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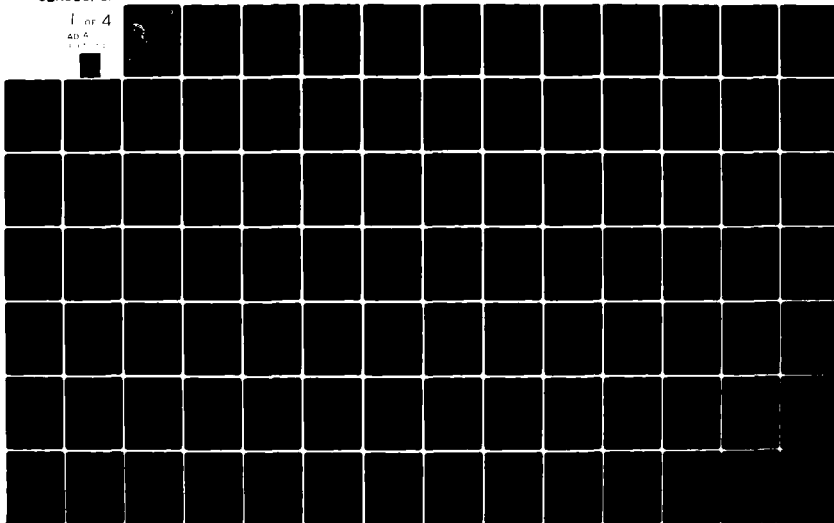
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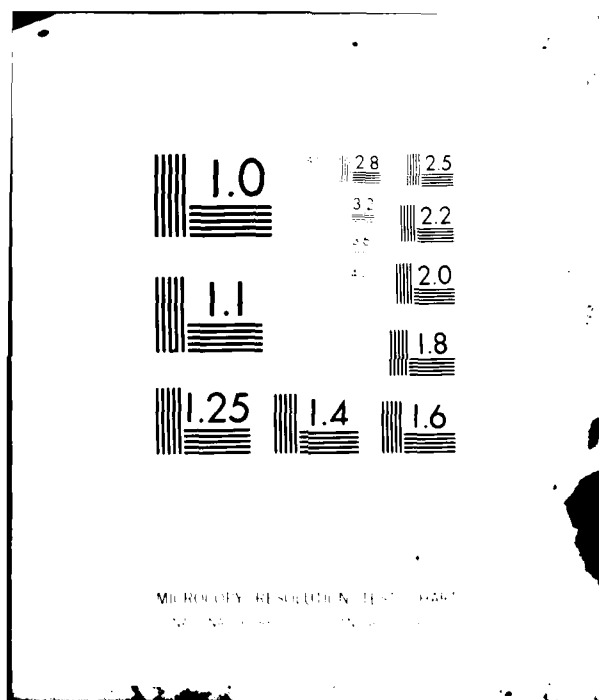
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BIOCULTURAL STUDIES IN THE GAINESVILLE LAKE AREA

LEVEL II

by
Gloria May Caddell,
Anne Woodrick, and Mary C. Hill

VOLUME IV
OF
ARCHAEOLOGICAL INVESTIGATIONS
IN THE
GAINESVILLE LAKE AREA
OF THE
TENNESSEE-TOMBIGBEE WATERWAY

Report of Investigations No. 14
Office of Archaeological Research
The University of Alabama
1981

