 1973:83). It would therefore anger the Great Spirit to show disrespect to older individuals. The community turned to councils of the aged, chiefs, and men of superior wisdom for advice in many matters. It was believed that if one respected and aided the elderly, then one should expect similar treatment when they reached old age. Parents encouraged their children to help old people. Children who were seen helping the old and infirm, by either helping them get around or bringing them food, were praised and it was believed that they too would enjoy a long life. This belief that a long life would come from helping the aged perpetuated the deep respect for the elderly (Axtell 1973:33).

In the Southeast poor old men and women who suffered from lack of clothing were allowed to sleep in the hot houses of the town where they lived. Paul Wilhelm, Duke of Württemburg, traveled through North America from 1822 to 1824, and he, too, described the respect offered to old people. He stated that “the Indian feels an unbounded respect for old age which almost borders on superstition. He respects the gray hair even of an enemy and never will offend an old person with words,” (Wilhelm 1973:251). Indian informants also were important in Wilhelm’s travels, as they were during the travels of many Europeans in years following European contact. Many of the Indian informants were old people for the simple fact that they knew more about their people and environment than younger individuals.
Elderly men played an important role in teaching boys and young men, both indirectly and directly. Young men learned about hunting, trapping, and warfare by listening to the aged in conversation. These conversations were considered an honor and were actively sought out by young men and boys. They used these opportunities to ask for advice, and the answers given by the elderly were rarely rejected. The aged were never ridiculed or laughed at for their forgetfulness and were always held in the utmost respect (Axtell 1973:85). More direct means of education often involved the elders, in particular in matrilineal societies the oldest uncle of a clan. According to Swanton (1979:715), this old man was mainly responsible for educating the young men of the clan. He would reprimand them, lecture them about the busk, or Green Corn Ceremony, and other ceremonial gatherings, and would sometimes resort to beating them with a strap or cane. Among the Choctaw he would scratch young boys with nettles to punish them (Swanton 1979:716). A disobedient son among the Chickasaw was sent to the oldest uncle of the mother’s side who might punish the youth by scolding him, imposing a small penance, appealing to his “feelings of shame and honor,” or by pouring cold water over him (Gibson 1971:21). There is an example of an old man who charged his nephew with being “more effeminate than became a warrior and with acting contrary to their old religious rites and customs,” (Gibson 1971:21). For this the young man was beaten with a whip made of plaited grass. Stealing by children could be punished by scratching them on the back with dried snake’s teeth (Gibson 1971:21). Boys were never whipped by their parents, but were corrected by the oldest uncle of the clan or family group, who was much revered (Swanton 1979). In addition to reprimanding bad behavior, old men would teach the tribal lore to selected youths. Youths of the Choctaw, for example, would be assembled each morning and evening to listen to the old men tell the legends of their people (Swanton 1979:716). Among the Chickasaws, boys between the
ages of twelve and fifteen were considered the “age of proper discrimination,” (Gibson 1971:21). At this age they were assigned to village elders whose job it was to teach them the necessary knowledge and qualifications to become a successful hunter and accomplished warrior.

An illustrative example of the importance of the role of the oldest uncle in the clan in the education of young boys was offered by Swanton (1967:127-138). Swanton relates the story of the life of Tokulki, a Tulsa Indian. Although this is not a Southeastern group, it is close enough for the purpose of demonstrating the importance of the old uncle in the life of a youth. At Tokulki’s birth an old woman was present to aid his mother. Swanton also tells us that an old woman was usually present to assist in a birth among the Creeks and Choctaw in the Southeast (Swanton 1979:714). As soon as he was born, the old woman took Tokulki to the river and plunged him into the water to clean and purify him, and then she strapped him into a cradle where he remained for the first several months of his life. As Tokulki grew up the most important man in his life was his maternal uncle who lived nearby and visited Tokulki’s house frequently. The same cleansing ritual that the old woman performed on Tokulki was repeated every day by all of the members of the clan, and it was the responsibility of the old maternal uncle to make sure everyone followed this custom. He would be present at the river each morning encouraging young boys into the cold water and scolding or even beating with a stick those who were overly stubborn. At the same time he gave good advice to the young men and boys, and Tolkulki soon learned that he was the man to whom he must appeal in times of trouble, to whom he must look to gain approval, and whose displeasure he must avoid (Swanton 1967:127-129).

The old uncle’s primary means of teaching was through telling stories of the deeds of the ancestors. Also, when old people were talking together, Tokulki was not allowed near them.
This was not out of fear or respect, because the old people minded little if small children were around, but it was believed that old people had certain powers and could bewitch a child who hung around them too closely. For most of the year if was easy for Tokulki to avoid the elders because they mostly talked together by themselves apart from others (Swanton 1967:129).

Tokulki’s uncle made him a small blowgun when he was old enough to learn to use it and was encouraged to try his skill on small game animals. When he was successful he received high praise from his entire family, but none higher than the praise from his uncle. His uncle, along with his father, taught Tokulki the art of working wood and how to stalk animals (Swanton 1967:132). On Tokulki’s first war expedition his maternal uncle accompanied him “to initiate his nephew into the cardinal tribal institution, man-killing, the one great avenue for the attainment of personal glory and social standing,” (Swanton 1967:137).

Other old men were important in Tokulki’s life, as well as the life of the entire community. In building a palisade, it was the job of older men to mark out the course of the wall and place the large tree trunks at regular intervals. The younger men would then fill in the spaces in between (Swanton 1967:137). Old men were also considered “the custodians of the sacred legends and the keepers of the rituals,” (Swanton 1967:138). In order for this knowledge to continue, it was the duty of the old men to teach younger generations the stories and deeds of the ancestors.

Old beloved women were important in the rituals of the Green Corn Ceremony in the Southeast. They were the only females permitted to enter the sacred ceremonial space, and they were responsible for bringing the newly ripened corn to be offered (Adair 2005:149, 162). They also participated in the ritual dances with the old beloved men. Old women were the only females allowed to tend to wounded warriors because they were seen as “past the age of
temptations” (Adair 2005:165). The elderly also were valued in prehistoric societies for their wisdom. They were the ones who knew the stories and history of the people, and they also were known to preserve “artifacts,” or special objects of the past (Adair 2005:397). Old people knew the stories that were considered so important to the lives of most Native Americans.

The elderly were also valuable for more practical reasons. According to Hudson (1976:285), old people helped collect wild foods along with women and young children, and Swanton (1979:715) tells us that old men often helped women cut and carry firewood. The elderly also helped in watching the fields to frighten away birds and other pests, a job that was potentially very dangerous because it placed them outside the protection of the palisade walls of the village and made them an easy target for enemies during surprise attacks. Among the Powhatan of the mid-Atlantic region old men sometimes even helped work the fields (Swanton 1979:710). The threat of attack was very real in Southeastern Native American life, and old people were not exempt from becoming victims. Hernando de Soto tells the story of a Guachoya attack on the Anilco where many innocent people were killed, including “those most deserving of mercy, such as old women, already in extreme senility,” (Clayton, et al. 1993:443). The old women were stripped of their clothes before they were killed with arrows, often aimed at their genitals as opposed to other parts of their body.

During hunting expeditions, the elderly were left behind to help the women in their daily tasks (Swanton 1979:715). The elderly among the Creeks were so highly revered and respected that if they felt themselves to be too much of a burden they could ask for an honorable death, a request that was often granted (Waselkov and Braund 1995:119-120). It seems from the available accounts that the elderly in the prehistoric Southeast were valued for a number of
reasons and were well taken care of by their younger family and community members. This
treatment of the elderly should be reflected in their bones.

The elderly in Southeastern Native American myths:

Native American myths often include the elderly in important roles emphasizing the
importance of the aged in the ritual and supernatural world of the Southeastern Indians. The
erly played lead roles in the myths of the origins of tobacco and corn, as well as important
guides for the main characters of other myths (Swanton 1995). In the Creek version of “The
Origin of Tobacco” myth an old man discovers the tobacco plant and is the first to smoke the
dried leaves, a practice that is quickly copied by others (Swanton 1995:19). The Hitchiti version
of this myth has a younger man discovering the plant, but he takes it to the old men in his village
because he does not know what it is (Swanton 1995:87-88). The old men are the first to smoke the
leaves in this version as well. The Hitchiti version of this myth especially emphasizes the
importance of the aged for their knowledge because it is the old men to whom the youth takes the
unknown plant. The Koasati “Corn Woman” myth also illustrates the importance of the elderly
in the origin of corn (Swanton 1995:168):

An old woman was traveling about. She was covered with sores and was very
dirty, so that wherever she went people did not want to see her. Finally she came to
where some orphan children were living and remained there to take care of them. They
said, “Stay with us.” Then the old woman said, “Set out the things you use when you
cook,” and they set them before her. She was Corn. She rubbed herself as one rubs
roasting ears and made bread of what came off, which they continued to eat.

By and by she said, “The corn is now getting hard.” An old corncrib stood near,
and she said, “Sweep this out, shut it up, and go to sleep. I am your mother. You can eat
bread made out of white corn.” When night came they lay down, and they heard a
rapping noise in the corncrib, which presently ceased. Next day they went to it and
opened the door and it was full of corn.
This illustrates that some old people may have been looked down upon by most of the community, but it also shows the involvement of children in helping the elderly (Axtell 1973). In both the myth and the ethnohistorical accounts children who help the elderly were rewarded.

