Final Report on Archaeological Burial Recovery at Pepper Hill I Cemetery, 22LO998, Lowndes County, Mississippi

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February 13, 2006
ACKNOWLEDGEMENTS

The authors would like to acknowledge all of those who contributed to the execution and completion of this research project. We would like to thank everyone at the Weyerhaeuser Pulp and Paper Plant in Columbus, Mississippi for their support from the initiation of the fieldwork through the completion of this report. Mike White and Andy Sweatt of Weyerhaeuser were especially helpful and deserve special thanks. Mike was dedicated from the beginning to making sure that all appropriate measures were taken to mitigate further damage to the cemetery, and Andy faithfully checked on us each day to make sure we had everything we needed. Tommy Womack, of Hill Bros., Inc., also deserves special thanks for doing a superb job of operating the small excavator for us. Mrs. Hattie Blair provided invaluable information regarding the history of Pepper Hill I cemetery, most notably its name and the church it was associated with.

The assistance of William Adams, Jack Elliott, Elaine Nichols, Charles Orser, Stanley South and Michael Trinkley, in obtaining reference materials is greatly appreciated. We wish to thank Pamela Edwards and David Abbott, Mississippi Department of Archives and History, for their assistance especially with interpreting the Mississippi burial laws.

Our dedicated field crew also deserves thanks for all their hard work. They include Robert McCain, Jason Edmonds, Lacey Culpepper, and Taft Alford. Taft also deserves thanks for his hard work on the burial analysis. Lorien Elmore, William McNeill, and Scott Bierly proved invaluable as laboratory assistants responsible for water screening and sorting burial fill as well as cleaning and reconstructing skeletal materials and artifacts. We are grateful to Joe Seger, Director of the Cobb Institute of Archaeology, Mississippi State University, for his support of this project.
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I. MANAGEMENT SUMMARY

This report details the results of archaeological burial recovery and analysis conducted by S. Homes Hogue (biological anthropologist) and Jeffrey Alvey (archaeologist), Cobb Institute of Archaeology, Mississippi State University for the Weyerhaeuser Pulp and Paper Plant in Lowndes County, Mississippi. The project was funded by Weyerhaeuser, Inc., and was necessitated due to the identification of a Historic Period cemetery (Pepper Hill I - 22LO998) on June 7, 2005 when human skeletal remains were discovered during the excavation of a water-line ditch at the Weyerhaeuser plant (Figures 1 and 2). After the initial discovery of human remains the authors began fieldwork on June 27, 2005 to recover the exposed burials and other disturbed human remains. Five individuals were recovered by this work, which was reported in Hogue and Alvey (2005a). When the burials were first identified by Weyerhaeuser employees construction efforts had already removed almost all of the soil in the area down to the clay subsoil. Evidence for another episode of significant landscape alteration was found during archaeological investigations. A strata of fill composed of crushed asphalt was discovered approximately 10-20 cm above the level at which most of the burials were located. It is believed that this second episode of land alteration occurred during the initial construction of the Weyerhaeuser plant in the late 1970s, and it is possible that many other burials were disturbed during this time.

Due to the likelihood that other burials were located in the area Dr. S. Homes Hogue monitored further construction efforts. During monitoring other burials were soon revealed. Removal of the newly discovered burials commenced on Monday, August 8, 2005 and fieldwork was completed on August 19, 2005.
Figure 1. Map showing the location of site 22LO998 in the Black Prairie physiographic region, Lowndes County, Mississippi.
Figure 2. U.S.G.S. 15' Columbus, MS, topographic quadrangle (1960). Site 22LO998 is located approximately 3 miles west of the Tombigbee River.
Figure 3. Site map showing the locations of Burials and Features.
Dr. Hogue, Jeffrey Alvey, and field-crew members Robert McCain, Jason Edmonds, Lacey Culpepper, and Taft Alford conducted the fieldwork at 22LO998. A preliminary report was submitted to Weyerhaeuser and the Mississippi Department of Archives and History reporting on the initial findings of the burial recovery (Hogue and Alvey 2005b). A total of 17 burials were recovered during the cemetery mitigation (Figure 3).

In August 2005, Weyerhaeuser executives were contacted by Mrs. Hattie Blair of Columbus, Mississippi. Mrs. Blair revealed that she had been a previous resident of the community that once existed near the cemetery. After the discovery that Mrs. Blair was familiar with the cemetery she was contacted by Jeffrey Alvey for an interview. Mrs. Blair revealed that the burials were part of an African American cemetery that was once associated with Pepper Hill MB Church, which was located on Lindsey Ferry Road approximately 1 ½ miles northwest of the cemetery. A visit to the church by Jeffrey Alvey in November 2005 revealed that the church building was still standing; however, the church was no longer active and appears to have closed around the year 2000. Mrs. Blair stated that the church members had used the old cemetery (22LO998) from the late nineteenth century until 1956 when they were able to purchase land nearer to the church building. The new cemetery was located directly across the road from the church. At present, eight graves are marked in the more recent Pepper Hill MB cemetery. The headstones date from 1956-1998 confirming Mrs. Blair’s recollection of the Weyerhaeuser cemetery abandonment.

This report also provides the results of cultural/historical background research, which was intended to provide the cultural context for the population interred at site 22LO998,
or as it will be referred to in this report, Pepper Hill I cemetery, and analysis of the skeletal and cultural materials recovered from the burials. The following research questions were used to guide site excavation and the analysis of the recovered human remains.

1. What burial behavior is associated with the site? Does the site represent single interments in a cemetery or one multiple interment? Were the individuals interred in coffins or simple pits?
2. Are there other intact deposits in the undisturbed area?
3. How many individuals are represented?
4. What are the demographic parameters, stature, pathologies, and other physical conditions of the individuals recovered from the site?
5. What is the ethnic affiliation of the group?
6. When did the burial(s) take place? Or, when does the site date to?
7. How does this population/site compare with other similar groups/sites in the region?

Based on the research presented in this report the authors provide the following recommendations to guide future efforts associated with this project, and others similar to it:

1. Weyerhaeuser should take fiscal responsibility for reburying the remains and associated artifacts recovered from the Pepper Hill cemetery. This could take place on Weyerhaeuser property or contacts could be made with local churches, etc. This event should involve the public as much as possible.

2. The Mississippi Department of Archives and History should provide mandatory workshops for coroners throughout the state which should include in-depth educational programs on burial laws and protecting archaeological sites.

3. The Mississippi Department of Archives and History should begin legislation to protect all unmarked graves and cemeteries in the state. Existing burial legislation is ambiguous and difficult to interpret.
II. FIELD METHODS

This chapter provides a summary of the field methods employed to document and excavate the human remains discovered at the Pepper Hill I cemetery. Field investigations were divided into two phases, one beginning on June 27, 2005 and a second on August 8, 2005. On June 27, 2005 the authors began fieldwork aimed at recovering the human remains disturbed during construction and locating other burials in the area. A 1 x 1 meter square grid based on a single vertical control point was established across the site to provide spatial control for the excavation and assist in mapping *in situ* human remains, features, and associated artifacts. Field investigations revealed five separate areas containing skeletal remains. These areas, designated as Burials 2, 3, 4, and 5 contained human remains still *in situ*, although none were completely preserved and undisturbed. Identified burials and skeletal elements were cleaned and excavated using small-hand tools and brushes. Before removal each burial was photographed in black and white, color slide, and digital format and drawn to scale (Figure 4). Soil color was recorded using Munsell soil color charts. No in-field consolidants were used to preserve the skeletal elements as these can create problems during cleaning and reconstructing. A general surface collection was conducted over the site to recover skeletal elements and fragments disturbed by construction. Upon removal, all deposits and human remains were taken to the Cobb Institute of Archaeology for processing and analysis. Further testing of the site using a ¾” soil probe was conducted to identify additional burials. This method yielded no evidence for additional burials in the immediate area (Hogue and Alvey 2005a).
The report that followed this phase of burial recovery recommended that Weyerhaeuser either “greenspace” the area still undisturbed or have a qualified biological anthropologist or archaeologist present if construction activities were to continue (Hogue and Alvey 2005a). The Mississippi Department of Archives and History (MDAH) concurred with these recommendations.

Since the construction of an off-loading timber crane necessitated the area be paved, Weyerhaeuser officials had no choice but to continue construction. The Pepper Hill I cemetery site was visited on August 2, 2005 by Dr. S. Homes Hogue (biological anthropologists) to monitor further disturbance in the vicinity east of the burial location. A large excavator provided by Weyerhaeuser was employed to strip the site to locate burials. This effort led to the discovery of two additional burials and construction activities were again halted. MDAH personnel were contacted with a plan to leave the
area of the burials undisturbed and commence construction above them. MDAH responded that based on Mississippi law 97-29-25, *Desecration of cemetery; desecration of human corpse*, building above the undisturbed burials could be seen as cemetery desecration and provided Weyerhaeuser with two options. One option involved a professional survey and subsequent documentation of the cemetery’s legal boundary. The designated area would then be “green-spaced” and preserved as a natural area. The second option was to locate and remove the burials so that construction could proceed without having to address the legal restrictions protecting a cemetery (Hogue and Alvey 2005b). Since the area in question had to be disturbed to complete the construction project, Weyerhaeuser officials chose the second option.

On August 8, 2005 the second excavation phase commenced. A small excavator (Figure 5) supplied by Weyerhaeuser was used to strip a 45 x 45 meter area. This size excavator enabled ground removal to be controlled at six-inch levels, reducing burial damage and ensuring more accurate burial identification and recovery. Burials were identified by the presence of coffin wood, nails, artifacts, and obvious stains (Figure 6). During this second excavation phase, Burials 6 through 16 were discovered along with three features (Hogue and Alvey 2005b). One of the features, Feature 1, was determined to contain human remains during laboratory analysis and relabeled Burial 17. Features 2 and 3 have since been identified as coffin remnants and nails belonging to disturbed burials with no human remains present.
Figure 5. Small excavator used to strip area during the August excavations.

Figure 6. Crew members Taft Alford (left) and Lacey Culpepper (right) recording the dark rectangular pit stain associated with Burial 15. The stain was encountered during stripping.
Burials were uncovered and removed using the methods described earlier. All Burial fill was bagged and labeled for later water screening through $\frac{1}{4}$ and $\frac{1}{16}$ inch screen. Deposits and human remains recovered during the Weyerhaeuser project were processed at the Cobb Institute of Archaeology, Mississippi State University (Hogue and Alvey 2005a, 2005b).
III. CULTURAL BACKGROUND

Because of their position as second class citizens in the antebellum (1790-1860) and postbellum (1870-1920) South little concern was given to documenting the cultural environment of African Americans until well into the twentieth century. Indeed, the notion of “African American history” did not gain real momentum until after the period of the Civil Rights Movement. Interest in African American history and archaeology has certainly increased over the past few decades; however, the antebellum period has received a disproportionate amount of the attention. This is certainly true in archaeology where “Slave” archaeology has become increasingly prominent within the scope of Historical Archaeology. In contrast, relatively little research has focused on the postbellum period when African American communities in the South were faced with the task of modifying long-held cultural strategies to adapt to the new social environment created by the Civil War and the Thirteenth Amendment to the Constitution. Indeed, only at two Southern postbellum plantations, Millwood Plantation in Abbeville County, South Carolina (Orser et al. 1982) and Waverly Plantation in Clay County, Mississippi (Adams 1980) have postbellum occupations been subjected to extensive archaeological investigation.

Rathbun and Steckel’s (2002: 209) assessment that the disproportionate interest in the period of slavery is the “result of scholarly interest that was defined by the legacy of the debate over slavery and abolition” is undoubtedly a correct one. However, it is likely that neglect of the post-emancipation period also derives from the unfortunately common tendency among archaeologists and historians to focus their research interests on the
extraordinary rather than the ordinary. This is an especially unfortunate tendency in archaeology since it is the “ordinary” people who have done most of the living and dying in past societies, and whose “ordinary” efforts have produced much of the archaeological record that we now have access to. Indeed, the neglect of the ordinary produces a severely biased understanding of the past.

Despite its relative neglect, some understanding of the Southern postbellum period in African American history has been developed through the research of historians, geographers, sociologists, anthropologists and archaeologists (e.g., Adams 1980; Adams and Smith 1985; Aiken 1985; Atkinson and Turner 1987; Bybee 2003; Dirks and Duran 2001; Doster and Weaver 1981; Kern et al. 1982, 1983; Loewen and Sallis 1974; Orser 1991; Orser et al. 1982; Smith 1991; Weaver and Doster 1982, etc.). From this research, conducted in Mississippi and other parts of the South, it is possible to piece together an environmental and cultural backdrop for the lives of those individuals whose remains were recovered from the Pepper Hill I cemetery. This research component was considered to be of great importance by the authors since very few reports on the archaeological excavation of historic African American cemeteries are accompanied by substantial research on the cultural backdrop of these communities. Undoubtedly, this situation has primarily resulted from the pressures of salvage excavations. Whatever the reasons may be, however, it is imperative that this deficiency is remedied since no single site can be sufficiently understood without some knowledge of its cultural context.
Settlement

A Population History of Southern African Americans

Although the political and economic changes of the postbellum period brought African Americans more freedom and opportunities, demographic parameters of the antebellum period tended to persist. There were roughly four million slaves in the South in 1860, with the bulk concentrated in the plantation regions of Mississippi, Alabama, Georgia, South Carolina, and Louisiana (Tolnay 1999: 5). During the late nineteenth and early twentieth centuries the African American community remained heavily concentrated in the southern states. The South held 89 percent of African Americans in 1910, and 79 percent of them were rural (Aiken 1985: 383). This situation clearly derives from the region’s legacy of plantation slavery, which first concentrated African American populations in the region, and the oppressive economic systems of sharecropping and farm tenancy that kept African Americans tied to the land because of debts owed to land owners and other creditors. This vicious cycle kept African Americans impoverished, and as a result made land ownership an unlikely goal.