Prepared for
The U.S. Army Corps of Engineers,
Mobile District



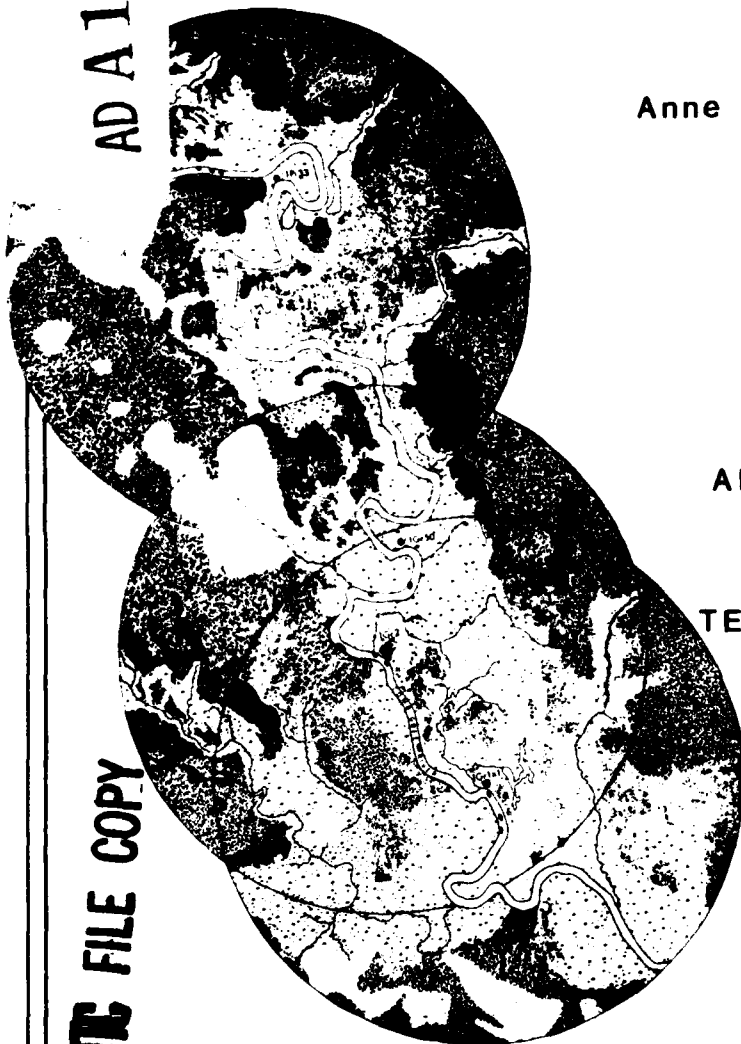
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↓ This report describes the botanical remains analyzed from five sites, 1Gr1X1, 1Gr2, 1Gr50, 1Pi61, and 1Pi33, located in Greene and Pickens Counties, Alabama, in the central Tombigbee River Valley. These five sites were excavated during 1976 and 1977 and, when taken together, represent most of the 12,000 year prehistory of the region. The 1976 and 1977 seasons at these sites marked the first time that a large sample of botanical remains from the area was systematically recovered, identified, and enumerated. In contrast, previous work utilized small samples from a few features, unsystematic recovery techniques, or failed to quantify the botanical remains. It nevertheless provided a starting point for this study, furnishing information on prehistoric plant use in the area. The previous research shows a reliance on wild plant resources from Archaic times through to the Mississippian stage, when cultivated plant remains form a large proportion of those identified.

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BIOCULTURAL STUDIES
IN THE GAINESVILLE LAKE AREA
THE TENNESSEE-TOMBIGBEE WATERWAY
TOMBIGBEE RIVER MULTI-RESOURCE DISTRICT

Plant Resources, Archaeological Plant Remains, and
Prehistoric Plant-Use Patterns in the
Central Tombigbee River Valley
by
Gloria May Caddell

An Analysis of the Faunal Remains from the Gainesville Lake Area
by
Anne Woodrick

Analysis, Synthesis, and Interpretation of the
Skeletal Material Excavated for the Gainesville Section
of the Tennessee-Tombigbee Waterway
by
Mary C. Hill

Volume IV
of
Archaeological Investigations in the
Gainesville Lake Area of the
Tennessee-Tombigbee Waterway

A Report Prepared in Cooperation with the U.S. Corps of Engineers, Mobile
District, in Partial Fulfillment of Contract No. DAC-W01-76-C-0120

Report of Investigations No. 14
Office of Archaeological Research
The University of Alabama
1981

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FOREWORD

In May 1976, the U.S. Army Corps of Engineers, Mobile District contracted with the Office of Archaeological Research, The University of Alabama, to conduct intensive archaeological investigations within the Gainesville Lake area located in Sumter, Greene and Pickens Counties, Alabama.