Another myth puts the elderly in a more peripheral role, but it is an important one nonetheless. In the Alabama myth “The Men Who Went to the Sky” two men travel to the sky to bring back a dead woman to her orphaned children (Swanton 1995:139). There are three versions of this myth, but they all include at least one old woman who helps the travelers on their journey. She lets them sleep in her house and feeds them before they move on. In two of the versions she gives them each a gourd and tells them how to use the gourd to cross a body of water by throwing the water to the side. In another version of this myth there is another woman who warns the men of snakes that they will encounter, and she gives them bark leg covers to keep them from being bitten (Swanton 1995:142-143). In all three versions of this myth the old women are instrumental in the men reaching their ultimate goal. Without the help and advice of the old women, the men would not make it to the sky.

Not all myths place old people in such venerated positions. In the Hitchiti myth “Rabbit and the Old Man” Rabbit fools the old man into convincing his daughters to sleep with him (Swanton 1995:114-115). He does this by taking advantage of the old man’s stupidity:

An old man had two daughters whom Rabbit wanted. At that time the old man’s many hogs were disappearing and he did not know what caused it. Then Rabbit shouted from a place near the house and the old man started out. When he got there Rabbit sat holding a hog’s tail, and Rabbit said, “You have been saying ‘My hogs are disappearing,’ I found them going underground, seized this one by the tail, and sat here with it while I called you.” “Well, I will hold it while you go and bring a grubbing hoe and shovel,” he said to Rabbit. So Rabbit went to the house, and when he got there said to the old man’s two daughters whom he wanted, “I have come because your father told me to have intercourse with both of you and come back.” When he told the girls this, they said, “You might lie.” When they said this to Rabbit, he called out to that old man, “Did you say both?” Then he answered back, “Yes, I said both,” and Rabbit said, “You hear what he says,” so they agreed and he had intercourse with both of them.
Other myths, such as the Koasati’s “The Wicked Mother-in-Law” (Swanton 1995:177-178) and “The Burr-Woman” (Lankford 2008:206-207), depict old women as evil and dangerous. “The Wicked Mother-in-Law” myth is about an old woman who had two daughters. One day when the daughters went swimming, they were seen by a man who fell in love with them. He took their clothes and would not give them back unless they agreed to marry him. The two daughters took the man home to meet their mother who is described as “a bad old woman” who wanted to kill him. She forced the man to work for her by making him hunt and repair the house. When this did not deter him, she challenged him to a race and wrestling match in hopes of hurting him. Instead, the man became angry with her and beat her by throwing her on the ground (Swanton 1995:177-178). Alabama’s myth “The Rescue of the Sun” is about an old woman who kept the sun in an earthen pot which had to be rescued and returned to the sky (Swanton 1995:123). It seems from Southeastern myths that old men were more often revered, epitomized in a Natchez myth where God is portrayed as an old man (Swanton 1995:240), and women were more likely to be depicted as wicked and dangerous.

**Ethnographic evidence of the treatment of the elderly worldwide:**

Because of the scarcity of detail in the ethnohistoric record regarding the lives of the elderly in the American Southeast, it is beneficial in understanding the lives of the oldest adults in non-industrialized societies to widen the scope to include ethnographic examples in other parts of the world. During the early part of the twentieth century an American ethnologist named John Cooper traveled to Tierra del Fuego to study the different indigenous tribes. Cooper (1917:178) found that it was the older men who held the influence and authority, though no real power, over the people. Among the three Fuegian tribes Cooper studied, all treated the aged with respect. There is an example of an old blind man among the Ona who was always accompanied by his
grandson as his guide (Cooper 1917:170). Considering that the Fuegians move around considerably, their regard for the aged and the lengths to which they go to accommodate the elderly speaks to the respect with which the elderly were treated. A boy was taught at a young age to be generous in sharing the spoils of the hunt, especially with the aged, and to be “docile and kind to his elders,” (Cooper 1917:173). However, at least one Fuegian tribe, the Onas, would abandon people who were too old or infirm to move with the clan, a fate that was accepted with sorrow but with no complaint (Cooper 1917:175). There were also accounts of another tribe, the Alacaluf, who reputedly killed and ate old women in times of extreme hunger and threw them overboard during very dangerous storms (Cooper 1917:136, 176), but there is little actual evidence to support these claims. From all supported evidence it is far more likely that the people of Tierra del Fuego in the early 1900s had the greatest respect for aged people and helped them at all costs.

For the vast majority of people in modern North America and most other industrialized Western societies, old age is something to be feared and hated. Old people are stereotyped as infirm, senile, childlike, and worthless, and the last several years of a person’s life is characterized by a sense of loss of both spouses and friends, as well as the individual’s self-esteem. Counts and Counts (1992:307) define the term Gerontophobia as “the irrational fear and/or hated of old age and the elderly,” which is expressed in both younger individuals and within the elderly themselves. Fear of old age may also contribute to a phenomenon called “ageism.” Ageism can be defined simply as discrimination against people because they are old, but in countries like the United States it is manifested in the disadvantage faced by old people in finding medical care. Old people with disabilities in the United States and other Western countries have fewer options in terms of the type of care available to them, and there is less
money spent to provide old people with adequate care compared to younger individuals (Kane et al. 2007:271). This is probably because the disabilities of the elderly are viewed as an expected part of the aging process, which is assumed to be an inevitable decline. Older individuals who find themselves in disadvantaged positions have little power and are not likely to act on their own behalf (Kane et al. 2007:272). Instead, younger family members make the decisions about how their parents or grandparents should be treated, without always keeping their best interests in mind. Old people are perceived as being dependent and unable to make their own decisions, which makes them vulnerable to inadequate care. The care they receive, such as nursing home care, often keeps them in a dependent and subordinate position (Kane et al. 2007:274). Counts and Counts (1992:308) point out that people in non-industrialized societies do not have this fear of old age like North Americans because in these societies it is the old people who control useful knowledge and hold positions of political and economic power. They also argue that the processes of urbanization, industrialization, and modernization have been the primary causes for the elderly’s loss of status and esteem, as well as the negative images of aging so prevalent in Western society (Counts and Counts 1992:308). Effectively, these processes have made the elderly obsolete because their knowledge of the past is no longer useful in a rapidly changing modernized world.

There also seems to be some confusion about the rate of aging in non-industrialized societies. It is a widely held belief that people in non-industrialized societies age faster than people in modern societies simply because people tend not to live as long in non-industrialized societies. While this point is true, pre-industrially most people did not tend to live past the age of 40, but this does not necessarily mean that people over 40 were considered old. The categories for young, middle-aged, and old were arbitrary ones in non-industrialized societies just as they
are in industrialized societies. It seems that the saying “you are only as old as you feel,” has some relevance in the discussion of aging of prehistoric or non-industrialized societies.

To illustrate this point Counts and Counts (1992) report of the Lusi, a horticultural society in West New Britain, Papua New Guinea will be described. The Lusi use different words when referring to an “elder” or “senior” female (*tamporonga*) or male (*taparonga*) and when referring to a “decrepit person” (*tanta taurai*) (Counts and Counts 1992:313). This is an important distinction because it demonstrates that an individual among the Lusi who is older and considered an elder is not necessarily considered to be decrepit and dependent on others.

Another important point is that these classifications are arbitrary ones, meaning they are not based on chronological age (Counts and Counts 1992:313). In fact, this would be impossible because most people of the Lusi do not actually know how old they are. They may be very aware of their relative age, but age in the number of years an individual has been alive is not well known to them. What defines an individual’s age, then, is the changing status of their kin in adjacent age groups, meaning their parents and children, so age in this society is relational rather than definitive (Counts and Counts 1992:316). The simplest Lusi term that can be roughly translated as “old” is *moho*. Both people and things could become *moho*, or worn out, and sometimes people would even refer to their age using this term (Counts and Counts 1992:321).

Unlike earlier age categories where transitions were based on definite visible changes, such as weaning or initiation ceremonies, the transitions between older age categories was less discrete. An individual became an “elder” and “senior” when his or her parents died or become socially defunct, or when his or her children married and he or she became a grandparent for the first time (Counts and Counts 1992:316). Once a person became an elder he or she was referred to as *taparonga* for a man or *tamporonga* for a woman. These terms invoked much respect and
were commonly used by younger individuals as terms of reverence (Counts and Counts 1992:316). Associated with the respect conferred upon them, elders were expected to be the stable, responsible members of the community (Counts and Counts 1992:317).

An elder’s status continued as long as that individual was responsible and active, regardless of gender and whether or not they maintained a domestic household and their spouse was still living or dead (Counts and Counts 1992:321). Their status depended solely on the elder’s level of activity and could only be lost by the person’s failure to act. Among the Lusi, people were expected to remain active in society as long as they were physically and mentally capable. Those individuals who willingly chose to retire from active life and become dependent simply because of their advanced years were looked upon with impatience. Only individuals who were incapacitated by chronic illness were looked upon with sympathy (Counts and Counts 1992:321).

The years spent as an elder were considered the prime years of an individual’s life. Although their physical strength decreased at this age, elders were not expected to do strenuous work as long as there was a younger person available to do the work for them (Counts and Counts 1992:318). The “senior” years were meant to be a time of ease when a person could be an active, respected, and essential part of the community while still resting from hard physical labor. The physical weakness of the very old was specifically attributed to the fact that their vitality had been expended into their children (Counts and Counts 1992:318). In this New Guinea society vitality was never lost; it was simply transferred from generation to generation.