African Americans did move in substantial numbers after the Civil War, but their movements were usually confined to short distances and were most often associated with the search for relatives or a better landlord (Steckel 2000: 464). Rare circumstances such as the political environment of Beaufort and Colleton counties, South Carolina, where African Americans were given the opportunity to acquire land and work in the phosphate industry, did compel many African Americans to move great distances from their counties or states of birth (Steckel 2000: 464). These rare situations were undoubtedly
appealing to Southern African Americans who were politically disenfranchised by the Black Codes and the general state of the Jim Crow South.

During the period of World War I (1914-1919), the geographic concentration of African Americans substantially declined. This decline resulted from the push factors associated with the devastation of the southern cotton economy by boll weevils, failing soils, foreign competitors, and serious floods that dramatically reduced the demand for farm tenants, and pull factors associated with the growth in demand for labor surrounding World War I that pulled African Americans to the industrial centers of the North (Boyd 2005: 405; Steckel 2000: 466). The attractiveness of starting a new and better life in the North led to the beginning of the Great Migration in 1915 when millions of African Americans migrated to northern states where the Industrial Revolution was producing a booming job market that provided wages more than twice what African Americans could get in the South (Boyd 2005: 406; Steckel 2000: 461, 466).

Employment opportunities were only one of the attractions that urban areas held for African Americans. These areas also provided a more fluid and less oppressive social climate than the one found under the Jim Crow laws of the South. Also, the fact that the offices of the Freedmen’s Bureau were all located in urban areas undoubtedly added to the appeal of city life (Steckel 2000: 464). Steckel (2000: 466) reports that between 1870 and 1910 the share of African Americans living in urban areas increased by 132 percent, whereas it increased only 78 percent for the U.S. population as a whole. During the period of 1910 to 1920 the cotton-belt states lost more than 500,000 African Americans, and in the 1920s the rate of outflow had increased to 800,000 (Steckel 2000: 464).
At the onset of the Great Depression other factors such as foreclosures and the mechanization of agriculture were forcing African Americans towards alternative modes of subsistence. One important factor that contributed to the diminishing population of African American farmers was the New Deal policy known as the Agricultural Adjustment Act (Boyd 2005: 406). This policy led to the withdrawal of land from cultivation with the goal of boosting the prices of cotton, tobacco, and sugar. Although the price supports helped the large-scale farm owners they forced many tenant farmers from their positions.

Despite these forces, by the end of the Great Depression 75 percent of all African Americans still resided in the South, primarily in the Black Belt physiographic region of Mississippi, Alabama, Georgia, and South Carolina (Farley and Allen 1987: 105). The decision by so many African Americans to stay in the South appears to derive from a complex set of interrelated factors including personal circumstances, poor education and a lack of knowledge of distant labor markets, the passing of strict vagrancy laws meant to keep African-Americans on the plantation, and a widespread lack of training for anything other than plantation agriculture (Orser 1991: 46; Steckel 2000: 464).

African American Settlement Patterning in the South

Antebellum Patterns

Aiken (1985: 386) notes that the general settlement pattern for African Americans in the antebellum South was one in which slaves’ houses were constructed close together in a nucleus. On plantations with small slaveholdings there were usually a cluster of two or three houses near the owner’s residence. The arrangement of dwellings in definite patterns was common on plantations with large slaveholdings. Houses were often
constructed in a row, which frequently was behind or to one side of the owner’s residence. The largest planters built their numerous slave dwellings on “streets” to form what appeared to be villages or small towns. The most common form was a single street with houses on both sides. Because owners of large plantations often employed overseers, slave quarters were sometimes built great distances from the owner’s house.

By the end of slavery the construction of slave dwellings had become quite standardized. Most were single-pen and double-pen cabins with slight architectural variations. Most often, single-pen houses were occupied by one family and double-pens by two. On some plantations single men and women, and even families, were housed in long buildings divided into three or more compartments. However, the most common house recommended by planters was a single-pen, 16 by 18 feet (Breeden 1980: 118-121). These were constructed of either logs or boards and usually set about two feet off the ground. Dwellings were to be built in a row from 50 to more than 200 feet apart. If a double row of houses were constructed, the street was to be 100 to 200 feet wide. The houses were to have brick or stone chimneys, and, if log, were to be chinked on the outside and sealed on the inside.

It should be noted, however, that despite the attempts by some planters to standardize slave housing, the condition of slave houses varied greatly throughout space and time. At one extreme was a small group of slaves who enjoyed better housing. House servants on large plantations often lived in multiroom frame or brick dwellings with plastered walls. However, most African-Americans lived closer to the other extreme of unchinked, windowless, single-pen shacks with dirt floors and clay and stick chimneys. But whatever the condition of the slave houses, across the plantation regions
most of the dwellings were clustered in hamlets that dotted the landscape (Aiken 1985: 387).

Postbellum Patterns

The era from the 1880s until after World War II was characterized by a dispersed settlement pattern that rapidly superseded the nucleated pattern of the antebellum period. This change is well illustrated in Figure 7, which shows how the African American settlement pattern was altered on David Barrow’s Georgia plantation from 1860 to 1881 (Barrow 1881: 832-833). Although many planters tried to continue to work their plantations with groups of wage laborers who lived in hamlets on the plantation, the system was resisted by the former slaves. Instead, a new system evolved in which each African American family was given a tract of the plantation to work for a share of the crops, and upon this tract a residence was erected for the family. Aiken (1985: 390) characterizes this new dispersed settlement pattern as a “spatial expression of freedom.”

With the growth of tenancy, “country stores” emerged that sold farmers basic food and clothing on credit and took liens on unharvested crops as security. These stores replaced the slave owner’s residence as the primary source for obtaining material goods. This shift from a dependence upon the owners’ residence during slavery, to a dependence upon the local country store also affected postbellum African American settlement patterns as crossroad hamlets and small towns emerged around the locations of these merchants’ stores. Footpaths, not roads, most often connected African American residences to one another, as well as to the land owner’s residence and to the local country store (Aiken 1985: 392).
Branson (1923: 216) notes in his study of farm tenancy in Chatham County, North Carolina that, “The farmers are settled in solitary dwellings (only three to the square mile) as almost everywhere else in the rural South. The thirteen roadside stores, the ten schools, and the twelve churches are the centers of country neighborhood life for whites and blacks alike.”

Along with dispersed dwellings, two other expressions of African American freedom appeared on the landscape, churches and schools. With emancipation African Americans quickly began to organize their own churches which were given names such
as Liberty, Fredonia, New Canaan, and Promised Land that symbolized their new found hopes and freedoms. Schools were often built in conjunction with churches and sometimes occupied the same buildings. These structures were usually erected on some portion of the plantation worked by the community for whom the structures were built. David Barrow provided a lot at the corner of his plantation for the construction of a church and schoolhouse (Figure 7) (Aiken 1985: 391-392).

The settlement pattern of African-American communities, characterized as small, self-contained and isolated, that emerged during the early years of the postbellum period would not change substantially until well into the mid-twentieth century.

Settlement Patterning in the Tombigbee Drainage

Evidence for African American settlement patterns in the Tombigbee Drainage Area comes from the Sharpley’s Bottom community in Monroe County, Mississippi, which is approximately 25 miles north of the Pepper Hill I cemetery (Kern et al. 1983). This community lived on plantation land owned by Needham Whitfield, who was the first planter to work the tract later known as Sharpley’s Bottom.

Mirroring the settlement pattern changes that occurred throughout the South, the primary settlement change evidenced in the African American community in Sharpley’s Bottom was the change from aggregated slave residences with centralized support facilities to dispersed tenant residences with accompanying secondary support facilities. Primary support facilities remained centralized. Kern et al. (1983: 27) define primary support facilities as “those structures instrumental in the production and distribution of the cash crop and the maintenance of the tenancy or plantation: cotton gin, gin house, corn mill, blacksmith shop, mule barns, commissary, etc.” Secondary support facilities
were defined as “those structures provided for the purpose of benefiting the tenants: hog pen, chicken house, etc.” (Kern et al. 1983: 27). Settlement in Sharpley’s Bottom also modified the landscape with the construction of roads, wells, drainage ditches, a levee, and a boat landing.

**Tenant Housing**

Although little information about tenant housing exists for the period of 1865 to 1925, an abundance of information exists from the years of 1925 to 1941. This period represents a time when American society began to recognize the significance of tenancy as a social problem. In response to this problem, considerable research was conducted by sociologists who often focused on tenant housing due to its effectiveness as a physical symbol of the inadequacies of tenancy. Most notable among the sociological studies produced during this period is Rupert B. Vance’s (1936) *How the Other Half Is Housed*, which provides a pictorial survey of tenant housing in the South.

One important source that fills in some of the gaps in information about tenant housing before 1925 is Atwater and Woods (1897). In their study of African American dietary patterns in Tuskegee, Alabama they also provided descriptions of the tenant dwellings they encountered during their fieldwork. The most common forms noted by Atwater and Woods (1897: 16-17) were small one-room houses, and larger two-room, dog trot houses. Both kinds were characterized as log dwellings with simple shingle or board roofs. Many of the houses were built with spaces between the logs while others were chinked with earth or boards. The windows in these houses were usually covered with boards rather than glass.
The one-room cabins were built with a single door, a fireplace on one side, and
one or two windows. Sometimes a small storeroom was attached to the main building.
The two-room cabin was a typical dog-trot house with one room used as a combination
kitchen and living room, and the other as a bedroom. The open, central passage was used
as a porch. These two architectural forms persisted into the early twentieth century even
when wood frame dwellings replaced log cabins as the more common method of
construction (Figures 8 through 13).

By 1928 it appears that tenant housing had somewhat improved. Dickins (1928:
5) notes in her study from the Mississippi Delta that the descriptions of tenant housing
from the Atwater and Woods study “do not picture conditions as they now exist” and “In
fact, many changes have been made since the Atwater studies.” Dickins (1928: 9) notes:

“On the Delta plantation the one-room cabin is not in evidence. It disappeared many years ago.
Where it once stood, rests a house containing, usually three rooms, two bedrooms and a kitchen.
A number of homes are painted, but the majority are white-washed. Practically every home has
a few flowers, though often, only castor plants or sunflowers. In the competition for labor, the
laborer’s homes are being constantly improved.”

Dickins describes the interiors of the homes as containing only the furniture that the
tenants could not do without, such as beds, chairs (usually not more than four), and
occasionally a dresser or wash-stand. The wall interiors were often covered with
newspapers that had been pasted to the walls. Floor coverings were rare with only a few
rugs made from discarded clothing. All windows had some kind of curtains. In the
kitchen, where the food was prepared and eaten, there were generally a stove, a table, a
few chairs, and several shelves on which dishes and utensils were kept.
Figure 8. Abandoned tenant house on a mechanized plantation of the Mississippi Delta, 1937. Source: [Library of Congress 1998 (Call Number: LC-USF34-017128-C)].

Figure 9. Dog-trot house inhabited by an African-American tenant farmer in Montgomery County, Georgia, 1937. Source: [Library of Congress 1998 (Call Number: LC-USF34-025451-D)].
Figure 10. Tenant houses on cotton plantation, Rolling Fork, Mississippi, 1940. Source: [Library of Congress 1998 (Call Number: LC-USF34-053771-D)].

Figure 11. Tenant farmer house with mud chimney, Melrose, Natchitoches Parish, Louisiana, 1940. Source: [Library of Congress 1998 (Call Number: LC-USF34-054807-D)].
Figure 12. Porch of African American tenant house, showing household equipment, Person County, North Carolina, 1939. Source: [Library of Congress 1998 (Call Number: LC-USF34-020128-E)].

Figure 13. Row of tenant houses on plantation near Montezuma, Georgia, 1939. Source: [Library of Congress 1998 (Call Number: LC-USF34-051732-D)].
Subsistence

Economic Strategies

With emancipation came the replacement of slavery with free labor. Plantation agriculture could no longer depend upon the masses of inexpensive and dependable labor that slavery provided. Despite their new found “freedom,” former slaves still found themselves bound to the plantation system and the balance of power still dramatically tilted in favor of the plantation owners. The only real currency former slaves had in this power struggle derived from their former slave-owners’ need for their labor and knowledge of the land, and their ability to withhold that labor.