As per terms of contract DAC-W01-76-C-0120 extensive excavations were conducted at Sites 1Gr1X1, 1Gr2, 1Gr50, 1Pi33 and 1Pi61. The work performed on these sites has produced a voluminous amount of data. So much that the information will be presented in five volumes: Volume I, the excavations; Volume II, ceramic descriptions and chronology; Volume III, lithics; Volume IV, flora, fauna and human osteology; Volume V, synthesis.

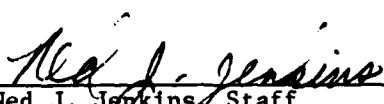
The primary goal of the Gainesville Archaeological Project is to describe and interpret the changes which occurred in the life ways of the prehistoric groups who lived in this region for over 12,000 years. Data from the earlier time periods are sketchy and incomplete; therefore, statements pertinent to those temporal units are limited. The most complete data recovered by this project pertains to the late Middle Woodland to Late Mississippian periods. The following reports are primarily descriptive; they describe the flora, fauna, and human osteology from four major sites: 1Gr1X1, 1Gr2, 1Pi33, and 1Pi61 as well as the flora from one smaller site, 1Gr50. The temporal position or cultural affiliation of the features at each site have been relative dated using the ceramic chronology which is tied to absolute time by a series of 18 radiocarbon dates. When the assignments of cultural affiliation for the features were given to the authors of this volume, two refinements in the chronology found in Jenkins (Volume II) had not been made. That is, the distinctions between Early Miller IIIa and Early Miller IIIb and Late and Terminal Miller III had not been completed. Therefore, in this report all Early Miller III features are referred to by that designation and all Late and Terminal Miller III features are referred to as Late Miller III.

This volume is composed of three separate reports which have been contributed by four authors. The floral report has been prepared by Gloria Caddell, and the faunal report by Anne Woodrick with an accompanying appendix written by Cailup Curren. Finally, the human osteology section has been prepared by Mary Cassandra Hill. Each contribution has been included as a separate report.

Gloria Caddell would like to express her thanks to: Dr. C. Earle Smith, Jr., for providing guidance during all phases of the floral analysis; Dr. Joseph O. Vogel and Dr. Kenneth R. Turner, for editing drafts of the floral report; Laura Knott and Daniel Ames, for assisting in the chemical flotation and sorting of the plant remains; and Nancy B. and David L. Asch, for allowing use of the comparative collections at the Northwestern University Archaeological Research Center, and aiding in the identification of the plant remains.

Anne Woodrick would like to thank Dr. Elizabeth Wing of the Florida State Museum for identifying the Atlantic sturgeon bone, and Sarah Anderson of the Northwestern University Archaeological Program for providing access to faunal collections and for confirming the identification of the porcupine tooth.

We appreciate the research and writing time the authors have expended in the preparation of these reports. In addition, appreciation is due to the contract manager for this study, Jerry J. Nielsen, U.S. Army Corps of Engineers, Mobile District, for his patience during this project. Finally, recognition is due Nery Ballinger, Linda Burnett, Beverly Sigler, and Kemp White for the final typing of this manuscript.



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Carey B. Oakley, Director

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Plant Resources, Archaeological Plant Remains, and
Prehistoric Plant-Use Patterns in the
Central Tombigbee River Valley

by
Gloria May Caddell

Part I
of

Biocultural Studies
in the Gainesville Lake Area

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CHAPTER I

INTRODUCTION

Our knowledge of prehistoric plant utilization in the Southeast is derived primarily from early chroniclers and their record of the practices of historic Indians, or the attempts of ethnobotanists to produce a picture of subsistence from the plant remains at archaeological sites. In the past, plant remains were often ignored by archaeologists, who concentrated on larger, more durable remains--stone tools, bones, and potsherds, for example. Now archaeologists realize that the study of botanical remains is necessary to understanding the activities of prehistoric man. As a result, they have developed techniques for the collection of botanical evidence, and the use of these techniques in recent excavations in Alabama has resulted in the recovery of substantial amounts of botanical remains (Stowe 1970; Yarnell 1971; Cutler and Blake 1973; Griffin 1974; Smith 1974, 1975; Oakley and Futato 1975; Smith and Caddell 1977).