From this description it is understood that among the Lusi old age was an enjoyable time of life for most individuals; however, it was not without its difficulties. Embedded in the enjoyment of greater respect and authority that came with increased age was the knowledge that
one’s faculties would soon decline, and with them so would one’s prestige (Counts and Counts 1992:319). Older people also feared that they would lose the knowledge they possessed that allowed for them to gain this higher prestige. For this reason elders felt an obligation to pass their knowledge on to younger generations so that it would not be lost forever when they died. It was also important for elders to begin deferring to the judgment of younger kin so that when their abilities were spent others would be trained to take their place (Counts and Counts 1992:319). This shows that while old age was a time to relax and enjoy the fruits of one’s labor, it was also a time full of responsibility to make sure that important, and sometimes sacred and secret knowledge was passed on so that it would not die with the older generation.

The authority of old age had other costs as well. People with power were the ones most likely to make enemies, and were therefore at the highest risk of falling victim to sorcery. This caused a longing for a peaceful old age in most individuals (Counts and Counts 1992:319). For this reason individuals were likely to begin withdrawing from social life, a process that could be quite long, at the peak of their power and influence.

The transition to the status of taurai (decrepit person) was very gradual and progressed depending on the individual’s degree of social interaction and physical ability. A decrepit person was seen as someone who had begun the process of dying (Counts and Counts 1992:333). A person’s declining physical strength and mental acuity, as well as lessened independence and social activity, eventually designated them as taurai (Counts and Counts 1992:321-322). It was especially crucial that an individual be able to garden to meet his or her own basic needs and participate in important ceremonies. With the loss of these abilities, an individual moved out of the elder or senior status and into the status of a decrepit person. However, the designation of decrepit person was not dependent solely on a person’s physical abilities. It was restricted to
those individuals who were too weak, ill, or senile by reason of age to carry on a normal social life (Counts and Counts 1992:331). Because there was no definite boundary between elder and taurai, a person’s classification in one group or the other relied heavily on the way he or she presented themselves to others and how they allowed others to treat them (Counts and Counts 1992:321-322).

The death of a taurai or decrepit person was seen as a natural event resulting from a period of gradual deterioration. It was simply the completion of a process that had begun long before (Counts and Counts 1992:335). Family members passively accepted the death, doing little to try to prevent it, and mourned quietly in the privacy of their homes (Counts and Counts 1992:340). Elders, on the other hand, were greatly mourned after death, and elaborate burial ceremonies were carried out. During a serious sudden illness family members and friends worked frantically to prevent death and promote recovery (Counts and Counts 1992:339-340). This was because the sudden death of a seemingly healthy person was seen as unnatural and the death of a productive individual was seen as a great loss.

The previous example of old age among the Lusi of Papua New Guinea illustrates the importance of elderly people in non-industrialized societies. While it cannot be used as a direct analogy for prehistoric peoples of the Southeastern United States, it does offer an insightful glimpse into what life may have been like for older individuals in pre-industrial societies. Among the Lusi the old had vital roles to play in society, and the same can be assumed for the Archaic and Mississippian peoples in prehistoric Alabama. The roles likely differed, but in societies where kin relationships were essential to the social structure of the community, it is reasonable to assume that the elderly played an important role in training younger generations for
the responsibilities of positions of authority and passing on sacred knowledge about the history of the people.

Among the Osage of the Plains, it was the sayings of the old men that were passed from generation to generation (Hall 1997:102). The sayings were passed down from long ago and continued to be treasured by the people because they were seen as expressions that came from men who had been in close touch with the “Mysterious Power”, which the people worshiped and revered. Many of the men who had uttered these sayings had long since passed away and were believed to reside in the spirit land, giving them the designation of sacred and mysterious persons (Hall 1997:102). Because old people were the ones who knew the sayings and perpetuated them in the community, they were perceived as being closer to the Mysterious Power and sacred and mysterious persons living in the afterlife. Having this knowledge offered them great honor and respect from younger generations.

Because the elderly were the ones most knowledgeable about their people’s history, they were often the informants to anthropologists and ethnographers studying other cultures, especially to American anthropologists studying Native American societies. Alanson B. Skinner, for instance, was an anthropologist who worked with the Menominee. He was adopted by Sabatis, an old tribal leader, who taught Skinner the Medicine Dance (Hall 1997:59-61). At the time, Sabatis was in his seventies and was the leader of the Medicine Dance ritual. He also was the sole head of the Medicine Lodge. If it had not been for older individuals who knew the sacred and secret knowledge of their ancestors and taught it to anthropologists and ethnographers of the early twentieth century, much of that knowledge would have been lost forever because younger generations within the Indian community were becoming increasingly disinterested in their own legends and history.
In the early twentieth century it was a priority of cultural anthropologists to study American Indian groups and preserve their cultures and histories because it was believed that many Indian tribes were dying out. Aleš Hrdlička was one of the leading anthropologists of the day and contributed greatly to anthropology as a whole and specifically to physical anthropology. During his fieldwork Hrdlička spent much time on the Indian reservations in the Southwestern United States where he witnessed and recorded, among other things, the treatment of elderly people. While most evidence points to the extreme respect and care of the elderly, Hrdlička reported data from the Southwest that contradicts that notion. On the Hupa reservation he reported that old people along with the sick and dissipated had less access to food and other resources (Hrdlička 1909:18). Hrdlička also observed that most people living on the reservations did not live past the age of 40 (Hrdlička 1908:40). Aged people were generally neglected by their children and were required to provide for themselves, or else suffer greatly. As cruel as this may seem, the elderly apparently did not expect anything different, but they showed very little affection for their children in return (Hrdlička 1908:31). Interestingly, however, Hrdlička (1908; p. 41) described a shared general interest centered around the oldest individual in each tribe.

While the treatment of aged individuals in the Southwest during the early twentieth century was not good, advanced senility was rare in people under the age of 70 (Hrdlička 1908:158). Although muscular strength was diminished in the elderly, many individuals were able to preserve a healthy appearance. Not only that, but many also were able to walk for long distances, carry heavy burdens, ride on horseback for an extended time, and exert themselves during religious ceremonies (Hrdlička 1908:158). It seems clear that even though old people may not have received the best treatment from younger generations, at least some retained the capacity to be a full participant in society.
The practice of merciful killing of the aged and elderly has been found not only in the Southeast, but also in other parts of the world. Examples of killing old people also have been observed in Siberia and Australia, but the reasons behind the practice differ. These accounts were collected by anthropologist Ellie Bendann who worked in Siberia, Melanesia, Australia, and parts of India during the early part of the twentieth century. In Siberia the idea was to send the elderly on to the next world where their faculties and physical condition will be unimpaired by old age (Bendann 1969:188). It was believed that life in the next world was a continuance of their present existence, and it was considered wrong to allow old people to perpetuate such an impaired condition when their lives could be improved by sending them on to the next world (Bendann 1969:1-2). Some Australian aborigines had a different reason for killing the aged. Bendann (1969:1-2) explains that in Australia some old people were killed to get rid of them because it was feared that they would become burdensome, or because they would be unable to cope with the difficulties of a dangerous journey. They were also afraid that the old and infirm would be captured by enemies, and they therefore looked to prevent their torture, and also to keep the enemy from gaining valuable information, by killing the old before they became too much of a liability (Bendann 1969:1-2).

Another example is a little closer to home. The Navajos of the Southwestern United States also practiced the killing of old people because they were too burdensome to care for in the harsh desert environment (Ward 1980:9). In this way abandonment of the aged and other physically disabled persons aided group survival. The old or disabled person would be left lying on the ground and covered with brush for protection from animals. Sometimes a little food or water would be left for them to survive a few days, but eventually they would expire and their
covered remains constituted one of the types of surface burials common in that region (Ward 1980:9).

George Catlin witnessed the killing, or as it was called by the Puncahs, exposing, of an old person among this Plains group (Catlin 1973:216-217). Many of the Plains tribes moved frequently in search of food and other resources. When an individual became too old and weak to move with the group, he or she was left alone with a small amount of food and water. Catlin saw an old man left by the Puncahs when they moved settlements. He was left with nothing but some food and water, a small fire, and a small shelter of sticks and a buffalo hide over him. The old man told his children to leave him because he was too old to go with them and would be nothing but a burden to them. Catlin recounted the old man’s words, “my children, our nation is poor and it is necessary that you should all go to the country where you can get meat, - my eyes are dimmed and my strength is no more; my days are numbered, and I am a burthen to my children – I cannot go, and I wish to die. Keep your hearts stout and think not of me; I am no longer good for anything,” (Catlin 1973:217). These words finished the exposing ceremony. When Catlin revisited the site later in the year, only a few bones remained after the old man’s body had been scavenged by wild animals (Catlin 1973:217). The practice of exposing was fairly common on the Plains where people were constantly on the move. Old people were described as baggage that encumbered the community and were thrown aside like rubbish (Stirling 1930: 422). In other regions of the U.S. mercy killings were not as common. The practice of killing or abandoning the elderly is related to the level of group mobility. Groups that had to move often to hunt or exploit other resources were more likely to practice merciful killings of the elderly because old people would have slowed the rest of the group and jeopardized group survival. More sedentary groups could better tolerate the aged and
appreciated them for their talents in storytelling and other valuable knowledge (Stirling 1930:576-577). An example from the Pima in the Southwest illustrates that more sedentary populations did not often kill their aged family members. Among the Pima the old and helpless were not killed, but they were sometimes neglected (Holmes 1908:192). There were cases of old people who were neglected to the point of starvation and accounts of the aged setting fire to their houses in an attempt to commit suicide. Young people among the Pimas would sometimes throw stones at old persons to see them “act like children,” (Holmes 1908:192). There were, however, cases of old divining men who became more feared for their supernatural powers as they became older. Their supposed supernatural powers prevented children from playing practical jokes and tormenting them (Stirling 1930:576-577). This is very different from the accounts from the Southeast where children were taught to treat the elderly with the utmost respect. In fact, among the Creeks there is no recorded instance of an old person being killed to save his family from the trouble of supporting him (Fawkes 1928:345).