The new economic model that developed under the depressed postbellum conditions of the South perpetuated a prejudiced economic environment in which African American laborers were compelled towards one of three unfavorable subsistence strategies: wage labor, sharecropping, or tenant farming. These three modes of subsistence represented the rungs on what was referred to as the “Southern Agricultural Ladder” (Alston and Kauffman 1997: 464). This phrase was used to refer to the hierarchy of those engaged in agriculture ranging from wage laborers (at the bottom) to plantation owners (at the top). The metaphor was meant to illustrate the way in which individuals or families could climb out of their low social and economic status into a better life than the one they found themselves in. Unfortunately, African Americans found the ascent virtually impossible due to the social mores and laws of the Jim Crow South instituted for the purpose of limiting their upward mobility.
Wage Labor

Wage labor was structured very similarly to the antebellum gang system (Kern et al. 1983: 11). Under this system, former slaves worked under the specifications of a signed, legally binding labor contract designed to keep them tied to the plantations (Orser 1991: 41). These contracts established a new system of oppression that among other things set the length of the workday, established a schedule of docking pay for tardiness and insubordination, and required the landlord’s permission in order to leave the plantation (Orser 1991: 41). Despite receiving a wage for their work, African American laborers were still under the direct supervision of plantation owners and still oppressed by the prejudiced attitudes, habits, and practices of generations that could not be changed as swiftly as laws. The similarity to the old plantation system, along with a number of other factors, made wage labor a less than appealing option for African Americans. The system of wage labor was also unattractive to many plantation owners who despite ample land were generally without funds to pay laborers (U.S. Special Committee on Farm Tenancy 1937: 43). Instability in the system, because of its dependence upon the unpredictable labor of migratory workers, also made it a less than effective economic strategy for landowners (U.S. Special Committee on Farm Tenancy 1937: 43). The failures of the wage labor system in the South led to its eventual replacement with sharecropping as the primary economic strategy operating in the region. However, during the period of 1910 to 1940 the proportion of African Americans who were wage laborers rose by 42 percent due to the effects of farm mechanization, which caused landowners to prefer wage workers in combination with improved machinery rather than tenants to farm their land (Tolnoy 1999: 14). In 1916, the U.S. Department of Commerce
(1916: 7) reported that there were still several thousand plantations in the South operating by wage labor.

**Sharecropping**

With the establishment of new crop lien laws during the postbellum period American sharecropping was born (Adams and Smith 1985: 311). This system, which was sought first by African Americans, provided a better alternative for plantation owners as it more permanently attached African American laborers to the land; thereby, providing a more stable labor force (Orser 1991: 41). Under sharecropping, African American laborers were employed to cultivate specific land holdings that were created by sub-dividing plantations into smaller tracts commonly called “parcels” or “cuts” (U.S. Department of Commerce 1916: 7). Formal contracts were often made between the laborers and landlords, who furnished not only the land, but also a house and the teams of animals and implements that were required to farm the land (Loewen and Sallis 1974: 203). The sharecropper provided only his labor. The fee paid by the laborer for renting all the above was usually half the crop, although agreements did vary (Loewen and Sallis 1974: 203). Driven by a desire for independence from landowner supervision many African American laborers found the economic arrangement of sharecropping more appealing since it offered some degree of independence and an agricultural return on their labor. However, the sharecropping system still managed considerable oppression due to the recognition by Southern courts that sharecroppers did not own their crops; therefore, by law, sharecroppers were really only wage workers who received crops rather than cash (Orser 1991: 43).
Tenant Farming

In many parts of the South, tenancy eventually replaced the sharecropping system as the primary economic arrangement between laborers and landowners. Generally speaking, farm tenancy was a renting system whereby the tenant furnished the equipment, animals, and labor required to farm the land, and paid the landowner rent in the form of cash or most often a portion of his crop (Adams and Smith 1985: 311; Orser 1991: 45). This system did produce instances in which tenants made profits in some years; however, these years were undoubtedly balanced out by lean years (U.S. Special Committee on Farm Tenancy 1937: 43). The tenant farming community was able to remain stable in many parts of the South due to the fact that landlords would often provide for the tenants in bad years to ensure an available labor force (Adams and Smith 1985: 311). In fact, furnishing their tenants proved to be a major source of income for many landlords and a major source of debt for laborers (Orser 1991: 45).

Despite the unappealing nature of tenant farming, in many cases this option did provide African Americans less supervision from landowners enabling them moderate but increasing degrees of independence. This was especially true in the North where owners ordinarily exercised little control over their tenants (U.S. Department of Commerce 1916: 7). In the South, however, the plantation as a unit for administration did not disappear, and in many cases tenants were subjected to complete supervision by the owner, general lessee, or hired manager (U.S. Department of Commerce 1916: 7).

It should also be noted that despite the highly prejudiced environment in which they found themselves not all southern African Americans were sharecroppers or tenant farmers during the postbellum period. During the late-nineteenth century, between 20
and 25 percent of African American farmers owned their land (Tolnay 1999: 12). This is an impressive figure considering all the obstacles to land ownership faced by African Americans.

**Dietary Patterning**

In contrast to other aspects of postbellum African American culture of which little is known, considerable information is available concerning the dietary patterns of African Americans at the turn of the century. Anecdotal information about the dietary habits of various groups can be found in a variety of sources including cookbooks, memoirs, and diaries. The systematic collection of information appears to have begun around 1880 when chemists became interested in nutritional requirements and how much food people consumed. During the late nineteenth and early twentieth centuries a number of government studies were conducted throughout the country. Most notable are four projects that were conducted in the South, one in Tuskegee, Alabama (Atwater and Woods 1897), two in some of the eastern counties of Virginia (Bevier 1899; Frissell 1899), and one in four counties of the Yazoo-Mississippi Delta (Dickins 1928). These studies examined the dietary habits of African Americans, although comparisons were often made to other ethnic groups, especially “whites.”

Dirks and Duran (2001) provide an excellent analysis of the information collected from the studies in Alabama and Virginia, which provides a more modern treatment of the data. Dietary profiles from the Alabama and Virginia studies will be presented based upon the model used by Dirks and Duran (2001: 1882), which represents a diet as consisting of three sectors: a primary core, a secondary core, and a periphery. Inclusion into the three sectors was determined arbitrarily by defining primary foods as those
consumed more than 50 percent of the time, secondary foods are those eaten 50 percent
to 25 percent of the time, and peripheral foods are those eaten less than 25 percent of the
time. The primary core tended to include the most basic or most commonly consumed
foods. The secondary core covered foods that tended to be more recent additions to the
diet such as foods that had gained in popularity because of expanding markets in the
region. Peripheral foods consisted of novel products and luxury foods that were not
commonly purchased.

The Tuskegee Study

The Tuskegee study was conducted in Alabama from the spring of 1895 until the
spring of 1896 by W. O. Atwater, head of the USDA’s Office of Experiment Stations
(OES). The study was associated with the Tuskegee Normal and Industrial Institute due
to the Institute’s good standing with the African American community. The Institute’s
farm manager recruited subjects, enlisting 18 families in all. The families selected for
study included mostly tenant farmers and plantation workers who were meant to be
typical of most African American families inhabiting the Black Belt region. Some of the
families, however, worked at the Institute. Table 1 below, which provides the dietary
profile for the Tuskegee families, was taken from Dirks and Duran (2001: 1883).

<table>
<thead>
<tr>
<th></th>
<th>Meat and Dairy</th>
<th>Grains and Beans</th>
<th>Fats, Sugars, Oil, and Starches</th>
<th>Roots and Tubers</th>
<th>Other Vegetables</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary core</td>
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<tr>
<td>Secondary core</td>
<td>Pork ²,³</td>
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<td></td>
</tr>
<tr>
<td>Periphery</td>
<td>Eggs</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Rice</td>
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</tbody>
</table>

Table 1: Typical annual diet, Tuskegee, 1895-1896

¹ Excludes families associated with the Tuskegee Institute.
Based on the study, Dirks and Duran (2001: 1882) identify the staple foods as cornmeal, molasses, and fat salt pork, with bacon being the most popular form of pork. In fact, among the families the term “meat” referred only to fat pork. Only a few instances were recorded of families consuming fresh meat. These meats included chicken, opossum, and rabbit. The consumption of beef and mutton was noted in only one household whose head was an employee of the Institute. Bacon was most often prepared by slicing it thin and cooking it over the fireplace, as only two of the families owned stoves. The bacon grease would then be mixed with molasses to make “sap” which was eaten with cornbread. Cornbread was made by simply mixing cornmeal and water and baking it on a griddle or the flat surface of a hoe. Occasionally, families would make “crackling bread” by frying fat until brittle and then crushing it into a mixture of cornmeal, water, soda and salt, and then baking it.

Vegetables were grown by some of the families for personal consumption. These primarily included sweet potatoes, and collard or turnip greens. Vegetables were often boiled with a piece of pork fat, which was said to make the vegetables taste “rich.” From a yearly perspective, however, vegetables other than sweet potatoes were peripheral. A complete list of peripheral fruits and vegetables used in less than 10 percent of the households were not included in Table 1, but include beets, blackberries, cabbage, dried apples, green corn, okra, onions, peaches, sugar cane, strawberries, string beans and tomatoes. Although this may seem like a nice variety of foods, these foods were only recorded in two of the 18 households, both connected with the Institute.
Some egg and dairy production did occur among the families. To produce eggs, families very often kept hens. Of the eight spring dietaries, five included eggs. None of the 12 winter dietaries listed eggs. Some of the families associated with the Institute owned cows for producing milk and butter. Butter was made in glazed earthenware churns called “splashers,” which held approximately two gallons of milk. People would eat the butter fresh and would drink the butter milk. Butter and milk appeared in five spring dietaries, but in the winter dietaries only two instances of butter consumption were noted and only three instances of milk consumption. It was noted that spring milk production averaged 544 grams per person per day, while winter production was a mere 55 grams per person per day.

Although the typical diet changed little throughout the year in terms of the types of foods being consumed there were large fluctuations in nutritional values from season to season. When looking only at the families not connected to the Institute and comparing April, May, and June to December, January, and February, Dirks and Duran (2001: 1883) demonstrated a nearly 30 percent decline in food consumption by weight during the winter. Animal products accounted for most of the decrease. It was determined that the families were eating 55 percent less animal matter in winter than they did during the spring. The decline in the consumption of vegetable foods amounted to 16 percent by weight. Dirks and Duran (2001: 1883) calculate that this is equal to a drop of 37 percent in energy intake and 29 percent in protein intake. The seasonal decline in nutrition is attributed to the sharp decline in winter egg and milk production.
The Franklin County Study

The Franklin County, Virginia study was conducted in the spring of 1897 among 12 households living in the region of the Great Dismal Swamp. It was directed by H.B. Frissell, the principal of the Hampton Institute, a prestigious African American college. Similar to the Tuskegee families, most of the Franklin County families made their living as tenant farmers raising cotton, peanuts, or sweet potatoes. Food for personal consumption was largely home produced. Most families purchased no food from stores, with the exception of occasional small purchases of salt, green coffee, tea, baking powder or vinegar. Frissell characterized the diet as “hog and hominy,” similar to that in Alabama. It was, however, more varied. See Table 2 below taken from Dirks and Duran (2001: 1884). For one thing, bacon was not the only form of pork in the primary core diet. People also ate boiled pork shoulders and boiled ham. Meat was often served with a type of cornbread called “ash cake.” Ash cake was made from unbolted cornmeal containing large amounts of bran. The meal was mixed only with water and then baked directly in hot ashes. Many of the periphery foods from the Tuskegee diet appeared in the primary core of the Franklin County diet. These included cabbage, mustard greens, and sweet potatoes. Food items from the primary and secondary core diets of Franklin County families, that was absent from the Tuskegee diets, were cured herring and fresh fish. At some times of the year they would even eat frogs, turtles, and snakes. Dirks and Duran (2001: 1884) attribute this increased dietary variety to the rich ecology and abundant wildlife of Franklin County, as opposed to that found in the Alabama Black Belt.
Table 2. Typical spring diet of households in Franklin County, 1897.

<table>
<thead>
<tr>
<th>Primary core</th>
<th>Meat and Dairy</th>
<th>Grains and Beans</th>
<th>Fats, Oils, Sugars, and Starches</th>
<th>Roots and Tubers</th>
<th>Other Vegetables</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork shoulder</td>
<td>Pork shoulder</td>
<td>Cornmeal</td>
<td>Salt pork</td>
<td>Sweet potatoes</td>
<td>Cabbage</td>
<td></td>
</tr>
<tr>
<td>Herring 1,2</td>
<td>Herring 1,2</td>
<td>Flour (wheat)</td>
<td>Lard</td>
<td>Greens (mustard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary core</td>
<td>Fish 3,4</td>
<td>Bacon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periphery</td>
<td>Ham</td>
<td>Corn bread</td>
<td>Pork jowl</td>
<td>Collard (sprouts)</td>
<td>Apples 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pork sausage</td>
<td>Brown sugar</td>
<td>Tomato 5</td>
<td>Strawberries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eggs</td>
<td>Molasses</td>
<td></td>
<td>Peaches 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Salted.
2 Dried.
3 Various cuts or types.
4 Fresh.
5 Canned.

The Elizabeth City County Study

The Elizabeth City County study was conducted by Isabel Bevier during May and June of 1898 near the town of Hampton, Virginia. She studied seven households, most of them over a period of seven days. Unlike the subjects studied in the Tuskegee and Franklin County projects, Bevier’s subjects lived under a wide variety of economic and social circumstances, and, most importantly, lived in an urban environment. These differences undoubtedly prevent the Elizabeth City County dietary patterns from being used as analogues for the diets of rural tenant farmers in Mississippi. They do, however, provide an interesting opportunity for comparison between the dietary habits of rural and urban African American populations at the turn of the century.