Archaeological activities associated with the construction of the Tennessee-Tombigbee Waterway in west Alabama have provided a record of plant use in the Tombigbee River Valley from Archaic through Mississippian times. Previously, the only research on prehistoric plant utilization in the entire Tombigbee River Valley was a discussion by Jones (1951) of botanical remains from the Bynum Mounds in Chickasaw County, northeast Mississippi. He identified honey locust seeds, cane, hickory nutshell, acorn shell, and pine cone fragments from Mound B, which, according to the current chronology (Table 1) is associated with the Middle Miller I subphase. Another feature assigned to the Middle Miller I subphase produced a quantity of passion flower or maypop seeds. Cane and hickory nutshell fragments were recovered from two burials associated with a Middle Miller III occupation.

Subsequently, three investigators described carbonized botanical remains from six sites in the valley. Smith (1975) described plant remains from four sites in the Gainesville Lake Area: 1Gr2, 1Pi12, 1Pi13, and 1Pi15. These represented occupations from the Archaic through Mississippian cultural periods. Since only the larger plant remains were recovered, interpretations were limited. Hickory nutshell was the most abundant food plant remain identified from the Archaic stage, although acorn fragments, a persimmon seed, and Liliaceae bulbs were also identified. Hickory nutshell was also the most frequent food plant remain identified from the Miller I, II, and III phases of the Woodland stage. A maize cob fragment was recovered from a Late Miller I level in the midden at Site 1Gr2, but its provenience in this disturbed midden is questionable. Acorns, Liliaceae bulbs, and five fragments of rind, possibly gourd, were identified from Miller II contexts, and persimmon seeds from Miller III context. Plant remains of Mississippian

age included maize cobs and kernels, persimmon seeds, hickory nutshell fragments, and 27 common beans; the first confirmed find of beans from an archaeological site in Alabama.

Mosenfelder (1977) analyzed the botanical remains of three Late Miller II subphase features from the L.A. Strickland site in Tishomingo County, Mississippi. She identified hickory and acorn nutshell fragments and plum, persimmon, grape, and honey locust seeds.

Blakeman et al. (1976) described botanical remains recovered during excavations at the Cofferdam site in Lowndes County, Mississippi. Their quantification was limited to a statement of relative proportion of the various floral materials. Botanical remains were associated with features from the Archaic, Transitional Archaic-Woodland, and Miller I, II and III cultural periods. Hickory nutshell was present in all features, and acorn occurred in a Miller III feature and a burial. Walnut shell was present in a Miller III phase feature and in one Miller I. A persimmon seed was identified from a Miller II phase feature. The Cofferdam site contained the earliest corn reported in an undisturbed context from the Tombigbee River area. Eighty-seven corn cupules and one kernel were identified from Middle Miller III contexts.

The following describes the botanical remains analyzed from five sites, 1Gr1X1, 1Gr2, 1Gr50, 1Pi61, and 1Pi33, located in Greene and Pickens Counties, Alabama, in the central Tombigbee River Valley. These five sites were excavated during 1976 and 1977 and, when taken together, represent most of the 12,000 year prehistory of the region. The 1976 and 1977 seasons at these sites marked the first time that a large sample of botanical remains from the area was systematically recovered, identified, and enumerated. In contrast, previous work utilized small samples from a few features, unsystematic recovery techniques, or failed to quantify the botanical remains. It nevertheless provided a starting point for this study, furnishing information on prehistoric plant use in the area. The previous research shows a reliance on wild plant resources from Archaic times through to the Mississippian stage, when cultivated plant remains form a large proportion of those identified.