**The elderly in burial ceremonies:**

The elderly were often integral parts of ceremonies dealing with death and burial probably because of their advanced age and relative closeness to the grave. A few examples from across North America will show some of the distinctions made for older people in death and burial ceremonies. The first comes from British Columbia where eating fresh salmon was taboo after a death of a member of the community. Here the length of the period of mourning varied by age, with younger individuals having to abstain from fresh salmon longer than older individuals (Bendann 1969:231-232). Older people were allowed to eat fresh salmon as soon as the first salmon run was over and there were enough fish that there was no danger of depleting the population, but younger people had to wait an extended amount of time. Also, in eastern
Maine the Algonquian mourned for their dead for as long as a full year, it only ending with the Keutikaw, a special dance that marked the end of mourning (Bushnell 1920:17). At this time presents were given to the family of the deceased, which were accepted by an elderly member of the family. This practice illustrates the high status of older members of the family by an aged person accepting the gifts on behalf of the younger family members.

Because of their advanced age, the elderly often had special roles in ceremonies dealing with death and mourning. They may have had specific tasks that they had to perform associated with the burial ceremonies of dead family or community members. One such example comes from Melville Island, Australia where two old men who were tribal fathers of the dead man singed the hair on their arms and legs, and if this ritual was neglected it was thought that they would develop a serious illness (Bendann 1969:227-228). The inferred explanation for this ritual is that it was an act of purification; however, why it was practiced by old men and if it was practiced at the death of a woman was not explained. Another mourning ceremony practiced by old men and women in Australia was found among the Kakadu tribe where small lily seed cakes were eaten only by old men, and old women painted their entire bodies with yellow ochre or mud (Bendann 1969:231). This was distinguished from the practice of young girls and women who painted themselves red. This obvious separation of aged individuals in the community was surely significant, perhaps as a sign of their reverence and respect, or conversely as a sign of their lower social status. This may be the case in the example of older women painting their bodies yellow rather than red. Because the color red often carried great significance in Native American society and ritual, the fact that old women were exempt from using the color red may indicate their lower status.
A final example of a mourning ceremony that involved the elderly dealt with totemic spirits of the dead. After the death of a member of the Wanduman or Mudburra tribes in Australia, it was the task of two or three old men to go into the bush and capture the totemic animal or plant to which the dead man belonged (Bendann 1969:245). Taboos against eating the totemic plant or animal of a dead person were common throughout the world, and this ritual was undoubtedly related to some sort of totemic taboo and illustrates the central importance of the elderly in upholding these special traditions.

Related to the elderly’s role in mourning is their role in preparing the body for burial. This is, again, probably due to their advanced age and relative closeness to the grave. A prominent example comes from the Southeastern United States where Romans (1962:89-90) observed a group of highly venerated old men who wore their finger nails very long on the thumb, forefinger, and middle finger. The long nails were considered a distinguishing badge that advertised their vital role in the disposal of dead bodies. These old men, who were about five in number at the time Romans encountered them, were flesh strippers and they traveled about the Choctaw nation stripping rotting flesh from the bones of recently deceased individuals (Romans 1962:89-90). It was the custom among the Choctaw, as well as many other Native American groups in the Southeast and elsewhere in North America to dispose of a dead body by placing it on a scaffold until the flesh rotted away. Any flesh left on the bones would be removed by the old men of this “respectable order” by using their long finger nails (Romans 1962:89-90). The flesh would be consumed in a fire along with the entrails. The cleaned bones were then put into a chest and deposited in the bone house, of which there was at least one in each village. This custom was essential to the burial rites among the Choctaw, yet the fear of death and dead bodies prevented most people from performing this task. Only old men were allowed to tear the flesh.
from the bones of the dead. Perhaps because of their advanced age and nearness to death they could not be harmed by the spirit of the dead. It is interesting that a job so feared and loathed by other members of the community inferred such high honor and respect to the old men who performed it. Rather than being considered impure from contact with the dead they were honored and venerated, perhaps a gesture of gratitude for taking the dirty business of cleaning a corpse out of the hands of family and friends of the deceased.

It is interesting that the previous example is that of a man preparing the dead body for final burial because in most cases it seemed to be women, especially old women, who were required to clean the body and prepare the grave for burial. For instance, the graves of the Delaware were usually prepared by old women because younger people disliked the work (Bushnell 1920:23). This is an example of work falling to old women because of their possible low status. Another explanation is offered by Yarrow (1880:67) who states that women, usually old women, prepared burials as a part of their domestic responsibilities. If this was the case then the work of preparing burials was not assigned to old women because of their lower status, but because it was part of their responsibility as a member of the household.

Among the Algonquian in eastern Maine it was common for individuals to be buried in a sitting position similar to the fetal position (Bushnell 1920:13). What sets this practice apart from other societies that buried their dead in sitting and/or fetal positions was the importance behind this specific sitting posture. Among the Algonquians a similar posture to the burial position was assumed by children when sitting in front of their fathers and the elderly. The position signified reverence, and it was an important symbol in life as well as in death. The fact that this posture was assumed when in the presence of an aged person illustrates the respect that was shown to people of advanced age.
Not only are there differences in the ethnographic record in how aged people mourn the death of community and family members, but there also are differences in how old people were mourned after death. In Victoria, Australia aborigine groups mourned greatly over the death of a young person by lacerating their bodies; however, there was very little mourning over the deaths of old men and women (Bendann 1969:228). The explanation for this practice states that the young afford much mourning because their lives were cut short and their deaths were somewhat of a shock to family and friends, and therefore great mourning ensued. The death of an elderly person was less shocking and was seen as the natural way of life, leaving friends and family less devastated than after the death of a young person. The minimum amount of mourning for old people, therefore, was not associated with their lower status and esteem, but rather because they had lived long and fulfilled lives and were ready to enter the next world. A similar custom was observed among tribes of Encounter Bay in Australia where old people were not treated with the same ceremony as younger individuals (Bendann 1969:205). Whereas younger people were left unburied for several days during which time many ceremonies and rituals were performed, older people were buried immediately after death with very little ceremony.

Just as there are differences in the mourning of elderly people, there also have been found differences in how the bodies of old people are disposed of after death. For instance, the Ghanji of North Australia placed old people directly on the ground after death, but young men and women were placed on tree platforms (Bendann 1969:204). Older people of Port Jackson, Australia were burned while young people were buried. The practice of cremating the remains of aged persons also was found in parts of India, specifically among the Komars (Bendann 1969:205-206). Another difference in the disposal of the body of old people was found on
Frazer Island, Queensland, Australia where the old and “stale” were placed in the boughs of trees after death (Bendann 1969:205). This custom was not practiced for younger individuals.

Among the Sebei in Uganda, very old men and women who no longer engaged in active affairs were said to have what was called a sweet death or kelil (Goldschmidt 1992:142). The funeral rites for such persons differed from the ceremonies practiced when a younger individual died. The body of the old person was laid out in an open place or under a tree on a sleeping skin with several of his or her possessions beside the body. Then the grandchildren and great-grandchildren of the deceased were told to go see the body and that doing so would give them a long life like the one enjoyed by the grandparent. Seeing the body was accompanied by laughter and enjoyment and the singing of songs of welcome such that would be sung at a wedding (Goldschmidt 1992:142). In this way, the death of an old person was not mourned rather the person was celebrated for their long life.

Another example of differential treatment of the elderly after death and disposal of the body was found among the Inuit who bury their young in the direction of the rising sun, but place the aged in the opposite direction (Bendann 1969:204). This may be an instance where the daily cycle of the sun rising and setting was associated with the life cycle of individuals, where people in their youth were associated with the rising sun and people in old age corresponded with the setting sun.

Sometimes the disposal of the body and mourning of an old man was different than the practices surrounding the death of an old woman. Among the Goulburn tribes in Australia old women were burnt immediately following death without any ceremony, but this was not the case for old men (Bendann 1969:203). Little effort was also put into the disposal of old women after death north of the Arunta in Australia where the custom was to place the dead body in a tree until
the flesh rotted away and then bury the cleaned remains in the earth. Old women however were buried directly following death, and according to the tribes, this was because “it is not worth while to trouble about them [women],” (Bendann 1969:203). Another example of differential treatment of old men and women after death was found among the Jajaurung in Australia who bury old men, and especially medicine-men, with much ceremony (Bendann 1969:204). The reasoning here is that old men gained much status and prestige throughout their long lives. The fact that old women were excluded from this custom points to the possibility that women were unable to gain the same level of prestige as men in this particular society.

From the above ethnographic evidence, it seems to be common for the elderly to receive less attention in death than younger individuals, but there are some exceptions beyond the case of medicine-men. One example comes from Western Australia where people dying of old age often would request to be taken back to their place of birth so that they could die and be buried there (Bendann 1969:223). This desire was sometimes so strong that parents would show their children where they were born well ahead of time so that when they become old and infirm their children would know where they wished to be buried.