Many of Bevier’s subjects were farmers who owned land, and produced two crops a year for sell in the urban markets of the north and Washington, DC. People in this community also took jobs in the fishing industry and the ship yards at Newport News. They were also able to work in the town of Hampton at various trades and professions. The town even supported several businesses owned by African Americans, including a large building and loan association.
Bevier collected dietaries among seven households, three from families in Hampton and four from families outside of town. The dietary profile of Bevier’s subjects is listed below in Table 3 taken from Dirks and Duran (2001: 1885). About half of the families owned a cow. Most kept chickens and a pig. Most of these families kept a small garden where they grew vegetables such as corn, sweet potatoes, and cabbage. Diets consisted of considerably more fish than those from the other two studies; however, pork was still eaten in greater quantities. Processed beef was also part of the core diet. Breads were common, with biscuits and “hoe cake” made from cornmeal being the most popular. The dietary patterns in Hampton reflected its commercial orientation. The diets included salt pork from the Midwest and rice from the South along with commercial products such as cornstarch, macaroni and oat flakes. From a nutritional standpoint the diets described by Bevier are not very different from those reported by Frissell. Bevier’s subjects did consume about 20 percent more food per man per day; however, the nutritional values of the two diets were very similar.

Table 3. Typical spring diet of seven families in Elizabeth City County, 1898.

<table>
<thead>
<tr>
<th>Meat and dairy</th>
<th>Grains and beans</th>
<th>Fats, oils, sugars, and starches</th>
<th>Roots and tubers</th>
<th>Other vegetables</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary core</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td>Cornmeal</td>
<td>Salt pork</td>
<td>Cabbage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh fish</td>
<td>Flour(wheat)</td>
<td>Lard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary core</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ham</td>
<td>Oat flakes</td>
<td>Bacon</td>
<td>Potatoes</td>
<td>Apples</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>Cornstarch</td>
<td></td>
<td></td>
<td>Blackberries</td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td></td>
<td></td>
<td></td>
<td>Strawberries</td>
<td></td>
</tr>
<tr>
<td>Periphery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef liver</td>
<td>Hominy</td>
<td>Pork side</td>
<td>Beets</td>
<td>Lettuce</td>
<td></td>
</tr>
<tr>
<td>Pork sausage</td>
<td>Corn bread</td>
<td>Salad oil</td>
<td>Onions</td>
<td>Peas</td>
<td></td>
</tr>
<tr>
<td>Herring</td>
<td>Crackers</td>
<td>Loaf sugar</td>
<td>Corn</td>
<td>Peaches</td>
<td></td>
</tr>
<tr>
<td>Turtle</td>
<td>Macaroni</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1 Various cuts or types.
2 Salted.
3 Dried.
The Yazoo-Mississippi Delta Study

This study was conducted by Dorothy Dickins (1928) of the Mississippi Agricultural Experiment Station of A. & M. College, Mississippi, which is now Mississippi State University. Dietaries were collected from families living in Bolivar, Coahoma, Quitman, and Sharkey counties, Mississippi. Two African American women were selected from each of these counties to supervise the food consumption studies. Each study was then located on the plantation on which each woman lived. Each plantation’s supervisor enrolled ten families from her respective plantation. This meant that a total of eighty families, including 386 individuals, were involved in the study, which started in February of 1927 and lasted for one month. This time was chosen because it came at the end of the cotton picking season and at the beginning of the cultivating season. By conducting the study at this time Dickins was able to collect dietaries of tenant families before being supplemented in March. February was always a lean month for tenant farmers because they were not supplied by the plantation owners during this period, and whatever money had been made on crops had often already been spent paying off debts. Supplies, or their equivalent in cash, were issued on March 1, which generally represented the beginning of the working season. This time was also chosen for the study because the typical winter diet and the early spring diet would both be represented.
Table 4 below includes three diets that Dickins (1928: 35-37) included in her report which she characterized as “One of the Better Menus,” “A Typical Menu”, and “One of the Most Inadequate Menus.”

Table 4. Three dietaries collected during the Yazoo-Mississippi Delta Study, 1927.

### One of the Better Menus

<table>
<thead>
<tr>
<th>BREAKFAST</th>
<th>DINNER</th>
<th>SUPPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried eggs</td>
<td>Rabbit</td>
<td>Rabbit</td>
</tr>
<tr>
<td>Salt pork</td>
<td>Cornbread</td>
<td>Biscuit</td>
</tr>
<tr>
<td>Biscuit</td>
<td>Rice pudding</td>
<td>Tea cakes</td>
</tr>
<tr>
<td>Molasses</td>
<td>Milk</td>
<td>Milk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monday</th>
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<tbody>
<tr>
<td>BREAKFAST</td>
</tr>
<tr>
<td>Fried eggs</td>
</tr>
<tr>
<td>Salt pork</td>
</tr>
<tr>
<td>Biscuit</td>
</tr>
<tr>
<td>Molasses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tuesday</th>
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<tbody>
<tr>
<td>BREAKFAST</td>
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<tr>
<td>Fried eggs</td>
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<tr>
<td>Biscuit</td>
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<tr>
<td>Molasses</td>
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<table>
<thead>
<tr>
<th>Wednesday</th>
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</thead>
<tbody>
<tr>
<td>BREAKFAST</td>
</tr>
<tr>
<td>Sausage</td>
</tr>
<tr>
<td>Cornbread</td>
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<tr>
<td>Molasses</td>
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<tr>
<td>Milk</td>
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<table>
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<tr>
<th>Thursday</th>
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<tbody>
<tr>
<td>BREAKFAST</td>
</tr>
<tr>
<td>Canned peaches</td>
</tr>
<tr>
<td>Rice</td>
</tr>
<tr>
<td>Biscuit</td>
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<tr>
<td>Butter</td>
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<table>
<thead>
<tr>
<th>Friday</th>
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<tbody>
<tr>
<td>BREAKFAST</td>
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<tr>
<td>Fried Eggs</td>
</tr>
<tr>
<td>Fried potatoes</td>
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<tr>
<td>Biscuit</td>
</tr>
<tr>
<td>Butter</td>
</tr>
<tr>
<td>Molasses</td>
</tr>
</tbody>
</table>
Saturday
Biscuit     Fried potatoes   Fried eggs
Butter     Salt pork   Biscuit
Molasses    Cornbread   Butter
Milk     Molasses

Sunday
Fried steak
Biscuit     Cabbage   Cabbage
Butter     Cornbread   Cornbread
Molasses    Tomato pie   Molasses
Tea cakes     Milk   Milk
Milk

A Typical Menu

Monday
BREAKFAST    DINNER   SUPPER
Fried eggs
Biscuit     Peas    Peas
Sorghum     Cornbread

Tuesday
Salt pork    Turnip greens
Biscuit     Biscuit    Milk
Sorghum     Biscuit pudding   Biscuit pudding

Wednesday
Salt pork
Cornbread    Fried potatoes
Biscuit     Biscuit pudding   Biscuit
Sorghum     Milk   Sorghum

Thursday
Fried eggs
Biscuit     Peas    Fried eggs
Milk     Cornbread   Biscuit

Friday
Pears (canned)     Rice   Salt pork
Biscuit     Gravy   Biscuit
Milk     Cornbread   Sorghum
Dickins concluded that upon comparison between the diets of her study’s participants and those from Atwater’s studies in the late 1800s, there was a general improvement in diet. She attributed this improvement to the greater variety of foods that African Americans included in their diets in the late 1920s beyond simply the staples identified by Atwater as salt pork, cornmeal, and molasses. However, Dickins also concluded that the diets of her participants were still significantly lacking in nutritive value, especially in terms of vitamins. She attributed the “high death rate, frequent illnesses, lack of energy, and lowered resistance to infectious and contagious diseases” of African Americans to these inadequate dietaries (Dickins 1928: 46).
Summary

Even though considerable spatial and temporal variability among the dietary patterns of Southern African Americans clearly existed during the postbellum period, general trends are evident. The three M’s: meat, meal, and molasses, along with sweet potatoes, were clearly the main staples of the rural African American diet. Despite their easy access to land, surprisingly few farm families grew enough vegetables to supplement these staples adequately. The harvesting of fresh game undoubtedly occurred among these communities, though much like the production of vegetables for personal consumption, it seems to have provided only a supplemental contribution to the overall diet. Popularity in the harvesting of fresh game and fish appears to have varied considerably through space and time. Interestingly, the importance of hunting and fishing is evidenced by the opposition of tenant farmers and wage laborers to early “conservation” efforts made by the U.S. government to protect wildlife from depletion. These efforts were viewed as a type of class warfare that was waged by wealthy planters, landowners, and merchants intending to increase the dependence of farmers and laborers by removing a source of free food (Tolnay 1999: 32).

The studies clearly show the dietary profile of Southern African Americans during the postbellum to be one that was rich in fats and deficient in essential vitamins and nutrients. These types of dietary habits undoubtedly contributed to the poor health, high susceptibility to disease, and high mortality among farm tenant families.
African American Cemeteries and Burial Practices

The archaeological excavation of Historic Period cemeteries merely to answer research questions is clearly inappropriate. From a strictly archaeological perspective this moral certainty is an unfortunate fact since these cemeteries offer the rare opportunity to examine short-term change in what is often a well understood chronological environment. However, population growth and subsequent development in cities and rural areas have often required the archaeological recovery and relocation of cemeteries in cases where their unfortunate location has impeded the expansive reach of urban sprawl or rural development. These instances have afforded archaeologists the opportunity to study these populations. These opportunities have provided increased understanding of past populations in regards to demography, health, status, dietary history, violence and trauma, ancestry, and a society’s perception of death and burial. Perhaps most importantly, these studies sometimes shed light on the cultural lives of communities whose low social status in American society prevented their inclusion in the archival and historical records.

Undoubtedly, the impact of development upon historic cemeteries has disproportionately affected African American cemeteries due to their often unknown locations in both urban and rural areas. The “invisibility” of many pre-1960s African American cemeteries results from a number of factors including: social isolation of African American communities, the fact that racism and their status as second-class citizens often precluded the inclusion of African Americans in archival records, and the fact that African American burials during the late nineteenth and early twentieth century
often were not associated with a church. Combes (1972: 56) suggests that the avoidance of burial in a church cemetery was related to the importance among African Americans of being interred with family due to the belief that those not interred in their families’ final resting place would have a wandering spirit that would never rest. This belief led to an avoidance of churchyard burial by African Americans since a clergym an could deny an individual interment in his or her families’ final resting place. Other evidence that suggests an avoidance of churchyard burial by African Americans is found in government statistics from 1923, collected among both African American and European American tenant farmer communities, which demonstrated that about 15 percent of the rural communities studied were without any church, and 42 percent of the rural communities were without a resident pastor (U.S. Special Committee on Farm Tenancy 1937: 60). If similar data were available for earlier periods one would expect to see a trend towards decreasing association with church burial back through time. This trend would be expected since the efforts towards “Christianization” of African slaves did not begin in earnest until the early to mid nineteenth century, and even then the transformation appears to have occurred gradually (Patterson 1982: 72-73). Another study from 1923 demonstrated that among African-American sharecroppers and tenant farmers in North Carolina only about 60 percent were church members (Ormond 1931).

Despite the relative paucity of information regarding African American cemeteries and burial practices, some understanding can be elicited from the existing archaeological and historical data, as well as ethnohistorical accounts.
Burial Practices

African-American burial practices during the ante- and postbellum periods were undoubtedly influenced by both African and European or Christian traditions. Considerable research has been directed towards the topic of the African Diaspora and how the cultural traditions of African slaves manifested themselves in the New World, and how those traditions mutated over time from the influence of the European traditions of slave-owners (e.g., Armstrong 1990; Creel 1988; DeCorse 1992; Garman 1994; Genovese 1972; Herskovits 1941; Jamieson 1995; Patterson 1982; Raboteau 1978; Sobel 1979, 1987). Jamieson (1995: 52) notes, however, that “only in rural African American communities have practices related to an African past continued into the modern era.” Generally speaking, however, African burial practices strongly began to “fade out” among African American communities with the rise of fundamentalist Protestantism during the period of 1790-1830 (Patterson 1982: 73). During this period, long-held attitudes among European Americans that characterized African slaves as beyond the reach of Christian salvation began to be replaced by the notion that slave owners should make concerted efforts towards the “Christianization” of African slaves. The “Christianization” of slaves was also resisted by slave owners due to their fears that teaching Christian doctrine would undermine their authority as the slaves’ masters (Patterson 1982: 73). This attitude is evidenced in Reverend Charles Thompson’s account of life as a slave in Attala County, Mississippi. Thompson notes that, “slaves in the South were persecuted and punished severely for preaching the gospel of Christ…. because it would teach the slaves obedience to a higher power than the inhuman laws of the southern states as they then existed” (Thompson 1833: 52).
Coffins and Burial Artifacts

Coffins

By the 1790s use of wooden coffins was almost universal throughout the U.S. (Bybee 2003). The construction of coffins was often undertaken by local carpenters or family members; however, by the mid-nineteenth century pre-made coffins were available (Bybee 2003).