This report intends to add to our knowledge of plant use and human subsistence in the Tombigbee River Valley. A description of the environment in the study area prior to extensive settlement and development attempts to gain a perspective on the most probable floral resources available to a prehistoric population. The botanical data from each site will be presented, with some suggestions of occupational seasonality, associated subsistence activities, and settlement patterns. Following this, hypotheses relating to changes in subsistence patterns through time will be formed, which may be tested in future excavations. Most of the plant remains analyzed are associated with the Late Miller II through Mississippian cultural periods. Interpretations will therefore concentrate on changes in plant utilization and subsistence during this time.

CHAPTER II

THE NATURAL ENVIRONMENT

Sites 1Gr1X1, 1Gr2, 1Gr50, 1Pi61, and 1Pi33 are located on alluvial terraces within the central Tombigbee River Valley of west central Alabama, in the Gainesville Lake area. Site 1Gr1X1 is situated on the east bank of Turkey Paw Branch, 1500 feet north of its confluence with the Tombigbee River. Its legal location is Township 22 North, Range 2 West, the northeast quarter of the northwest quarter of Section 25 (Gainesville, Ala. U.S.G.S. 7.5' Series).

Site 1Gr2 is situated on the second or upper terrace of the Tombigbee River, 170 feet from the water's edge. Wilkes Creek flows into the Tombigbee River 500 feet northwest of 1Gr2. The site is located in Township 22 North, Range 2 West, the northeast quarter of the southwest quarter of Section 3 (Warsaw, Ala. U.S.G.S. 7.5' Series).

Site 1Gr50 is located in the neck of Cooks Bend, 500 feet north of the eastern bank of the Tombigbee River at river mile 293.5. A natural spring on the northwestern edge of the site flows from the terrace edge year-round. The legal location of the site is the northeast quarter of the southwest quarter of Section 26 of Township 23 North, Range 2 West (Warsaw, Ala. U.S.G.S. 7.5' Series).

Site 1Pi61 is situated on the upper terrace of the Tombigbee River, some 250 feet from the east bank. The legal location is Township 24 North, Range 2 West, the southwest quarter of the southwest quarter of Section 21 (Aliceville South, Ala. U.S.G.S. 7.5' Series). An oxbow lake lies approximately 2000 feet south of this site, and is fed by an unnamed stream.

Site 1Pi33 is located on the western side of the Tombigbee River, in a sharp bend, at river mile 310.5. The specific location is Township 24 North, Range 2 West, the southwest quarter of the southeast quarter of Section 9 (Aliceville South, Ala. U.S.G.S. 7.5' Series).

GEOLOGY

Geologically, the area lies within the Gulf Coastal Plain. The oldest Gulf Coastal Plain deposit in Alabama is the Tuscaloosa formation of the Upper Cretaceous. Overlying it are two other Cretaceous formations, the Eutaw formation and the Selma Chalk group. Areas underlain by the Selma group form the Black Belt, named for its characteristic deep, dark soils. The Tombigbee River cuts through the Eutaw formation and the Demopolis and Mooreville

Chalks of the Selma group, depositing alluvium on land adjacent to it and its tributaries (Clark 1972:108-110). The sites are located on the alluvial terraces.

CLIMATE

The climate is temperate. The average year-round temperature is 65°F. (Harper 1943:159) ranging from a mean minimum temperature of 41°F. in January to a mean maximum temperature of 91.3°F. in June and July at the closest weather station, located in the mid-Coastal Plain (Clark 1972:111-112). The average July temperature is 81°F., and the average January temperature is 48°F. (Hays 1973:14). The average date of the first killing frost falls somewhere between October 25 and 30, and the average date of the last killing frost between March 25 and 30 (Hays 1973:12-13). Mean annual precipitation varies from 50 to 54 inches. Rainfall occurs mainly in the winter and spring months, and summer rainfall is sparse compared to areas immediately to the north and south (Harper 1943:159). The lower summer rainfall and high summer temperatures promote annual droughts in the upland areas of the Black Belt (Clark 1972:110).

VEGETATION

Clark (1972:112-115) has suggested that the major vegetational categories in the study area prior to extensive disturbance, and therefore available to aboriginal populations, were:

- (1) a swamp forest complex along the major streams,
- (2) a prairie-forest mosaic, characterized by patches of grassland interspersed with oak-hickory forest, to the west of the Tombigbee River, and roughly corresponding to the Black Belt, and
- (3) an oak-hickory forest complex to the east of the Tombigbee River, which contained two large patches of prairie.