Just as the elderly played an integral role in the myths and folklore of Southeastern Indians, they play an equally important role in the myths of other cultures throughout the world. It was a common belief among many preindustrial societies that humans had originally been immortal and only after some pivotal event did they begin to die. Two examples have been found where this pivotal event revolved around an old person whose actions forever changed how humans lived and died. In many parts of the world it was believed that when people reached old age they shed their skin like a snake and returned to youth. One myth states that one day an old women decided not to shed her skin, and forever after people grow old and die
(Bendann 1969:21). Another instance of the elderly in myths comes from Australia where it was believed that originally people died but came back to life three days later, and all individuals were in a continuous cycle of life and death. One day an old man became tired of continually dying and coming back to life and decided he wanted to die once and for all. After that people stopped coming back to life after death (Bendann 1969:25). Both of these examples show the importance of old people in myths, specifically those myths regarding why people die. It is not surprising that the elderly would figure prominently in myths about death because they are the individuals who are considered to be closest to death.

This chapter has summarized how the elderly are treated in many parts of the world. For the most part older people are treated well and often occupy roles of leadership, but this appears to be truer for men than for women. In some cases of more mobile groups the elderly may be abandoned or killed when they can no longer move with the community, but even in these societies the elderly are respected and cared for until the time they become too much of a burden on their family. Aged individuals are greatly respected for their knowledge and experience and are considered true assets in the lives of people living in non-industrialized societies. This also seems to be the case among prehistoric people living in the Southeastern U.S. According to several ethnohistoric sources, the elderly were highly respected, even venerated, because of their knowledge and experience. The terms “beloved old men” and “beloved old women” illustrate just how cherished these individuals were in the Southeast. Old people were especially important in their roles as educators and disciplinarians, but they also made practical contributions to the community by collecting food and firewood. Old people were given aid in times of need, and children especially were trained to assist the elderly whenever possible. The importance of the elderly in Southeastern society is also evident in their myths where they often
fill helpful roles that illustrate their superior knowledge and experience. All of this evidence suggests that the elderly led a relative life of ease in Southeastern Native American society, and the purpose of this study is to see if this lifestyle is reflected in their bones. From the numerous osteological studies that have been conducted on the physical consequences of the adoption of agriculture, it seems that changes varied from region to region. Based on many studies of prehistoric Southeastern Indians led by Bridges in the late 1980s and early 1990s it seems likely that the introduction of maize agriculture in Alabama resulted in an increase in workload and trauma. This study will be examining the remains of the oldest segment of two populations in Alabama, one from a foraging society and the other from an agricultural society, to determine if the effects of agriculture are visible in the bones of the elderly.
CHAPTER 3
MATERIALS AND METHODS

The research design of this study involves a two-group comparison, using only quantitative data. Two samples were chosen from an Archaic site in the Tennessee River Valley in northern Alabama (Perry site) and a Mississippian site (Moundville) located in the Black Warrior River Valley in west central Alabama. According to Buikstra and Ubelaker (1994), adult age is divided into young adult (20-34), middle adult (35-49), and old adult (50+). For the purposes of this study, however, Bridges’ (1989b) classification of old adult as 40+ years was used because it utilized the same skeletal collections. For this reason only specimens with estimated ages of 40 and above were eligible for study. Once all appropriate specimens were identified, each was numbered, and a random sample was chosen using the table of random numbers in Bernard (2006:697-699). The total sample was to include at least 40 individuals from each time period with similar numbers of males and females from the Archaic and Mississippian periods. All specimens are curated at the osteological laboratory in the Mary Harmon Bryant building at The University of Alabama campus.

The first step in examining the skeletal remains was to determine the sex and approximate age of each individual. This was accomplished by focusing on the pelvis because the pelvis is the best indicator for both sex and age. Sex was determined using five separate features of the pelvis from White and Folkens (2000). Female characteristics include a wide and deep preauricular sulcus, a wide greater sciatic notch, a wide subpubic concavity, a sharp
ischiopubic ramus, and the presence of the ventral arc. Male characteristics are the opposite with a narrower or absent preauricular sulcus, a narrow greater sciatic notch, a narrow subpubic concavity, a rounded ischiopubic ramus, and the absence of a ventral arc. Age was estimated by looking at both the degeneration of the pubic symphysis (Brooks and Suchey 1990; Gilbert and McKern 1973) and auricular surface of the pelvis (Lovejoy et al. 1985). According to Lovejoy et al. (1985) the auricular surface is the best indicator of age for the present study, more so than the pubic symphysis, because it reflects changes well into the sixth decade of life (Meindl and Russell 1998). In cases where the pelvis was fragmented or missing, features of the skull were used to determine age and sex. The most accurate estimator of extreme adult age in the skull is occlusal dental wear (Lovejoy 1985). While suture closure is the least reliable of the cranial aging techniques, Buikstra and Ubelaker’s (1994) method was used in situations where no other techniques were possible due to incomplete remains. The skull was also used to determine sex with females exhibiting a sharper superior orbital margin, reduced brow ridges, rounder chin, more obtuse gonial angle, smaller mastoid process, and smaller nuchal area relative to males (White and Folkens 2000).

After all of the specimens were aged and sexed, markers of physical activity were measured, beginning with osteoarthritis. Each of nine joints (knee, elbow, shoulder, hip, ankle, wrist, and cervical, thoracic, and lumbar vertebrae) were scored on a scale modeled after Stewart (1958) where zero indicates no osteoarthritis and four indicates a major extent of arthritic damage (Fig. 2a-f). The bones that make up each joint analyzed are the scapula, clavicle, and humerus for the shoulder, the humerus, radius, and ulna for the elbow, the radius, ulna, and carpals for the wrist, the pelvis and femur for the hip, the femur, tibia, and patella for the knee, and theibia, fibula, talus, and calcaneus for the ankle. For paired bones only the right
Fig. 2a-f. Osteoarthritis scores 0-4. (a) The head of this right humerus from a Mississippian male aged 40-49 illustrates a score of 0 (no osteoarthritis). It has a smooth joint surface and margins with no boney projections. (b) This lumbar vertebra from the same male in (a) is shown in superior view and illustrates a score of 1 (trace amount of osteoarthritis). It is similar to a score of 0, but there is a single osteophyte present on the joint margin. (c) The articular surface of this right scapula from an Archaic male aged 60-69 illustrates a score of 2 (mild osteoarthritis). It has multiple osteophytes and a defined lip around the joint surface. (d) This right tibia from an Archaic female aged 60-69 illustrates a score of 3 (moderate osteoarthritis). The oblique posteriolateral view shows large osteophytes projecting from the joint margin and advanced lipping around the lateral joint surface. (e) This lumbar vertebra is from an Archaic male aged 60-69 and illustrates a score of 4 (severe osteoarthritis). Large osteophytes and extreme deterioration of the joint surface are visible in this superior view. (f) This is another example of a score of 4. These fused cervical vertebrae viewed anteriorly are from an Archaic female aged 50-59.

side was used because, like in the present, most people in the past were right handed and, therefore, there is more likely to be signs of use on the right side. The left side was substituted in cases where the right side was missing. A score of one (Fig. 2b) was given if only single points of osteophyte development were visible with very slight lipping around the joint surface. Osteophytes are boney projections that commonly form on the edge of the joint surface as a result of friction, and lipping is the formation of a boney rim around the joint surface (Lockie 1972:17). A score of two (Fig. 2c) was given if lipping was more developed with multiple osteophytes present. A score of three (Fig. 2d) was assigned for cases of advanced lipping, with large osteophytes taking on a beak-like appearance, and eburnation, or polishing, of the joint surface due to bone on bone contact. A score of four was given for cases of extreme degeneration of the joint surface where the joint surface is breaking down (Fig. 2e) or there is joint fusion (Fig. 2f). The scores for each joint per individual were summed to get a total score for each individual. Because of the large number of individuals missing at least one relevant bone, only those individuals with all nine joints represented were included in the analysis of the total osteoarthritis scores. Bones could be missing for several reasons. Some bones were not
preserved in the field or were victim to extreme weathering. Others may have been missed during excavation, and still others have been lost since the 1930s.

Osteoporosis was determined as either present or absent by visually assessing bone density and weight of the long bones. Bones that were extremely lightweight were ruled as being osteoporotic and bones that were of normal weight were considered normal. The bones that were somewhat lightweight, but that could still be differentiated from normal bone were also considered to be osteoporotic for the purposes of this study. The reasoning behind this assumption is that osteoporosis is a gradual disease that takes many years to reach advanced stages. Even a slight loss in weight or density is a likely indicator of osteoporosis and it was therefore considered to be present in cases where some bone loss was evident. There are other more accurate means of measuring osteoporosis in skeletal remains, such as cortical histomorphometry, examination of trabecular architecture, and dual-energy x-ray absorptiometry (Agarwal 2008:388), but these methods require specialized processing and microscopy or CT equipment that were unavailable for this study.

Next trauma was analyzed, beginning with fractures. Only healed or partially healed fractures were included in this study because unhealed fractures are difficult to recognize in fragmentary remains. However, once fractures heal, it becomes impossible to know when the traumatic event occurred during life, so the goal of analyzing fractures is not to determine the frequency of fractures in old age; rather, it is to determine patterns of fracture throughout an individual’s lifetime. Similar methods were used to measure the prevalence of dislocations. The bones of the shoulder and hip were assessed for evidence of dislocation, such as remodeling or distortion of the joint surfaces or the presence of a false or secondary joint (Merbs 1989; Aufderheide and Rodríguez-Martín 1998:25-26).
The fragmentary nature of many of the specimens in the collection raises the question as to how much of a bone is required to include it in the sample under observation. Buikstra and Ubelaker (1994) developed the “5 segment method” to deal with this problem. Their method divides each long bone into five segments: proximal, middle, and distal segments and the two epiphyses. If 75% of each segment is present, the bone is considered complete and is included in the study. This method has been adopted by many physical anthropologists, including Judd (2002).