In the U.S., hexagonal was the predominant shape of coffins until the late 1850s when it began to be replaced by rectangular shaped coffins (Blakely and Beck 1982: 188). However, hexagonal coffins did not become obsolete until the 1920s (Bybee 2003). This trend is evidenced at the Blackburn Cemetery (1818-1925) in Tennessee where the most obvious change between early nineteenth century and early twentieth century coffins is shape (Atkinson and Turner 1987: 39). All coffins from Blackburn that dated to the nineteenth century were hexagonal in shape, whereas all those from the twentieth century were rectangular (Atkinson and Turner 1987: 39). At the Cedar Grove Cemetery in Arkansas, burials dating between 1890 and 1926 contained both hexagonal and rectangular coffins, as well as tapering, straight-sided coffins (Rose 1985: 131-135). Garrow et al. (1985: 6-7) notes that in a part of the Nancy Creek Cemetery in Georgia dating to the 1850s seven coffins were hexagonal and seven were rectangular, whereas in another part dating between 1850 and 1979 only 2 of 15 coffins were hexagonal. All 20 burials post-dating 1879 were rectangular. Mt. Gilead cemetery in Georgia dating to the second quarter of the nineteenth century had 16 hexagonal coffins and 8 rectangular (Wood et al. 1986: 79). An anomaly to this trend was discovered at Mt. Pleasant Cemetery in South Carolina where 37 burials dating between 1840 and 1920 all
contained octagonal coffins (Trinkley and Hacker-Norton 1984: 4). Harrison (1982: 39) identified octagonal coffins as the earliest style in America which persisted through the 1850s. On the other hand, 11 burials recovered from a German Lutheran cemetery (1846-1890) in Tennessee all had rectangular coffins (Bass and Bass 1975). Oakland cemetery in Atlanta, Georgia dating between 1866 and 1884 contained a variety of coffin shapes including 2 octagonal, 12 hexagonal and three rectangular (Harrison 1982: 3-4, 40). It should be noted that while some important general trends can be identified in the change of coffin shape through time, these “trends” undoubtedly mask variability resulting from ethnic variance and local traditions.

Nails

Nails used in the construction of wood coffins are common inclusions within historic African-American burials and can be used to provide general dates for coffin construction. During the 17th and 18th centuries, nails were hand-wrought. These nails were made by hand from cutting nail-rods or nail-splits of a specified size from a metal plate (Adams 1980: 545). These malleable rods were then drawn to a point by hammering and headed in a vise with a hammer (Adams 1980: 545).

Manufacture of “plate” or machine-cut nails began in the U.S. in 1775 by Jeremiah Wilkinson of Cumberland, Rhode Island (Adams 1980: 545). In the early 19th century many patented machines appeared which cut nails from rectangular iron sheets (Adams 1980: 545). The nails were cut by a hand-operated blade, but the heads were still shaped by a hammer and vise (Adams 1980: 545). These nails date from ca. 1790 to the mid 1820s (Adams 1980: 546).
After 1825 the production rate for nails was greatly increased as water and steam powered machines automatically headed the nails (Adams 1980: 546). Nelson (1962: 7) places these nails in the period from around 1815 to the late 1830s and describes them as being “distinguished by their irregular heads which vary in size and shape.” Nelson (1962: 7) also notes that these “nails generally have a rather distinct rounded shank, caused by a wide heading clamp.”

Modern machine-cut nails were standardized in the 1830s and have changed very little through time (Adams 1980: 546). Modern machine-cut nails were most popular during the period of 1850-1888 (Adams 1980: 546).

Wire nails rapidly replaced cut nails as the most popular type and by 1895 represented three-fourths of the total U.S. nail production (Adams 1980: 549). Wire nails are usually manufactured from steel wire, which is held in gripper dies and headed (producing gripper marks on shanks); then wire is advanced and sheared to length with cutter die; and wire stock is then advanced to repeat operation (Nelson 1962: 7). Although wire nails had been produced early in the 19th century in France, various economic and political barriers kept them from spreading rapidly to the U.S. (Adams 1980: 549). In 1879, the H.P. Nail Company of Cleveland, Ohio, became one of the first American naileries to successfully produce wire nails from non-imported wire steel. For the most part, wire nails had replaced the machine cut types by the early 1900s (Adams 1980: 549). However, cut nails are still commercially produced and frequently used today especially for historic renovations or reconstructions (Adams 1980: 549).
The study of coffin hardware has provided a useful means for dating burials and addressing issues of social status. Based on their review of catalogs and trade journals Hacker-Norton and Trinkley (1984: 8) identified seven major categories of coffin hardware: handles, thumbscrews, escutcheons, plates, caplifters, decorative studs, and white metal screws and tacks. For general descriptions of these items see Hacker-Norton and Trinkley (1984: 8-13). While hardware styles can be used as a dating technique, Hacker-Norton and Trinkley (1984: 44, 49) warn that factors relating to local popularity, availability, expense, wholesale purchasing, and stylistic lag in rural areas limit the accuracy of this technique since it is practically impossible to quantify these social and economic biases. The broad chronological boundaries of hardware styles also act as a limiting factor in their usefulness as temporal markers (Hacker-Norton and Trinkley 1984: 44).

Despite the limitations of hardware styles as temporal markers Hacker-Norton and Trinkley (1984: 44-45, 49) note that some general trends in coffin handle styles are obvious. Around 1880 there was a temporal shift in emphasis from the swing bail to the two lug short bar handles. By 1912, however, it appears that extension handles were becoming more popular than short bar handles and hardware was becoming “cleaner” with straight lines and simple designs. Studs are dated from the mid-nineteenth through the mid-twentieth centuries. Escutcheons are available from at least the mid-nineteenth century. By the early twentieth century thumbscrews are observed as decorative styles distinct from coffin screws. White metal coffin screws and coffin tacks are found as early as 1865, but disappear sometimes between 1877 and 1920. Caplifters first appear
around 1877. Coffin hinges are shown in catalogs from 1865, but by 1900 are no longer illustrated. As noted above, the design of coffin hardware was much more intricate prior to 1900 when an array of design motifs were available, such as cherubs, angel heads and wings, flowers, vines, and background textures. By 1900, however, styles become much simpler.

Of all the coffin hardware mentioned above, handles were the most expensive. All of the other items combined would rarely cost more than four or six handles (Hacker-Norton and Trinkley 1984: 50). This fact may contribute to an understanding of status within communities. Hacker-Norton and Trinkley (1984: 51) warn, however, that coffin hardware may denote “apparent” status as well as “real” status.

Grave Goods

The inclusion of artifacts within and on top of burials was a common practice among African Americans in the South, especially along the east coast. In fact, one of the most common indicators of historic African American burials is the presence of artifacts on the burial’s ground surface. It is common during the excavation of historic African American burials to recover a variety of artifacts from the uppermost levels of the burial shaft. This practice suggests that field methods adopted for the excavation of African American cemeteries should emphasize careful hand excavation of the first 10-20 cm, as opposed to the use of heavy machinery. Some examples of artifacts that have been recovered include ceramics, glass bottles, white pebbles, marine shells, mirrors, clocks, and glass statues of roosters and hens (Bolton 1891; Combes 1972: 54; Ingersoll 1892; Vlach 1978: 140-147).
During the 1920s an informant from South Carolina claimed that common practices included the placement of the last cup and saucer used by the deceased, as well as the last medicine bottle, on top of the grave (Combes 1972: 56). The informant also indicated that other common artifacts placed on the surfaces of burials in South Carolina were cups, cut glass, bottles and lamps. Flowers and conch shells were said to be just for grave decoration. Jamieson (1995: 50-51) reports on a wide variety of testimonies, collected by historical and ethnohistorical researchers, that provide some possible insights into this phenomenon. It should be noted that Jamieson (1995: 51) incorrectly refers to information collected from “an informant in Mississippi in the 1920s.” The informant was actually from South Carolina. Communications with Jamieson have confirmed this error. In Alabama in the 1920s and Georgia in the 1930s accounts emphasize the placement of artifacts belonging to the deceased on the burial surface to satisfy the spirit and keep it from wandering. It was also noted that breaking all artifacts placed on the grave was an important ritual as it was believed this would break the chain of death in the community. Informants also provided testimony that clocks set to either 12 o’clock noon to wake the dead on Judgement day, or at the time of the deceased’s death, were often placed on the burial’s surface. Pressed glass hens and roosters have been found in the upper levels of burials from South Carolina. Jamieson (1995: 51) notes that the placement of white chicken images in tombs in the Kongo was a common practice in the nineteenth century, which suggests that this phenomenon may have African origins.

The interment of artifacts with the deceased was also a common practice among African Americans. Cultural materials have included clothing items, coins, and ceramic
dishes, as well as personal items such as pieces of jewelry. The discovery of items such as smoking pipes, toys, and combs suggests the interment of personal items that may have held sentimental value to either the deceased or the remaining family members responsible for interment. The presence of coins within historic burials is attributed to the common practice of placing a coin on each eye of the deceased to keep the eyes closed. This practice is convenient for archaeologists who can use the date on the coins to provide an approximate date for the burial. Female use of decorative combs was popular from the early to mid-nineteenth century until approximately 1920 (Bybee 2003). These combs were first made from materials such as tortoiseshell, horn, and metal (Bybee 2003). These materials were replaced in the 1850s with vulcanized rubber forms, which remained popular until approximately 1900 when rubber was replaced by synthetic materials such as celluloid and bakelite (Bybee 2003). Therefore, the presence of combs made from these materials suggests the interment of a female pre-dating 1920.

Burial of the deceased in shrouds or other simple garments was common practice before the mid-nineteenth century; therefore, evidence of clothing is rarely found in excavated burials dating to this period (Bybee 2003). During the mid-nineteenth century, however, a phenomenon referred to as the “beautification of death movement” was occurring that emphasized the idealization of death and heaven (Bell 1990; Bybee 2003). This “Victorian” movement called for the burial of the deceased in their everyday clothing, and by the end of the century had begun to emphasize interment of the individual in their “Sunday’s best” (Bybee 2003).
Grave Shafts

Based on archaeological evidence, it seems that there have been two primary episodes in the construction of grave shafts in the southern U.S. The first episode includes the pre-1890 period when the inclusion of a coffin chamber at the bottom of rectangular burial pit was common practice. During the second episode, which dates to the post-1890 period, grave shafts were constructed primarily as rectangular pits lacking a coffin chamber.

Evidence from excavated cemeteries dating to the first three quarters of the nineteenth century reveals the predominance of a practice whereby coffin chambers were dug into the bottom of larger pits. These chambers were often dug in the same shape as the coffin (i.e., octagonal, hexagonal, or rectangular). At the Mt. Gilead Cemetery (Wood et al. 1986) and the Oakland Cemetery (Dickens and Blakely 1979) in Georgia evidence showed that planks were often laid across the tops of the coffin chambers, presumably to serve as protection for the coffins. All 17 excavated burials from the Oakland cemetery contained either octagonal, hexagonal, or rectangular coffin chambers (Dickens and Blakely 1979). Ward and Graham (1978) report on Cemetery 1 in North Carolina where three of five graves had hexagonal coffin chambers in the bottom of rectangular pits. At Cemetery 2 all six excavated graves had hexagonal chambers (Ward and Graham 1978). No gravestones were associated with these graves; however, the presence of cut-nails suggests an 1815-1910 burial period (Ward and Graham 1978). Evidence that coffin chambers were largely a pre-1890 phenomenon is found at the Cedar Grove Cemetery in Arkansas where none of the 79 graves that dated to ca. 1890-1926 contained coffin chambers (Rose 1985).
There is some evidence, however, for the use of coffin chambers after 1890. Atkinson and Turner (1987: 23) report that Burial 1 (ca. 1900-1925) from the Blackburn Cemetery in Tennessee contained a rectangular coffin chamber inset into the bottom of a rectangular burial pit. Atkinson and Turner (1987: 40) also report, however, that their literature review failed to discover any other evidence for post-1890 coffin chamber construction.

**Burial Orientation**

During both the ante- and postbellum periods, burial orientation in African American cemeteries was predominately characterized by an east-west orientation with the individual in a supine position (Jamieson 1995: 52). In most cases the head is to the west; however, the orientation of the head to the east is sometimes found as well suggesting a modification of the almost universal Christian tradition of head to the west. The rationale behind the Christian tradition is that this will enable the individuals to rise up and meet Jesus during the Second Coming as he arrives from the east. Researchers have noted that many African burial traditions also use an east-west orientation of graves (Handler and Lange 1978: 317). Jamieson (1995: 52) points out, however, that there were a great variety of burial orientations in West Africa; therefore, it is unclear whether this phenomenon persisted from African traditions.

Based on evidence from excavated burials, variability in African American burial orientation decreases greatly in the nineteenth century as the supine, head to the west orientation becomes almost universal. This change is undoubtedly related to the “Christianization” of African slaves discussed above. One noted variation on east-west orientation includes north-south orientation, which was reported by Jordan (1982) as a
practice used when interring individuals accused of unforgivable sins, such as suicide. Jordan (1982) also notes that in Christian burial practice wives are always buried to the left of their husbands following the Christian account of Creation in which Eve was created from the left rib of Adam.

Despite the predominance of supine burial, evidence for prone burials does exist. Combes (1972: 58) reports on ethnographic testimony from African Americans in Georgia in the 1940s that stated if a family experienced repeated deaths of children that burial face down of the last child to die would ensure that the next child would live to adulthood. Jamieson (1995) and Bybee (2003) both note that this practice has also traditionally occurred with “negatively viewed” individuals or social outcasts within a community, such as the historical practice in Europe of burying suspected witches face down.
IV. BURIAL ANALYSIS

Several research questions posed in the Weyerhaeuser proposal have been addressed in the preliminary reports submitted earlier by Hogue and Alvey (2005a, 2005b). These reports document the presence of an unmarked cemetery with both disturbed and intact single coffin interments dating between the late 19\textsuperscript{th}-early 20\textsuperscript{th} centuries. The major focus of the burial analysis discussed in this section is to determine the number of individuals represented in the skeletal series and to document demographic parameters, ancestry, stature, pathologies, and other physical conditions of the individuals recovered from the site.