It has been suggested (Munson et al. 1971:412) that, when considering the economic activities of a prehistoric group, the micro-environments immediately adjacent to a site are more relevant than major vegetational categories. Therefore, such zones were delineated in order to produce an anthropologically useful description of site ecology in terms of the resources immediately available to a prehistoric population, and to derive from this considerations relative to settlement location.

The areas contained within a 10 km radius of Site 1Gr1X1, 1Gr2, and 1P161 were mapped (see Figure 1). Higgs (1975:ix) suggested that the "site territory," or the "territory . . . which would have been habitually exploited by the inhabitant of [a] site," is an area lying within two hours' walk of a site for hunters and gatherers. This approximates the area contained within a 10 km radius. The areas mapped for Sites 1Gr1X1, 1Gr2, and 1P161 contain Sites 1P133 and 1Gr50 and most of their respective "site territories." These areas contain all or portions of T21N R1-2W, T22N R1-3W, T23N R1-3W, T24N R1-3W, and T22S R15-16W.



Figure 1. Vegetation Zone Reconstruction

The choice of a 10 km radius does not mean to imply that the inhabitants of these sites were so locally restricted that they derived their total subsistence from such a small area. As Wobst (1978:304) notes, although hunter-gatherers articulate strongly with their local environment, they may also be the least restricted by it, due to the wide range of food sources exploited by them, as well as the "weak development of facilities, storage, ownership, and claims to the land." While agriculturalists would experience difficulty, hunter-gatherers can move more easily under extreme conditions, either "redefining their catchment area" or their food supply. He also notes that the plant and animal food sources of hunter-gatherers are not as spatially limited within a catchment area as are those of many agriculturalists.

Therefore, the areas plotted may be those exploited habitually by prehistoric peoples at the time they occupied the sites, but it must not be assumed that their activities were limited solely to this area, particularly on a year-round basis. There is substantial evidence (Swanton 1946:255-265) that, even into historic times, the Indian populations were never so restricted.

A fairly accurate picture of the tree cover prior to extensive settlement and development can be reconstructed from the United States General Land Office Survey notes and plats, housed in the State Archives in Montgomery, Alabama. The study area was surveyed in 1820, 1832, and 1834. The surveyors consistently recorded certain topographical and botanical data along section lines: the general forest and underbrush composition, the common names of at least two trees at each section and quarter section corner, the slope of the land, and land quality. A map or "plat" of each township and range was drawn by the General Land Office from the field notes.

The survey notes and plats, U.S.G.S. topographical maps, and a previous reconstruction of Sumter County "prairies" (Jones and Patton 1966) were used to reconstruct the early 19th century vegetation. A composite map of the original plats served as the base map. The procedure generally followed that of Lewis (1974). The common names of selected "bearing" or "marker" trees were recorded on the map, using color-coded symbols. Trees were selected for plotting if they displayed a known restriction to a particular habitat. Ecotonal boundaries were also recorded where this information was supplied by the surveyors. For purposes of this study, the "red oak" as recorded by the surveyors is considered to be Quercus rubra, the black oak, Quercus velutina, and the white oak, Quercus alba. However, it cannot be certain that the common names of these oaks as recorded by the surveyors correspond to these species.

The composite map was studied to ascertain whether particular trees clustered. The distributions of different trees could be correlated with present-day elevations from U.S.G.S. topographical maps, and the gross outlines of four zones could be defined. Tables 2-5 summarize the composition of these zones as determined from the General Land Office Survey notes from 1820, 1832, and 1834.