All data were analyzed using SPSS 16.0. Frequencies of all variables, including the osteoarthritis scores for the shoulder, elbow, wrist, hip, knee, and ankle, the total osteoarthritis scores for each individual, and osteoporosis were run, followed by descriptive statistics. For all of the individual scores the mode was found for each variable, and for the summed scores the mean and standard deviation were determined. Chi-squares also were calculated to determine if there was a significant difference in the number and severity of each marker of activity and trauma for each variable with respect to time period. In cases where the samples were too small for chi-squares to be meaningful, the Fisher’s exact test was used. Because there was a significant amount of missing data, only those skeletons that have all of the relevant joints were included when comparing mean total osteoarthritis scores. A t test was used to determine if there was a significant difference in the means of all the summed scores. Finally, because there are more than two age groups present in this study, a one-way ANOVA and Tukey’s HSD post hoc test were used to compare means by age. The ultimate goal of analyzing and interpreting the data was to see if there was a difference in the above skeletal markers in the elderly between a hunting-and-gathering society in the Archaic period and an agricultural society in the
Mississippian period in Alabama. The assumption is that the treatment of the elderly in these two time periods can be inferred from the physical evidence left in their skeletal remains.
CHAPTER 4

RESULTS

A total of 76 skeletons were examined from the Archaic period Perry site and 45 were examined from the Mississippian period at Moundville for a grand total of 121. There were 37 males and 39 females in the Archaic sample and 20 males and 25 females in the Mississippian sample. Comparing the Archaic population to the Mississippian, there were few statistically significant differences, but there were some differences that emerged. The most substantial differences regarded osteoporosis between males and females. A chi-square test of independence was calculated comparing the frequency of osteoporosis in males and females. A significant difference was found ($\chi^2(1) = 8.992, p = .003$). When looking at the two time periods together, females were more likely to have osteoporosis than males. Significant differences also were found by comparing males and females within the two time periods separately. There were statistically significant differences between males and females within the Archaic ($\chi^2(1) = 4.675, p = .031$) and within the Mississippian ($\chi^2(1) = 4.377, p = .036$). It is not surprising that from these data it seems that there was a difference in the prevalence of osteoporosis between males and females in prehistoric Alabama regardless of subsistence strategy. This is a trend that continues today with females being at a much higher risk of osteoporosis than males (Weaver 1998:36). An interesting observation with this data, however, shows that after the age of 50 males caught up to females with regard to prevalence of osteoporosis (Table 1). Within the 40-49 age group there is a significant difference in osteoporosis between males and females ($\chi^2(1) = \ldots$
Table 1. Osteoarthritis present in males and females by age. * indicates a significant difference.

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Total</th>
<th>Percent</th>
<th>Present</th>
<th>Total</th>
<th>Percent</th>
<th>Present</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40-49</td>
<td>50-59</td>
<td>60-69</td>
<td>40-49</td>
<td>50-59</td>
<td>60-69</td>
<td>40-49</td>
<td>50-59</td>
<td>60-69</td>
</tr>
<tr>
<td>Males</td>
<td>5</td>
<td>24</td>
<td>21%*</td>
<td>6</td>
<td>25</td>
<td>24%</td>
<td>4</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Females</td>
<td>17</td>
<td>29</td>
<td>59%*</td>
<td>13</td>
<td>28</td>
<td>46%</td>
<td>3</td>
<td>6</td>
<td>50%</td>
</tr>
</tbody>
</table>

7.723, p = .005), but there is no significant difference in osteoporosis between males and females in either the 50-59 ($\chi^2(1) = 2.889$, p = .089) or 60-69 ($\chi^2(1) = .000$, p = 1.00) age groups.

Apparently, as males grew older they became just as susceptible to osteoporosis as females.

Next, the osteoarthritis scores for the individual joints were analyzed. Of the 121 individuals examined 49 were missing at least one of the relevant joints, so there is quite a bit of missing data (Table 2). Broken down by individual joint, there were 104 scores for the shoulder, 116 for the elbow, 106 for the wrist, 115 for the hip, 116 for the knee, 110 for the ankle, 104 for the cervical vertebrae, 114 for the thoracic vertebrae, and 109 for the lumbar vertebrae out of a possible 121 individuals. Each joint (shoulder, elbow, wrist, hip, knee, ankle, and cervical, thoracic, and lumbar vertebrae) was given a score between 0 (no osteoarthritis) and 4 (severe osteoarthritis). The joints that were the most severely affected by osteoarthritis were the joints of the vertebral column (Table 3). The lumbar was the most severely affected for females from both the Archaic and Mississippian time periods, followed by the cervical and thoracic vertebrae. Males had a slightly different pattern. Males in the Mississippian sample showed the same pattern as the females with the lumbar region showing the most severe osteoarthritis, followed by the cervical and thoracic vertebrae, but for males in the Archaic sample the most severe osteoarthritis was in the cervical vertebrae, followed by the lumbar and thoracic vertebrae.
Table 2. Number of individuals that were missing bones for each joint and the percentage of individuals with each joint present.

<table>
<thead>
<tr>
<th>Joint</th>
<th>Number Present</th>
<th>Number Missing</th>
<th>Percent of Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>104</td>
<td>17</td>
<td>86%</td>
</tr>
<tr>
<td>Elbow</td>
<td>116</td>
<td>5</td>
<td>96%</td>
</tr>
<tr>
<td>Wrist</td>
<td>106</td>
<td>15</td>
<td>88%</td>
</tr>
<tr>
<td>Hip</td>
<td>115</td>
<td>6</td>
<td>95%</td>
</tr>
<tr>
<td>Knee</td>
<td>116</td>
<td>5</td>
<td>96%</td>
</tr>
<tr>
<td>Ankle</td>
<td>110</td>
<td>11</td>
<td>91%</td>
</tr>
<tr>
<td>Cervical</td>
<td>104</td>
<td>17</td>
<td>86%</td>
</tr>
<tr>
<td>Thoracic</td>
<td>114</td>
<td>7</td>
<td>94%</td>
</tr>
<tr>
<td>Lumbar</td>
<td>109</td>
<td>12</td>
<td>90%</td>
</tr>
</tbody>
</table>

Table 3. Joints that were most severely affected by osteoarthritis for males and females in each time period.

<table>
<thead>
<tr>
<th></th>
<th>Archaic</th>
<th>Mississippian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Cervical</td>
<td>1. Lumbar</td>
</tr>
<tr>
<td></td>
<td>2. Lumbar</td>
<td>2. Cervical</td>
</tr>
<tr>
<td></td>
<td>3. Thoracic</td>
<td>3. Thoracic</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Lumbar</td>
<td>1. Lumbar</td>
</tr>
<tr>
<td></td>
<td>2. Cervical</td>
<td>2. Cervical</td>
</tr>
<tr>
<td></td>
<td>3. Thoracic</td>
<td>3. Thoracic</td>
</tr>
</tbody>
</table>
To analyze the prevalence of osteoarthritis between the Archaic and Mississippian time periods, all scores of one and higher were collapsed into a single category, allowing osteoarthritis to be analyzed on the basis of presence and absence. The results of the chi-square tests revealed some statistically significant differences between groups. Of the nine specific joints examined, four were found to have a significant difference in the prevalence of osteoarthritis between the Archaic and Mississippian periods (Table 4). Osteoarthritis of the elbow ($\chi^2(1) = 6.943$, $p = .008$), wrist ($\chi^2(1) = 4.541$, $p = .033$), and cervical ($\chi^2(1) = 7.533$, $p = .014$) and thoracic vertebrae ($\chi^2(1) = 5.609$, $p = .028$) was significantly higher among the Archaic sample than among the Mississippian sample. For the elbow, the significant difference between the Archaic and Mississippian held up for females ($\chi^2(1) = 7.549$, $p = .006$) when the samples were separated by sex, but there was no significant difference in osteoarthritis of the elbow between the Archaic and Mississippian when the males were analyzed separately. When the cervical vertebrae were analyzed by sex there was a significant difference in males ($\chi^2(1) = 5.844$, $p = .039$) between the Archaic and Mississippian, but not in females. Differences between the age groups were found for the shoulder joint ($\chi^2(2) = 8.130$, $p = .017$), where osteoarthritis was significantly more common in the 60-69 age category than in the 40-49 and 50-59 age groups. When the samples were separated by time periods, only the Archaic held up this trend ($\chi^2(2) = 7.573$, $p = .023$).

Because there were several individuals with missing bones, to calculate and test the means of the total osteoarthritis scores of all joints for each individual only the individuals with a complete set of the relevant joints were analyzed. Bones could be missing for a number of reasons. They may not have been present in the field because of carnivore scavenging or other taphonomic processes, they may not have been collected from the field during excavations, they may not have been preserved adequately in the lab, or they could have been lost since the 1930s.
Table 4. Number of joints affected by osteoarthritis by time period and the percentage of affected joints. * indicates joints where the difference between time periods is statistically significant.