Laboratory Methods

All burial and feature fill was water screened through ¼ and ¹/₁₆ inch mesh to ensure complete recovery of skeletal elements and artifacts. Following the screening stage the remaining preserved materials were sorted for human remains and any cultural artifacts such as wood or nails. Efforts were made to reconstruct the individual elements but this process was often limited by poor bone preservation. A detailed inventory of each burial and disturbed specimen was then conducted. These inventories are presented in Appendix 1.

Seventeen burials were recovered during the cemetery mitigation. Although five burial labels were used in the first excavations, only four adult burials can definitely be recognized by the presence of four adult right humeri. These Burials are labeled 1/3, 2, 4, and 5. An immature femur of an adolescent probably represents another individual and for research purposes is labeled Burial 5a. The second excavation phase yielded eleven additional burials (Burials 6-16) and three features. Sorting through the screened fill led
to the discovery that Feature 1 contained human bone. Feature 1 was then relabeled Burial 17. Based on our analysis of both disturbed and undisturbed human remains the total number of individuals represented in the Weyerhaeuser Pepper Hill I sample is seventeen.

Once the number of individuals was determined for the Pepper Hill I sample, basic osteological analysis was conducted following the standards outlined in Bass (1995) and Buikstra and Ubelaker (1994). These included age at death, sex determination, anthropometric analysis, and the paleopathological analysis. Age for adults involved evaluating skeletal maturity (epiphyseal union), age related changes to the pelvis and cranium, age related joint changes (osteoarthritis), dental wear, and evidence of wear through lifetime activities. Aging of infants and subadults (individuals less than 15 years old at the time of death) involved comparing degrees of dental calcification and eruption with published standards (Buikstra and Ubelaker 1994), diaphyseal measurements (Scheurer and Black 2000), and epiphyseal union. Since subadults have not developed the skeletal markers used for sex determination only adults were considered. Adult sex determination involved standard observations of cranial and pelvic traits, especially pelvic characteristics and skeletal robusticity associated with males and females. To corroborate these findings, discriminant function analysis of the talus and calcaneus (Steele 1976) and the FORDISC 2.0 software program (Ousley and Jantz 1996) were used. Discriminant function analysis uses measurements of skeletal elements in standard formulae to determine the individual’s sex. Skeletal inventories and measurements are provided in Appendix 1. Table 5 presents a summary of age, sex, and preservation for the Pepper Hill I burials. Analysis indicated the presence of six adults
Table 5. Pepper Hill I burial summary.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Provenience</th>
<th>Orientation</th>
<th>Age</th>
<th>Sex</th>
<th>Preservation</th>
<th>Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>Disturbed and in situ</td>
<td>E-W ? (in situ feet in east)</td>
<td>Adult</td>
<td>Male</td>
<td>Good</td>
<td>Coffin Handles</td>
</tr>
<tr>
<td>2</td>
<td>Disturbed and in situ</td>
<td>E-W (feet in east)</td>
<td>35 - 45</td>
<td>Male</td>
<td>Good</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Disturbed and in situ</td>
<td>E-W (skull in east)</td>
<td>35-50</td>
<td>Male</td>
<td>Fair</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Disturbed Unknown</td>
<td>Adult</td>
<td>Male?</td>
<td>Fair</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Disturbed Unknown</td>
<td>Adolescent</td>
<td>NA</td>
<td>Fair</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>In situ E-W</td>
<td>6 mths ± 3 mths</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>Comb, diaper pin, 2 white porcelain buttons, 1 blue porcelain button</td>
</tr>
<tr>
<td>8</td>
<td>In situ E-W</td>
<td>Perinatal</td>
<td>NA</td>
<td>Fair</td>
<td>-</td>
<td>10 white porcelain buttons</td>
</tr>
<tr>
<td>9</td>
<td>In situ E-W</td>
<td>6 mths ± 3 mths</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>In situ E-W</td>
<td>Perinatal</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>In situ E-W</td>
<td>Perinatal</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>In situ E-W</td>
<td>9 mths ± 3 mths</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>In situ E-W</td>
<td>6 mths ± 3 mths</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>4 white porcelain buttons, copper diaper pin</td>
</tr>
<tr>
<td>14</td>
<td>In situ E-W</td>
<td>6 mths ± 3 mths</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>In situ E-W</td>
<td>18 ± 3</td>
<td>Female</td>
<td>Fair</td>
<td>-</td>
<td>Metal clasp/pendant, cloth, diaper pin</td>
</tr>
<tr>
<td>16</td>
<td>In situ E-W</td>
<td>9 mths + 3 mths</td>
<td>NA</td>
<td>Fair</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17, Feature 1</td>
<td>In situ w/ disturbance</td>
<td>E-W ?</td>
<td>15 ± 3</td>
<td>NA</td>
<td>Poor</td>
<td>-</td>
</tr>
</tbody>
</table>

(five males and one female), two adolescents, six infants, and three perinatals or newborns. Details of other analyses follows and includes discussions on individual reconstruction through cross-mends and matching, ancestry, anthropometric analysis, paleopathology, and dietary reconstruction using isotope analysis.

**Cross-mends and Matches**

Since the first group of burials had been disturbed by heavy machinery and the Coroner, one important first step involved matching and cross-mending these skeletal elements with each other and the in situ burials to determine the number of individuals present. Skeletal measurements, bone color, age at death, and fitting/articulating elements were used to reconstruct the individuals. Table 6 presents the results of this process. Burial 1’s left tibia and Burial 3’s left talus articulated and the color was the
Table 6. Cross-mends and matches for the Pepper Hill I burials.

<table>
<thead>
<tr>
<th>Bone Element</th>
<th>Side</th>
<th>Sex</th>
<th>Age</th>
<th>Provenience</th>
<th>Criteria</th>
<th>Burial Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia</td>
<td>Left</td>
<td>Male</td>
<td>Adult</td>
<td>Burial 1</td>
<td>Articulates with Burial 3 left talus</td>
<td>Burial 3</td>
</tr>
<tr>
<td>Humerus 1</td>
<td>Right</td>
<td>Male</td>
<td>Adult</td>
<td>Collected by Contractor</td>
<td>Bone color and size</td>
<td>Burial 1</td>
</tr>
<tr>
<td>Humerus 2</td>
<td>Right</td>
<td>Unknown</td>
<td>Adult</td>
<td>Collected by Contractor</td>
<td>Bone color and size</td>
<td>Burial 5</td>
</tr>
<tr>
<td>Tibia</td>
<td>Left</td>
<td>Unknown</td>
<td>Adult</td>
<td>Collected by Contractor</td>
<td>Bone color and size, and articulation</td>
<td>Burial 5</td>
</tr>
<tr>
<td>Humeri 1 and 2</td>
<td>Right</td>
<td>Male</td>
<td>Adult</td>
<td>Removed by Coroner</td>
<td>Matches in situ left humerus</td>
<td>Burial 4</td>
</tr>
<tr>
<td>Ulna 2</td>
<td>Left</td>
<td>Unknown</td>
<td>Adult</td>
<td>Collected by Contractor</td>
<td>Mended with in situ ulna</td>
<td>Burial 4</td>
</tr>
<tr>
<td>Femur 1</td>
<td>Left</td>
<td>Unknown</td>
<td>Adolescent</td>
<td>Collected by Contractor</td>
<td>-</td>
<td>No Match</td>
</tr>
<tr>
<td>Maxilla/mandible</td>
<td>NA</td>
<td>Male</td>
<td>Adult</td>
<td>Collected by Contractor</td>
<td>Bone color and size</td>
<td>Burial 1</td>
</tr>
</tbody>
</table>

same for all elements. The location of Burial 1 directly above the in situ feet of Burial 3 strengthens the argument that these elements belong to one individual. Burial 1’s lower limb measurements show this individual to be the tallest of the group. Measurements of disturbed humeri and color observations indicated that the longest right humerus (Humerus #1, collected by the contractor) was a probable match for Burial 1. The mandible and maxilla recovered by the contractor also match in color to this individual. The large/robust size of the mandible is another criteria used for this match.

Two matching humeri (Numbers 1 and 2) removed by the Coroner, were alike in color to Burial 2. Although the distal ends of the humeri were fragmented, wear patterns and arthritis suggested their association with the Burial 2 ulnas.

Disturbed elements linked to Burial 4 are the proximal epiphysis of the left ulna that mended with the left ulna diaphysis recovered from the burial and Humerus #3 removed by the Coroner. This latter specimen was similar in color, size, and shape to the in situ left humerus of Burial 4. It is possible that the Burial 5 femur and left tibia collected by the contractor may also go with Burial 4; however, the color is different and there are no other specimens in Burial 4 with which to compare. For this reason these elements, as well as another right humerus of similar color, are allocated as Burial 5.
A left femur (Femur #1 collected by the contractor) belonged to an adolescent. This determination was based on the absence of epiphyseal union of the lesser trochanter, which usually occurs at age seventeen (Stewart 1979).

Cross-mending and matching the disturbed skeletal specimens with *in situ* burials indicated at least five individuals were recovered during the initial excavation phase at the Pepper Hill I cemetery site.

**Ancestry**

*Morphological and Metrical Traits*

The determination of ancestry is considered one of the more difficult tasks facing the osteologist due to the long history of miscegenation in the U. S. There are no truly distinct traits common to one group or another, but certain morphological traits appear more often in endogamous groups, such as the high frequency of shovel-shaped incisors among individuals of Asian descent (Bass 1995). In addition to morphological traits, forensic research has led to the development of computer programs such as FORDISC 2.0 (Ousley and Jantz 1996), which are designed to provide probabilities of descent based on adult cranial measurements. Unfortunately most cranial remains recovered from the Pepper Hill I cemetery were too fragmented to employ FORDISC 2.0 and, because of the fragmented nature of the cranial remains, the morphological features of the face and skull which characterize individuals as European, African, or Asian origin could not be considered for most individuals. The one exception is Burial 15 whose cranium could be partially reconstructed. Based on cranial measurements FORDISC 2.0 showed this individual to be female but white rather than black. This unexpected result may be due to the young age of this individual. The ancestry discrimination formula devised by Giles
and Elliot (1962) was also employed for this individual. The results placed Burial 15 in the American Indian category, but very close to the sectioning line for African Americans. The cranium of Burial 15 did exhibit three morphological characteristics typical of African ancestry. These are post-bregmatic depression, lack of a nasal sill, and lower facial prognathism (Stewart 1979).

**DNA Analysis**

DNA analysis was also conducted to assist in ancestral determination. Conditions for using ancient and older human DNA are the same as modern human DNA. Contamination of bones by handling during or after excavation is a major concern (Brown 2000). Other problems include hot temperatures, acid soils, and wet/humid climates. The tooth root, rather than bone or tissue, is considered the best source for DNA extraction (Stone 2000).

For this study the left second molar associated with the Burial 1/3 mandible/maxilla was extracted from the mandible for DNA analysis. Dr. Bert Ely at the University of South Carolina, Columbia, conducted the test. Prior to DNA extraction, the surface of the tooth was washed with 15% HCl, rinsed with sterile ddH₂O, and dried under a UV lamp. This procedure follows those outlined in Maca-Meyer et al. (2005). The tooth was reduced to powder by first wrapping it in aluminum foil and submerging it into liquid nitrogen before pulverizing. The Gentra systems Puregene Tissue extraction kit was used to successfully extract DNA. Following extraction, three overlapping regions of the mitochondrial DNA (mtDNA) were amplified (replicated quickly) and tested for contamination, which proved negative. The amplifications were then arranged using the program Sequencer and compared with known human mtDNA sequences.
Differences from the known standards were noted at positions 16172, 16189, 16223, and 16311. No exact matches were identified in the University of South Carolina or University of Cambridge databases. The sequence seemed to resemble patterns identified for the Indian sub-continent, but an African origin cannot yet be ruled out (Ely 2006). An additional test is currently being conducted to discriminate between these two possibilities.

**Anthropometric Analysis**

Anthropometric studies followed the guidelines in Buikstra and Ubelaker (1994) and Bass (1995). All complete elements were measured and the results provided in the Appendix. The data were then used for sex determination and stature estimates for adult individuals.

*Sex Determination*

The FORDISC 2.0 program (Ousley and Jantz 1996) was used to determine sex of the adult individuals based on long bone measurements. This information provided corroborative support for morphological observation. Using this program, Burials 1, and 2 were determined to be males and Burial 15, female. Steele’s (1976) formulae for sex determination based on the talus and calcaneus were used to determine that Burial 3 was male.