The first zone is the flood plain forest, which occurs on stream banks, low natural levees, and on stream terraces which are occasionally flooded. This complex corresponds to what Hosner (1962:299) has termed the first bottoms of the Southern Bottomland Hardwood Region: those lands which are "formed by the present drainage system and are subject to frequent flooding." Hosner (1962:305) indicates that the "recognition of specific forest types" in the first bottoms is very difficult. This was found to be true in the study area because of the extremely heterogeneous mixture of trees. Thirty-eight different trees were recorded by the surveyors in the flood plain forest. Hickory trees were the most common, forming over 16 percent of those recorded. Red oak, tupelo gum, post oak, ash, pine, and white oak each formed 5 to 10 percent of the total. Hackberry, elm, sweetgum, Spanish oak, willow oak, maple, black oak, hornbeam, bay, linden, sassafras, sycamore, cypress, and blackjack oak each made up 1 to 5 percent of the total, the remainder consisting of water oak, birch, chinquapin, mulberry, swamp oak, beech, locust, laurel oak, ironwood, redbud, cottonwood, willow, chestnut, dogwood, walnut, persimmon, and holly.

There are several divisions of the flood plain forest which should be noted even though they could not be delineated on the map. It has been shown (Lewis 1974:9; Hosner 1962:299) that, in a flood plain, the distribution of species is affected by very slight elevation changes. On the low banks and natural levees adjacent to the river, the characteristic trees are cypress, tupelo gum, cottonwood, willow oak, maple, willow, and sycamore. The dominant trees around sloughs and swamps are cypress and tupelo gum. Mixed oaks are found on the higher ridges, which according to Hosner (1962:299) are the "banks or 'fronts' of former stream courses." The vegetation on these ridges was observed to be similar to the vegetation of the even higher slopes and was mapped as such. The lower land between ridges is called flats (Hosner 1962:299), and is characterized by sweetgum, water oaks, and water hickory.

The second major zone delineated is the vegetation of the terraces and slopes, usually 20 to 50 feet above river level. The general composition consists of mixed oaks, hickories, and pine. Twenty-three different trees were recorded by the surveyors in this zone. Post oak, black oak, hickory, white oak, and pine each made up 11 to 17 percent of this forest; blackjack oak and red oak comprised 6 to 7 percent each. Spanish oak, gum, redbud, water oak, maple, and plum comprised between 1 and 4 percent each; the remainder was made up of lesser quantities of persimmon, sweetgum, mulberry, dogwood, haw, sassafras, sourwood, ash, cedar and linden.

The third forest zone delineated was the upland forest. This complex usually starts about 50 feet above river level. Here the species composition is of a much different nature, blackjack oak comprising 30.1 percent of the trees recorded and post oak forming 28.1 percent. Red oak, hickory, and black oak occurred in substantial numbers, each making up 8 to 12 percent of the total. Associated trees were pine, ash, sweetgum, water oak, black gum, persimmon, hackberry, redbud, red haw, elm, white oak, sassafras, buckeye, mulberry, and plum.

The final vegetation zone was grassland, which was essentially treeless. The surveyors called this land "prairie," although its true nature has been a source of debate in recent years (Rostlund 1957; Jones and Patton 1966). The only trees noted in these areas were blackjack oak, post oak, white oak, black oak, and red oak, and these occurred only sporadically.

Several other plant communities should be mentioned. Fields and clearings could have supported a variety of weedy plants with edible seeds and vegetative parts. Genera such as Passiflora, Chenopodium, Amaranthus, Rubus and Phytolacca thrive on disturbed soil. Edges of lakes and sloughs would provide an abundance of edible aquatic and border plants, such as cat-tails, pond nuts, pond lilies and Sagittaria. Cane ridges, often mentioned in the survey notes, were a valuable source of material for technological purposes, and cane seeds are edible.

In general, topographic features on the plats correspond well with modern features. One major change in the course of the Tombigbee River was observed. At the time of the surveys, the river meandered to the eastern edges of Sections 10 and 15 of Township 24 North Range 2 West, while today it touches the western edges of these sections. Therefore, the bend in which Site 1Pi33 is located extended approximately one mile further east in the early 19th century. Smaller streams generally follow the same courses today as in the early nineteenth century. Several lakes were present on the survey plats which are not present on the U.S.G.S. topographical maps; these, however, correspond to swampy areas today and were possibly only seasonally inundated.