<table>
<thead>
<tr>
<th>Joint</th>
<th>Archaic</th>
<th>Mississippian</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Total</td>
</tr>
<tr>
<td>Shoulder</td>
<td>31</td>
<td>65</td>
</tr>
<tr>
<td>Elbow*</td>
<td>34</td>
<td>76</td>
</tr>
<tr>
<td>Wrist*</td>
<td>45</td>
<td>73</td>
</tr>
<tr>
<td>Hip</td>
<td>30</td>
<td>71</td>
</tr>
<tr>
<td>Knee</td>
<td>39</td>
<td>74</td>
</tr>
<tr>
<td>Ankle</td>
<td>17</td>
<td>73</td>
</tr>
<tr>
<td>Cervical*</td>
<td>67</td>
<td>67</td>
</tr>
<tr>
<td>Thoracic*</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>Lumbar</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Female Elbow*</td>
<td>20</td>
<td>39</td>
</tr>
<tr>
<td>Male Cervical*</td>
<td>33</td>
<td>33</td>
</tr>
</tbody>
</table>

There were 53 complete skeletons (23 males and 30 females) in the Archaic sample and 19 complete skeletons (8 males and 11 females) from the Mississippian sample. An independent samples t test comparing the mean scores of total osteoarthritis found a significant difference between the means of the two time periods ($t(70) = 2.060$, $p = .043$). The mean of the Archaic sample was significantly higher ($m = 12.15$, $sd = 4.162$) than the mean of the Mississippian sample ($m = 9.84$, $sd = 4.272$). When males and females were separated out, only the males were found to have a significant difference ($t(29) = 2.084$, $p = .046$) in osteoarthritis between the
Archaic and Mississippian time periods. The mean of the Archaic males was significantly higher ($m = 12.39, sd = 3.627$) than the mean of the Mississippian males ($m = 9.25, sd = 3.808$). There was no difference in the total scores of females between the Archaic and Mississippian time periods ($t(39) = 1.041, p = .304$). The mean of the osteoarthritis scores for Archaic females ($m = 11.97, sd = 4.582$) was not significantly different from the mean of osteoarthritis scores for Mississippian females ($m = 10.27, sd = 4.714$) (Table 5).

Table 5. Differences in the means of the total osteoarthritis scores by time period. * indicates statistically significant differences.

<table>
<thead>
<tr>
<th></th>
<th>Archaic</th>
<th>Mississippian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire sample*</td>
<td>$m = 12.15, sd = 4.162$</td>
<td>$m = 9.84, sd = 4.272$</td>
</tr>
<tr>
<td>Males only*</td>
<td>$m = 12.39, sd = 3.627$</td>
<td>$m = 9.25, sd = 3.803$</td>
</tr>
<tr>
<td>Females only</td>
<td>$m = 11.97, sd = 4.582$</td>
<td>$m = 10.27, sd = 4.714$</td>
</tr>
</tbody>
</table>

Using SPSS 16.0, the only other statistically significant differences found in the total osteoarthritis scores were between age groups. Because there were more than two age groups, the means of the osteoarthritis scores were compared using a one-way ANOVA. A significant difference was found among the osteoarthritis scores for the three age groups compared. Tukey’s HSD is a post hoc test that was used to determine the nature of the differences between the age groups. This analysis revealed a significant difference between the mean osteoarthritis score for the age groups 40-49 and 60-49 ($F(2) = 5.556, p = .004$). The mean osteoarthritis score for the age group 40-49 was lower ($m = 10.40, sd = 3.905$) than the mean osteoarthritis score for the age group 60-69 ($m = 15.62, sd = 4.241$). The mean osteoarthritis score for the 50-59 age
group \((m = 11.79, sd = 4.135)\) was not significantly different from either of the other two groups. When the two time periods were analyzed separately, the differences between age groups held up only for the Archaic \((F(2) = 4.064, p = .017)\). The mean osteoarthritis score for Archaic individuals aged 40-49 was significantly lower \((m = 11.00, sd = 3.478)\) than the mean osteoarthritis score for Archaic individuals aged 60-69 \((m = 15.62, sd = 4.241)\). The mean score for Archaic individuals aged 50-59 \((m = 12.04, sd = 4.237)\) was not significantly different from either of the other two groups. This could be the result of a difference in longevity between the two age groups. Indeed, there were more individuals who died in their 60s and 70s from the Archaic period than in the Mississippian period. Then again, this could simply be due to the small sample size that was used in this study to represent the Mississippian population. Finally, when males and females were analyzed separately, the differences between age groups were found in females \((F(2) = 4.842, p = .010)\) but not in males. The mean osteoarthritis score for females aged 40-49 was significantly lower \((m = 10.00, sd = 4.163)\) than the mean osteoarthritis score for females aged 60-69 \((m = 16.17, sd = 4.834)\). Again, the mean score for females aged 50-59 \((m = 11.56, sd = 4.098)\) was not significantly different from either of the other two groups. These results are not surprising considering that osteoarthritis grows more severe as individuals age.

Finally, when the severity of osteoarthritis for each individual joint was analyzed across groups only one difference was significant. A chi-square test found that osteoarthritis of the elbow was more severe \((\chi^2(2) = 7.597, p = .022)\) during the Archaic than during the Mississippian period. Differences in other joints were either not significant or there was not a large enough sample for a chi-square test to be appropriate. Because the chi-squares for these
data were larger than a 2x2 table, a Fisher’s exact test was not applicable to correct for the small sample size.

The statistical analyses of trauma found no significant differences between time periods or between the sexes. Ten males (27%) and eight females (21%) within the Archaic sample had at least one healed or partially healed fracture. Within the Mississippian sample four males (20%) and two females (8%) exhibited evidence of at least one healed or partially healed fracture. At first glance the difference in the incidence of fracture between males and females in the Mississippian period seems significant, but the results of a chi-square test found no significance ($\chi^2(1) = 1.385, p = .383$). Likewise, there was no significant difference between females in the Archaic and Mississippian time periods ($\chi^2(1) = 1.809, p = .292$). Joint dislocations were entirely absent from the samples chosen for this study. These results are most likely due to the small sample sizes.
CHAPTER 5
RESULTS DISCUSSION

Based on the analysis of the data, several differences emerged between the two samples. One of the most obvious differences concerned osteoporosis. Osteoporosis was found to be significantly more prevalent in females than in males when comparing the samples as a whole and when looking at the Archaic and Mississippian time periods separately. This is not surprising considering that osteoporosis is far more prevalent in females than in males in modern populations. The stresses put on female bodies during pregnancy and lactation diminish the amount of calcium in the bones, and later in life hormonal changes accompanying menopause continue to affect calcium levels to an even higher degree (Weaver 1998:36). These biological changes would be expected to have occurred in the distant past as well. It is somewhat surprising however that no significant difference in the prevalence of osteoporosis was found when comparing the Archaic and Mississippian time periods with males and females combined. Considering the fact that bone density can be affected by many factors, including physical activity, it was expected that different activities engaged in during the Archaic and Mississippian time periods, which are characterized by drastically different living conditions, would be observable in differences in the prevalence of osteoporosis. On further thought, however, osteoporosis is not a reliable indicator of the type of physical activity (Weaver 1998:35-36). It can be assumed that although people were doing very different tasks in the two time periods, the two subsistence strategies both required a great amount of physical exertion. It may be of no surprise that there was no difference detected in the prevalence of osteoporosis between the
Archaic and Mississippian because people in both time periods would have been working hard to get their food, albeit in different ways.

One interesting difference regarding osteoporosis that is worth mentioning has to do with differences in prevalence across age groups. Among the youngest age group included in the study, 40-49, there was a significant difference between males and females, with females exhibiting a significantly higher prevalence of osteoporosis. However, there were no differences between males and females in the 50-59 and 60-69 age categories. It seems from these data that after the age of 50 men were catching up to women in regards to the prevalence of osteoporosis. By the oldest age category men and women were suffering from osteoporosis equally. The onset of this disease was simply earlier in women than in men.

The analysis of osteoarthritis also provides some interesting differences between the samples. With regards to the prevalence of osteoarthritis, there was a difference between time periods for four of the nine joints examined. Osteoarthritis of the elbow, wrist, and cervical and thoracic vertebrae was found to be significantly more prevalent among the Archaic sample than the Mississippian sample. These results go against the stated hypothesis, that osteoarthritis will be more prevalent in the Mississippian than the Archaic. This is interesting, but it should be noted here that sampling error and small sample size could be a factor. Furthermore, the only significant differences were found in joints of the wrist and elbow of the upper limb and the cervical and thoracic vertebrae in the superior portion of the spinal column, suggesting that people living in the Archaic were doing something very different with their upper bodies than their Mississippian counterparts. In particular, when males and females were compared for osteoarthritis prevalence by time period, females had more osteoarthritis of the elbow than males during the Archaic, but during the Mississippian there was no difference between the sexes. This
points to the fact that different activities were being performed by females during the Archaic period that involved the elbow. It is surprising that there was not a similar trend in the Mississippian period when females were supposedly grinding corn, but this inconsistency may be explained by the tools used for grinding. From ethnographic sources it is known that historic Southeastern groups were using large wooden mortars for processing corn (Swanton 1911:74, 346). Perhaps during the Archaic women were grinding food with a sandstone slab, and the horizontal pushing and pulling of stones would have a greater affect on their elbow joints. Similarly, when osteoarthritis of the cervical vertebrae was compared looking at males and females separately it was found that males had a significantly higher prevalence during the Archaic than during the Mississippian, but there was no difference for females. This suggests that Archaic males were engaged in more load-bearing activities than Mississippian males, which is a surprising finding because the Mississippian sample comes from Moundville. It would be expected that a population involved in the building of massive earthen structures like the mounds at Moundville would exhibit evidence of extreme load-bearing activities. While Moundvillian males do exhibit osteoarthritis of the spine, it is significantly more prevalent among males in the Archaic sample from the Perry site. One explanation for this discrepancy is the time period to which most of the Moundville skeletons date. As stated earlier, most of the skeletons in the sample date to the Moundville III phase when the site was used primarily as a burial ground. Most of the mounds were built during the phases Moundville I and II, so most of the individuals included in this study would not have participated in moundbuilding.