*Stature*

Stature estimates can be used as a measure for nutritional history during the developing years. Stature data are compared to indirectly assess diet variability among the Pepper Hill I individuals. This information will be complemented by the isotope analysis discussed later. Proper skeletal growth and body development depends on
sufficient protein levels and studies show increased height is associated with better nutrition (Floud 1994; Komlos 1994). Formulae available in FORDISC 2.0 (Ousley and Jantz 1996) were used for stature. Table 7 provides the stature estimates and standard deviations. There is a 95 percent chance that the individual’s height falls within the stature range. Using heights and standard deviations provided for the tibia, Burials 1/3 and 2, both males, ranged in height from 5 feet 4 inches to 6 feet 7 inches. The average for both males is $70.55 \pm 4.3$ inches, or about 5 feet 10 inches. Burial 15, as a female, was considerably shorter than the males. The height for Burial 15 based on the tibia ranged between 4 feet 8 inches and 5 feet 5 inches.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Forensic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>73.6 ± 3.5</td>
</tr>
<tr>
<td>2</td>
<td>68.7 ± 3.7</td>
</tr>
<tr>
<td>15</td>
<td>61.8 ± 3.1</td>
</tr>
<tr>
<td></td>
<td>61.8 ± 3.4</td>
</tr>
</tbody>
</table>

Robusticity

A series of measurements were taken on the humeri and femora to determine the external dimensions of the elements as well as the maximum length. General indices were calculated by dividing each external measurement by length to determine the overall size or robusticity of the bone. A higher index indicates greater external size relative to bone length. Table 8 presents a summary of the results. When the mid-shaft diameters
Table 8. Humerus and femur indices.

<table>
<thead>
<tr>
<th></th>
<th>Burial 1/3</th>
<th>Burial 2</th>
<th>Burial 4</th>
<th>Burial 6</th>
<th>Burial 15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humerus</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Diameter Midshaft</strong></td>
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<tr>
<td>Right</td>
<td>7.05</td>
<td>7.92</td>
<td>7.47</td>
<td>7.09</td>
<td>7.46</td>
</tr>
<tr>
<td>Left</td>
<td>7</td>
<td>7.03</td>
<td>7.8</td>
<td></td>
<td></td>
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<tr>
<td><strong>Minimum Diameter Midshaft</strong></td>
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<tr>
<td>Right</td>
<td>5.92</td>
<td>6.29</td>
<td>5.91</td>
<td>6.21</td>
<td>5.76</td>
</tr>
<tr>
<td>Left</td>
<td>6.23</td>
<td>6.09</td>
<td></td>
<td></td>
<td>5.76</td>
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<tr>
<td><strong>Minimum Circumference</strong></td>
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<tr>
<td>Right</td>
<td>20.27</td>
<td>20.86</td>
<td>20.94</td>
<td>17.88</td>
<td>20.34</td>
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<tr>
<td>Left</td>
<td>20.57</td>
<td>20.31</td>
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<td></td>
<td>20.34</td>
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<tr>
<td><strong>Femur</strong></td>
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<td><strong>Anterior-posterior Diameter Midshaft</strong></td>
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<tr>
<td>Right</td>
<td>6.07</td>
<td>6.1</td>
<td>6.67</td>
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<tr>
<td>Left</td>
<td>6.44</td>
<td>5.94</td>
<td>6.67</td>
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<td><strong>Medio-lateral Diameter Midshaft</strong></td>
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<td>Right</td>
<td>5.83</td>
<td>5.79</td>
<td>5.92</td>
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<td></td>
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<tr>
<td>Left</td>
<td>5.78</td>
<td>6.38</td>
<td>5.92</td>
<td></td>
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</tr>
<tr>
<td><strong>Circumference Midshaft</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>15.54</td>
<td>18.33</td>
<td>19.76</td>
<td></td>
<td></td>
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<tr>
<td>Left</td>
<td>16.42</td>
<td>18.96</td>
<td>19.76</td>
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<td></td>
</tr>
<tr>
<td><strong>Anterior-posterior Subtrochanteric Diameter</strong></td>
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<tr>
<td>Right</td>
<td>5.95</td>
<td>5.94</td>
<td>5.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>5.99</td>
<td>6.42</td>
<td>5.92</td>
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<tr>
<td><strong>Medio-lateral Subtrochanteric Diameter</strong></td>
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<tr>
<td>Right</td>
<td>7.22</td>
<td>7.19</td>
<td>7.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>6.9</td>
<td>7.17</td>
<td>7.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Robusticity Index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>11.95</td>
<td>17.3</td>
<td>12.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>12.25</td>
<td>17.91</td>
<td>12.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
indices are considered, robusticity is greater for the upper arms than the femurs for most individuals. This pattern has been documented for nineteenth century African American slave and freedmen, in Maryland and Pennsylvania and is thought to be related to excessive lifting activities (Angel et al. 1985; Turner 1987).

**Paleopathology**

Evaluations of health-related diseases are considered for the Pepper Hill I sample, including dental caries and antemortem tooth loss, infectious diseases, degenerative diseases (osteoarthritis) and mechanical stress, and trauma. In addition, anomalies such as supernumerary teeth and genetic skeletal markers are also noted.

*Dental Pathologies and Anomalies*

The study of dental pathologies for the sample included evaluating dental caries, antemortem tooth loss, calculus, and enamel hypoplasia. Dental caries, antemortem tooth loss, and calculus are affected by diet as well as poor hygiene. Linear enamel hypoplasia is a condition caused by enamel sensitivity to disease and nutritional stress. In these cases, dental development is interrupted leaving a linear defect on the enamel surface (Blakey et al. 1994; Ortner 2003). Dental anomalies are present and were observed as supernumerary teeth, shovel shaped incisor, and unusual dental wear.

*Dental Caries and Antemortem Tooth Loss.* No dental reconstruction was noted for any of the Pepper Hill I individuals. This provided an opportunity to assess the effects of diet on the dental health. Disease states such as dental caries and antemortem tooth loss occur more frequently in individuals relying on high carbohydrate diets. The prevalence and patterning of dental caries and antemortem tooth loss provide valuable tools for determining the effects of high carbohydrate foods in the diet (Powell 1998).
Studies have shown that in populations with a heavy carbohydrate diet, caries and antemortem tooth loss increase with age and the posterior (premolars and molars) are most often affected (Larsen 1984; Powell 1998). Antemortem tooth loss is considered a consequence of a high-carbohydrate diet. Dentition can be lost due to advancing age (Rathburn and Scurry 1991), carious destruction or periodontal disease creating gum irritation and bone loss (Powell 1998). Common carbohydrate sources are corn-related food products such as cornmeal and grits as well as flour and potatoes. Sugar from molasses would also play a major factor in creating dental caries and ultimate loss. Based on Dirks and Duran’s (2001) study, these food items provided the staple diet for African American tenant farmers in the early part of the 20th century so it was expected that dental health would be compromised for the study group. Frequencies of tooth caries and antemortem loss were calculated by adding the carious teeth to the number of antemortem teeth lost and dividing the sum by the total number of teeth observed (Powell 1998: 115). The results were then compared across three ten-year age groups (20-30, 30-40, and over 40). This analysis is presented in Table 9 and includes adult dentition associated with Burials 4, 6, 15, and the Burial 1/3 mandible/maxilla recovered by the contractor. As Table 9 illustrates, the posterior (premolars and molars) dentition were most affected and dental caries and antemortem tooth loss increased with age.

**Calculus.** Each tooth was examined for the calculus (calcified plaque). When present, calculus deposits were recorded as small, moderate, or large following the methods outlined in Brothwell (1981). The location, buccal (labial) or lingual side, was also noted for each affected tooth. Calculus is a common irritant in the development of
Table 9. Summary of dental caries and antemortem tooth loss

<table>
<thead>
<tr>
<th>Type</th>
<th>20-30</th>
<th>30-40</th>
<th>40+</th>
<th>20-30</th>
<th>30-40</th>
<th>40+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Canine</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Premolar</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Molar</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>19</td>
<td>6</td>
<td>16</td>
<td>22</td>
<td>10</td>
</tr>
</tbody>
</table>

-Anterior Teeth-
| Number Teeth | 5 | 8 | 3 | 6 | 8 | 6 |
| Number Caries | 0 | 0 | 0 | 0 | 0 | 0 |
| Carious Teeth | 0 | 0 | 0 | 0 | 0 | 0 |
| Antemortom Loss | 0 | 0 | 0 | 0 | 0 | 0 |
| % Teeth Affected | 0 | 0 | 0 | 0 | 0 | 0 |

-Posterior Teeth-
| Number Teeth | 9 | 11 | 3 | 10 | 14 | 4 |
| Number Caries | 0 | 5 | 2 | 0 | 8 | 0 |
| Carious Teeth | 0 | 5 | 2 | 0 | 6 | 0 |
| Antemortom Loss | 0 | 0 | 0 | 0 | 0 | 6 |
| % Teeth Affected | 0.0 | 45.4 | 66.6 | 0.0 | 42.8 | 60.0 |

periodontal disease and is caused by hardened bacterial plaque produced by poor dental hygiene and food retention in a protected area within the mouth. Over time, the buildup hardens and can eventually irritate and infect the gum areas leading to tooth loss (Aufderheide and Rodriguez-Martin 1998; Ortner 2003).

Calculus was observed on the dental remains of Burials 4, 6, and the Burial 1/3 maxilla/mandible. Burial 15, who showed no caries on available teeth also had no calculus (Appendix 1). Burial 4 had mild to moderate calculus buildup on most dentition and in almost all cases it was present on the buccal side or on both the buccal and lingual sides. Burial 6 had the most severe buildup ranging from mild to large amounts. Deposits on the maxillary teeth were mostly on the buccal side while located mostly on
the lingual side on mandibular teeth. The mandible/maxilla recovered by the contractor also had mild to moderate calculus deposits similar to Burial 4. The location of the deposits was typically on both buccal and lingual sides when present. Like dental caries and antemortem tooth loss, the presence and severity of dental calculus increased with age in the sample.

**Linear Enamel Hypoplasia.** Poor nutrition and disease states can negatively affect the normal development of dentition. In these instances, enamel growth slows down leaving developmental defects known as hypoplasia and hypocalcification (Blakey et al. 1994). These defects are often observed as horizontal bands, pitting, or discoloration on the enamel. Table 10 provides a summary of the dental hypoplasia lesions observed on the adult dentition. Measurements were taken from the cemento enamel junction (CEJ) to the actual lesion observed on the enamel. A 10x hand lens was used to assist identification of the defects. The measurements were then applied to the method devised by Goodman et al. (1980) for determining the age(s) associated with the enamel defect. In this method, ages are only considered when two or more different teeth have corresponding ages of interrupted development. For the Pepper Hill I sample the Burial 1/3 maxilla/mandible had developmental lesions associated with ages 2-2.5 and 3-3.5, Burial 4 ages 1-1.5 and 2-2.5, Burial 6 2-2.5, 2.5-3, 3-3.5 and 3.5-4, and Burial 15, the one female, had the most enamel developmental arrests at ages 2-2.5, 2.5-3, 3-3.5, 3.5-4 and 4-4.5 years. For all individuals enamel hypoplasia was correlated with age 2-2.5 indicating a possible association with nutritional stress and weaning although disease can also affect enamel development. Blakey et al. (1994), in their study of 27 African American slaves and 75 free African Americans in Philadelphia, found most
Table 10. Hypoplasia Measurements. Measurements are from the CEJ to the enamel lesion.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Maxillary</th>
<th>Right</th>
<th>M3</th>
<th>M2</th>
<th>M1</th>
<th>PM2</th>
<th>PM1</th>
<th>C</th>
<th>I2</th>
<th>H1</th>
<th>Left</th>
<th>M3</th>
<th>M2</th>
<th>M1</th>
<th>PM2</th>
<th>PM1</th>
<th>C</th>
<th>I2</th>
<th>H1</th>
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<tbody>
<tr>
<td>1</td>
<td>Max/Man</td>
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Note: Measurements are in millimeters.
hypoplasia defects, possibly associated with age at weaning, occurring between the ages of 1.5 and 4.5 years for both populations. This finding corresponds with the Pepper Hill I cemetery sample, which dates over 100 years later.

_Dental Anomalies._ Several unusual traits were present on the dentition of several burials. The maxilla/mandible (Burial 1/3) recovered by the contractor had a shovel-shaped left lateral maxillary incisor. This trait is recognized when mesial and distal margin ridges are present on the lingual surface of the anterior teeth. The trait is seen most often among Native Americans and individuals of Asian origin, but has also been observed in milder form among individuals of African and European origin (Bass 1995; Table 4-7). Africans exhibit an average frequency of 11 percent for distinct shoveling with frequency increasing to 12.5 percent for American blacks and 18.2 percent for populations from India (Scott and Turner 1997:183-184). In this particular lateral incisor the ridges are raised with a tuberculum dentale or interruption groove present. This trait is found in lowest frequency among Africans (10 –20 percent) and but increases (20-40 percent) in western Europe/east Asian populations such as those in India and Pakistan (Scott and Turner 1997:189). Another dental anomaly known as a pegged incisor was present in Burial 15. Pegged teeth occur most frequently among the third molars and lateral incisors, which are more genetically unstable (Bass 1995: 298).

Supernumerary teeth are additional teeth that can occur with any tooth group. One common example is the retention of a deciduous tooth in the adult dental arcade (Bass 1995). The deciduous left mandibular canine of Burial 4 was _in situ_ while the permanent canine had not erupted. A heavily worn root, probably belonging to the lateral
incisor was also visible. A radiograph of Burial 4 mandible shows the canine to be fully developed and still present in the mandibular crypt.