When looking at the specific age groups it was noted that differences in the prevalence of osteoarthritis were present when analyzing on the basis of presence and absence. Osteoarthritis of the shoulder was significantly higher in individuals aged 60-69 when compared to individuals
aged 40-49 but not individuals aged 50-59. This is not surprising because osteoarthritis becomes more prevalent and severe as individuals age, and the shoulder is one of the joints most closely associated with aging. However, that being the case, it would be expected to find a significant difference by age in the other joints as well, like the hip which is also closely associated with age. Obviously, there is something different going on with the shoulder. Perhaps overuse of the shoulder joint continued well into old age, more so than the other joints. This could point to activities practiced by aged individuals. When dividing and analyzing the sample by time period, the same difference in the shoulder joint appeared, where individuals aged 60-69 were far more likely to have osteoarthritis of the shoulder than individuals aged 40-49, but this was only observed among the Archaic sample and not among the Mississippian sample. This could perhaps be due to the types of hunting technology available during the two time periods. During the Archaic period, the atlatl, or spear thrower, was the primary hunting weapon, but during the Mississippian period the most effective hunting weapon was the bow and arrow. Because the atlatl requires the use of only one arm, presumably the right arm, all of the throwing force would be directed to the right shoulder and it would be expected that the right shoulder would have greater osteoarthritis. The bow and arrow requires the use of both arms, which would reduce the force to the right shoulder by evenly distributing it through both arms. This would result in less osteoarthritis of the shoulder during the Mississippian period. The fact that osteoarthritis increases with advancing age is a testament that degeneration of the joints worsens with the accumulation of wear and tear over time.

Comparing the means of the osteoarthritis scores for each individual brought some additional differences to light concerning the severity of osteoarthritis. The mean osteoarthritis score for the Archaic time period was significantly higher than the mean score for the
Mississippian. This means that not only was osteoarthritis more prevalent during the Archaic, but it was also more severe. The prevalence of osteoarthritis in males showed no difference between time periods, but there is a difference in severity. When comparing time periods by sex, males exhibited more severe osteoarthritis in the Archaic than the individuals from the Mississippian period. However, the females showed no difference between the time periods. Again, this indicates a difference in activities between the Archaic and Mississippian, but this time concerning males. Females may have been doing similar activities in the two time periods. This could be due to a few males engaging in extremely demanding activities during the Archaic such as hunting, but during the Mississippian most males were engaging in the same types of less demanding activities.

When severity was analyzed for the individual joint scores, only one significant difference was found. Osteoarthritis of the elbow was significantly more severe during the Archaic period than during the Mississippian period. It seems that the prevalence of osteoarthritis corresponds well with the severity of osteoarthritis, at least for some joints. Again, the difference in osteoarthritis of the elbow between the two time periods likely indicates a difference in activity involving the upper limb. There may be a significant difference in the severity of osteoarthritis of other joints, but the small sample size does not allow for reliable statistical analysis. The most severe osteoarthritis for both males and females was found in the vertebral column. Females from both the Archaic and Mississippian periods had the most severe osteoarthritis in the lumbar vertebrae, followed by the cervical and thoracic. The same pattern was observed for males from the Mississippian period, but among the Archaic sample males had the most severe osteoarthritis in the cervical vertebrae, followed by the lumbar and thoracic
vertebrae. This corresponds to the significant difference that was found between Archaic and Mississippian males with regards to the severity of osteoarthritis of the cervical vertebrae.

The final difference in the severity of overall osteoarthritis was found between age groups. Similar to what was found for the prevalence of osteoarthritis, the severity of osteoarthritis was found to be significantly higher in individuals in the 60-69 age group when compared to the 40-49 age group. There was no difference when either was compared to the 50-59 age group. These results, again, would be expected because osteoarthritis becomes more severe with advancing age. However, the fact that this trend was present only for the Archaic when the time periods were analyzed separately and not for the Mississippian, and only for the females and not for the males when the sexes were analyzed separately indicates that something else was going on. Individuals in the 60-69 age category may have been engaged in some kind of physical activity during the Archaic that they were not doing in the Mississippian. This could perhaps be due to the fact that Archaic people were more mobile. The more severe osteoarthritis could be the result of a lifetime of accumulation of wear and tear. This explanation does not explain why females in the most advanced age category would have more severe osteoarthritis than males of the same age. Females of both the Archaic and Mississippian must have been engaging in activities, such as those associated with processing food, throughout their lives that resulted in more severe osteoarthritis late in life.

As for the traumatic injuries of fractures, there were no significant differences between either males and females or between the Archaic and Mississippian time periods. However, when looking at the percentages of individuals with fractures it seems that there was a decrease in fracture rate in females from 21% in the Archaic period to 8% in the Mississippian period. The fracture rate in males stayed about the same, going from 27% in the Archaic to 20% in the
Mississippian. The equal numbers of males and females with fractures in the Archaic indicates that both sexes were about equally exposed to traumatic injury. The decrease in fracture rate among females from the Archaic period to the Mississippian period suggests that women were at less risk of trauma with the introduction of agriculture, while men’s risk remained the same. This could be due to women doing less work where they would be at risk of accidental injury, but more likely it reflects the increase in conflict and warfare with men being expected to fight. Another explanation considers how women were regarded in prehistoric society. For example, if it was standard practice during the Mississippian period to capture women and adopt them into conquering societies, then it would make little sense to injure them. However, if during the Archaic period the captivity of women was not an issue, then it is more likely that they would have fought along side the men to protect life and limb and, in the process, suffer similar injuries.
CHAPTER 6
CONCLUSION

One of the primary goals in anthropology is to attempt to understand how humans have changed both physically and culturally as they have gone through major transformations. One such transformation, and the one of interest in this study, was the transition from a hunting-and-gathering way of life to an agricultural existence. This change was marked with a decline in health, poorer nutrition, and an increase in violent conflict. Evidence for other changes is less clear. Previous studies in the Southeastern United States and other regions have found conflicting data regarding physical activity and occupational and accidental trauma. It seems likely that the various findings throughout the world indicate that the changes experienced by human groups that were influenced by the adoption of agriculture were not universal. The goal of this study was to see how the transition to agriculture affected the elderly.

The oldest segment of the population, 40 and over, has been largely overlooked in bioarchaeological studies of human physical remains. This is due to the difficulty in aging old individuals, which relies on degenerative changes in the skeleton that may not be constant between populations, or even within a single population. This problem was addressed by combining the most effective aging techniques to come up with the most accurate age estimation possible.
The ethnographic record offers some insights into the lives of the elderly. In the Southeast the elderly seem to have been treated with extreme respect and care. Old men, particularly the oldest maternal uncle of the clan, were responsible for teaching and disciplining young men and boys. Children were taught to respect the elderly at a very young age. Aged individuals often helped the community by gathering food and wood with the women and children and watched the fields and scared off destructive pests. The elderly were valued for their wisdom and knowledge, sometimes secret, of rituals, history, and legends. Not only were the elderly the ones who often told the stories and myths, they were also often prominent figures in the myths in roles of knowledge and honor. Ethnographic evidence worldwide supports the ethnographic evidence from the Southeast for good treatment of the elderly, although this may be truer for men than for women.

In studying the treatment of the elderly in the past, burials from two sites from two different time periods were compared. The Perry site, situated in northwest Alabama in the Tennessee River Valley, was primarily an Archaic site that was occupied from 6000 BC to 1000 BC by people who hunted and gathered wild resources for subsistence. The Moundville site is located in west central Alabama in the Black Warrior River Valley, and it represents the Mississippian component for this study dating from AD 1050 to AD 1650. Moundville was the economic center of a large chiefdom than subsisted primarily off of maize agriculture. The changes that occurred as a result of the transition to agriculture that were of interest in this study were explored by measuring osteoarthritis, osteoporosis, and trauma (occupational, accidental, and violent). The results show a general decrease in osteoarthritis from the Archaic to the Mississippian periods in the elbow, wrist, and cervical and thoracic vertebrae, as well as a decrease in the average total osteoarthritis score for each individual. This shows that the work
load in the Mississippian was probably less physically demanding overall than in the Archaic. The hypothesis that the elderly in the Mississippian would demonstrate evidence of a more physically demanding lifestyle than the elderly in the Archaic was rejected. A possible explanation for this is the small sample size, particularly of the Mississippian sample. Other significant differences concerned the prevalence of osteoarthritis between age groups, which was significantly higher in the oldest age category, and the prevalence of osteoporosis, which was significantly higher among females than males. Both of these results were expected based solely on normal human biological processes. Finally, there was a difference in the rate of fracture for females between the two time periods, with females in the Archaic sample having a higher incidence of fracture than females in the Mississippian sample. Fracture rate among men stayed about the same, indicating that men continued to be at high risk of injury throughout both time periods.

Although some of the results were not what was expected, they do show that different activities were being practiced during the two time periods. More information is needed to fully explain exactly what those differences entailed, but it is clear that they affected the elderly as dramatically as any other age category. Further research that can take advantage of a larger sample is the obvious first step. It should be tested whether there truly was a decrease in physical activity among the elderly with the introduction of agriculture as this study has found, or if these results were simply caused by the small sample size that was available. The region of interest may need to be expanded in order to achieve a large enough sample by including additional sites from Alabama and, perhaps, other parts of the Southeast as well. Finally, future research should take advantage of greater technology, such as radiography when evaluating fractures and other trauma and histomorphometry for testing osteoporosis. Other even more
accurate means of testing may be available in the future, and these, too, should be used at their full advantage. These are just a few suggestions for future research with the hopes of more clearly illuminating the lives of the elderly in the past.
REFERENCES CITED