Two other unusual dental characteristics are worthy of note. The unusual wear on the anterior teeth of Burial 6 suggests the use of teeth as tools. The anterior mandibular dentition had labial (buccal) wear bilaterally from the central incisor to the first premolar. The three remaining anterior maxillary teeth, right lateral incisor and the left central incisor and canine had extensive wear on the lingual surface. Modifications of the anterior teeth have been reported from a variety of archaeological settings. Often anterior wear is created by the “stuff and cut” method where an individual clamps an item in the teeth (as a vice) before cutting it. Symmetrical wear, such as that observed for Burial 6, is likely due to using teeth for tools or as a third hand rather than habitual pipe smoking (Milner and Larsen 1991). The wear observed Burial dentition appears consistent with an individual using their anterior teeth as a third hand say to hold reins while plowing.

Another interesting finding involved the dentition from Burial 15. The maxillary dentition had black stains extending from the central incisors to the first molars (Figures 55 and 56). The incisors had the most staining of over 100 percent of the enamel. The percentage of the enamel area actually stained decreased in frequency towards the molars. In comparison the mandibular teeth showed little staining. The difference in staining between the mandibular and maxillary teeth could be related to post-mortem decomposition with each exposed to different bacteria and elements within the coffin after the mandible had dropped away from the cranium. In contrast, the maxilla had collapsed within the cranial vault during decomposition. Other reasons for the staining
could be tobacco use, food, or environmental factors. However the latter two explanations are unlikely given that no other individual had evidence for the staining.

*Infectious Diseases*

All bone elements were inspected for osteoclastic (bone destruction) and osteoblastic (bone formation) lesions. Skeletal elements were included only if at least one third of the bone was present or if a lesion occurred on a smaller fragment. No resorptive or osteoclastic lesions, such as anemia-related porotic hyperostosis or cribra orbitalia, were present and most of the proliferative reactions or abnormal bone formations were coded as mild to moderate instances of periostitis on the lower limbs (Table 11). In most cases periostitis was observed bilaterally but the lesions tended to be unevenly distributed. Generally this condition is present with inflammatory periostitis (Ortner 2003). Primary periostitis results from either inflammation associated with traumas or by infections; however, it is difficult to determine the causal factors when working with archaeological collections. Traumatic periostitis is caused by direct bone injury and may be more randomly located while periostitis associated with infections may be bilaterally positioned and patterned. One of the most common sites for this condition is the tibia diaphysis. The high frequency of periostitis on the tibia results from the skin being closer to the bone, which creates an environment conducive to increased bone trauma. Also, because there is less muscle on the anterior tibia surface, this area of the body is cooler and more likely to be affected by infectious diseases (Ortner 2003).
Table 11. Periostitis pathology data.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Element</th>
<th>Identification</th>
<th>Location</th>
<th>Lesion Size</th>
<th>Degree of Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>Right Tibia</td>
<td>Periostitis</td>
<td>Anterior distal diaphysis</td>
<td>54 x 26.29 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periostitis</td>
<td>Lateral distal diaphysis</td>
<td>63 x 27.5 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Left Tibia</td>
<td>Periostitis</td>
<td>Lateral distal diaphysis</td>
<td>18.84 x 15.95 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td></td>
<td>Right Fibula</td>
<td>Periostitis</td>
<td>Medial distal diaphysis</td>
<td>13.33 x 21.39 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td></td>
<td>Left Fibula</td>
<td>Periostitis</td>
<td>Medial distal diaphysis</td>
<td>46.24 x 11.25 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Left Calcaneus</td>
<td>Periostitis</td>
<td>Inferior surface</td>
<td>11.07 x 13.98 mm</td>
<td>Mild woven</td>
</tr>
<tr>
<td>2</td>
<td>Right Tibia</td>
<td>Periostitis</td>
<td>Midshaft medial diaphysis</td>
<td>34.56 x 20.42 mm</td>
<td>Healed sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Left Tibia</td>
<td>Periostitis</td>
<td>Lateral Midshaft lateral diaphysis</td>
<td>41.92 x 20.01 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periostitis</td>
<td>Proximal third lateral diaphysis</td>
<td>37.43 x 22.76 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Right Fibula</td>
<td>Periostitis</td>
<td>Lateral diaphysis</td>
<td>91.28 x 15.08 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td></td>
<td>Right Radius</td>
<td>Periostitis</td>
<td>Proximal third lateral and posterior diaphysis</td>
<td>33.45 x 5.63 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td>6</td>
<td>Right Tibia</td>
<td>Periostitis</td>
<td>Midshaft medial diaphysis</td>
<td>40.22 x 21.95 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periostitis</td>
<td>Proximal third medial diaphysis</td>
<td>12.13 x 25.21 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Left Tibia</td>
<td>Periostitis</td>
<td>Midshaft lateral diaphysis</td>
<td>13.01 x 28.64 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periostitis</td>
<td>Midshaft medial diaphysis</td>
<td>38.03 x 19.72 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td></td>
<td>Left Fibula</td>
<td>Periostitis</td>
<td>Distal lateral third diaphysis</td>
<td>21.67 x 31.81 mm</td>
<td>Mild with woven bone</td>
</tr>
<tr>
<td></td>
<td>Left Fibula</td>
<td>Periostitis</td>
<td>Distal and midshaft diaphysis</td>
<td>33.38 x 12.01 mm</td>
<td>Moderate with some woven and sclerotic bone</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous</td>
<td>Longbone</td>
<td>Periostitis Diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td>7</td>
<td>Right and</td>
<td>Periostitis</td>
<td>Interior surface</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Left Orbit</td>
<td></td>
<td>Anterior and posterior proximal third diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td>10*</td>
<td>Right Humerus</td>
<td>Periostitis</td>
<td>Diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Right Radius</td>
<td>Periostitis</td>
<td>Proximal and midshaft diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Right Ulna</td>
<td>Periostitis</td>
<td>Diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Right Femur</td>
<td>Periostitis</td>
<td>Midshaft medial diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Left Femur</td>
<td>Periostitis</td>
<td>Midshaft medial diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Right Tibia</td>
<td>Periostitis</td>
<td>Distal and midshaft diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Left Tibia</td>
<td>Periostitis</td>
<td>Midshaft diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous</td>
<td>Longbones</td>
<td>Periostitis Diaphysis</td>
<td>Most of area</td>
<td>Moderate woven (active)</td>
</tr>
</tbody>
</table>

* Probable systemic infection
Periostitis was observed on burials 1/3, 2, 6, 7, 10, and 13. In one case, Burial 10, all cranial and long bones available for analysis had been affected. The degree of severity and the active nature of the lesions point to systemic infection as the probable cause of death for this newborn. Burials 7 and 13, both aged 6 months, also had active periosteal lesions which may be related to their early deaths.

Traumas

The right humerus collected by the coroner matched the left in situ humerus in Burial 4 and is considered to belong with this burial. This humerus exhibited a partial or greenstick fracture located on the lateral side of the midshaft. The fracture had completely healed with callus formation measuring 4.1 x 1.1 cm.

Osteoarthritis

Osteoarthritis, generally considered a degenerative disease, affects the skeleton in three ways. First because of cartilage wear, bone surfaces come into contact resulting in bone surface abrasion. Continued contact can cause bone porosity and eburnation (compact bone) on the surface. Finally the lipping (bony growths) or osteophytes can form on the joint edges (Ortner 2003). Each bone element was assessed for abrasion, pitting, eburnation, and arthritic lipping and osteophytes. Recording osteophyte development involved using a rank system that notes the degree of severity. Each incident of arthritis was recorded as follows 0- no evidence, 1-trace or mild, 2-minor, 3-moderate, and 4-severe, following methods used in similar studies by Bridges (1991) and Stewart (1979). Bone elements comprising each joint and individual vertebra were scored accordingly. The results are provided in Table 12.
Table 12.  Osteoarthritis and degenerative joint changes.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Vertebrae</th>
<th>Ankle</th>
<th>Elbow</th>
<th>Shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>2/3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

1 – sharp edges beginning
2 – sharp edges obvious
3 – osteophytes present

One interesting finding is that arthritic changes were not observed in any knee or hip joints where preservation permitted. The spine was most often affected followed equally by the ankle, shoulder, and elbow joints. For Burial 1/3 the left calcaneus and talus both had osteophytes indicating stage three lipping. The right foot bones were too fragmented to determine whether the condition was bilateral. The proximal right radius and left and right ulnas of Burial 2 exhibited stage 2 lipping. The degree of arthritis was similar for both the right and left ulnas. Humeri collected by the coroner thought to belong to this burial also exhibited stage 2 arthritic lipping in the elbow joint. Vertebral lipping was evident on several vertebrae for Burial 4. Two articulating cervical vertebra, (C4 and C5), had stage 2 lipping on the inferior and superior rims of the centra. Two very fragmented thoracic vertebrae had stage 2/3 lipping with osteophytes present on the centrum rims. One of these also had a Schmorl’s node, or herniated disc, on the superior surface of the centrum. A third thoracic vertebra exhibited only stage 1 change on the vertebral body. One miscellaneous fragmented lumbar vertebra also exhibited mild arthritic change. A second lumbar vertebra (L2 or L3) had a Schmorl’s node on the superior surface of the centrum. Schmorl’s nodes or herniation of the vertebral body can be degenerative or caused by mechanical stress (Ortner 2003). For Burial 4, arthritic change and skeletal degeneration is likely the cause. The skeletal remains associated with the oldest individual, Burial 6, were extremely fragmented and preservation limited
observation of most joints. The glenoid fossa of the right scapula exhibited slight lipping along most of the edge and some pitting was observed on the surface. In addition one cervical vertebra fragment had stage 2 lipping.

**Diet**

The focus of this inquiry is to assess the diet of the Pepper Hill I individuals using carbon and nitrogen isotope analyses of human bone collagen. Isotope signatures cannot be used to reconstruct a diet but provide information on the food characteristics such as high protein, being consumed (Larsen 1997: 270). Carbon isotopes discriminate between two terrestrial plant classes known as C3 and C4. Plants considered C3 include temperate grasses (wheat and rice), nuts, fruits, and root crops. Tropical grasses, such as corn, millet, and sorghum are recognized as C4 plants. C4 plants have been successfully adapted to temperate climates through human agricultural systems (Ambrose 1987:94-95; Katzenberg 1989). In the southeastern United States and elsewhere, carbon isotopes, measured as $\delta^{13}C$ values in human bone collagen, have been used to determine the presence of C4 plants, specifically dietary maize or corn. In pre-agricultural groups where corn is not consumed bone collagen yields $\delta^{13}C$ values below -19 parts per mil ($^\circ/o$), while values between -19 $^\circ/o$ to-7.5 $^\circ/o$ indicate a diet including C4 plants (Chisolm 1989: 34). More C4 plants in an individual’s diet yields higher $\delta^{13}C$ values in bone collagen.

Nitrogen values vary depending on an organism’s place in the trophic level with $\delta^{15}N$ values increasing as the organism moves up the food chain and consumes more protein rich foods (Katzenberg 1989; Schoeninger 1989, 1994; Shoening and DeNiro 1984). Protein can be obtained from animals and plants, although absorption of animal
protein occurs more rapidly. $\delta^{15}$N levels in omnivorous humans normally fall between carnivore and herbivore levels (Schoeninger 1989).

All bone samples were processed and analyzed for isotope values by Beta Analytic, Inc. (Miami, FL). At least 6 grams of long bone fragments from Burials 2, 6 and 15 were provided for collagen extraction. Long bone diaphysis samples were chosen since bone density is greater relative to other elements, increasing the chance of collagen occurrence. Before being crushed, the skeletal material was tested for friability and washed in de-ionized water. Bone apatite was eliminated using dilute, cold HCl acid. The remaining collagen was processed with alkali (NaOH) to ensure that no secondary organic acids were present (Beta Analytic Pretreatment Glossary).

The primary standards for the mass specs are to NIST 8547 ($\Delta^{15}$NAIR = +0.4 +/- 0.2 $\%$) and NIST 8541 ($\Delta^{13}$CVPDB = -15.9 +/- 0.25 $\%$). Beta analytic has calibrated an internal working standard (Acetanilide, Costech Analytical) against the NIST standards so that each batch put through the instruments includes reference measurements. Prior to accepting the ratios for the unknowns, the reference values are examined for deviation and trends. Appropriate normalization is applied to account for minor drift and adjustment of the unknown ratios is made. This is typically a correction factor of 0.0 - 0.2 $\%$ carbon and 0.2 - 0.4 $\%$ nitrogen (Darden Hood, personal communication).

The Pepper Hill I skeletal samples yielded plenty of carbon and the analysis went normally. The carbon isotope assays show a diet high in C4 plants. The $\delta^{13}$C values obtained were −9.8 (Burial 2), -15.3 (Burial 6), and −9.5 (Burial 15). These results are not unexpected given the high dietary use of corn and sorghum recorded historically (see
Nitrogen assays indicate a diet including animal protein. The $\delta^{15}\text{N}$ levels ranged from 10 $\%$ for Burial 2 to 13.8 $\%$ for Burial 15. Burial 6 measured 11.7 $\%$. Figure 14 presents a bivariate chart of the isotope analysis results. Carbon and nitrogen isotope levels were also included for deer and maize (Hogue 2003), catfish (Hogue 2005), and pork/beef and beans/peas (Schoeninger 1989).

Figure 14. Bivariate chart comparing isotope levels from Pepper Hill I, Burials 2, 6, and 15 with other animals and plants. (deer and maize values from Hogue 2003; pork/beef values and beans/peas values from Schoeninger and DeNiro 1984; catfish values from Hogue 2005).