Within a 10 km radius of Site 1Gr1X1 there were approximately 135 km² of flood plain forest, 83 km² of slope forest, 67 km² of upland forest, and 16 km² of grassland available for exploitation. Within the same radius of Site 1Gr2 were approximately 111 km² of flood plain forest, 88 km² of slope forest, 65 km² of upland forest, and 16 km² of grassland. Within a 10 km radius of Site 1Pi61 there were 65 km² of flood plain forest, 114 km² of slope forest, 83 km² of upland forest, and 28 km² of grassland.

In terms of available wild flora, the inhabitants of all sites were situated within easy access to a wide variety of resources. In addition to the foods and other products provided by the trees in the above zones, the undergrowth in each zone would provide fruits, seeds, greens, roots, and tubers. Grapes, pawpaws, hawthorns, sumac fruits, groundnut tubers, and Smilax roots are examples of items which would have been available.

In discussing food availability, mention should be made of the annual productivity of nut-producing trees in the area, since these seem to have been a staple plant food throughout the long hunting and gathering period in the central Tombigbee River Valley. Table 6 summarizes the frequencies of abundant crops for nut-producing trees. Individual hickory trees produce a good crop from once a year to one crop every five years. Productivity ranges from two to

three bushels of nuts in a good year, usually with light crops in intervening years (U.S.D.A. Forest Service 1948:110).

Walnut trees produce abundant crops irregularly, about two good crops in five years, with light crops borne in the intervening years (U.S.D.A. Forest Service 1948:202-203; Fowells 1965:204). Frequencies of abundant crops for acorns vary from almost every year to one crop every ten years among individual oak trees. The average yield of acorns per tree is also highly variable. In Missouri, field studies reveal that, on the average, white oak trees (Quercus alba) produce from 0 to 1,900 mature acorns per tree per year. The average number per tree varied from one county to the next, averaging 700 in one county and 1,100 in another. Specific trees were found to be either consistently good or consistently poor seed producers (Fowells 1965:590).

These variations in abundant nut crops would inhibit dependence on any particular species of tree. The site territory would no doubt be enlarged if poor years for several species occurred simultaneously. The subsistence behavior of the inhabitants would undoubtedly have been flexible enough to deal with such variations in food availability.

CHAPTER III

FIELD AND LABORATORY PROCEDURES

Botanical remains were recovered during the 1976 field season at Sites 1Gr1X1, 1Gr2, and 1Pi61. Excavations at Site 1Pi61 were continued during 1977 and two additional sites, 1Gr50 and 1Pi33, were excavated. The procedures for each site were slightly different, and a summary of these is presented here. In order to be consistent with prior excavations in the Gainesville Lake area, English linear measurements were used in the field. For purposes of clarity, they will be retained here when describing excavation procedures.

SITE 1Gr1X1

The basic excavation unit at this site was a 10 by 10 foot square. Five of these were dug in arbitrary 0.5 foot levels. All soil from the excavation squares was screened through one-quarter inch mesh; but the fill from one unit, designated a "control square", was waterscreened through one-quarter and one-sixteenth inch nested screens. A one gallon sample of soil was also saved from each excavation level of the control square for special processing in order to recover plant remains smaller than those caught in the one-sixteenth inch waterscreen. The fill from all features was also waterscreened through one-quarter and one-sixteenth inch mesh, and one gallon soil samples were taken from each feature.

Following excavation of the 10 by 10 foot squares, the topsoil was removed from a portion of the site. Exposed features, post-holes, and burials were excavated, and the fill was waterscreened through one-quarter and one-sixteenth inch mesh. A one gallon sample of soil was saved from each feature.

SITE 1Gr2

Six 10 by 10 foot units were excavated at Site 1Gr2. These units were dug in arbitrary 0.5 foot levels except the control unit. This unit was excavated in both natural zones and arbitrary 0.2 foot levels. Fill from the control unit was waterscreened through one-quarter and one-sixteenth inch mesh, and fill from other units was screened only through one-quarter inch mesh. A single one gallon sample of soil was saved from each level of the control square for special processing.

After the excavation of the test units, the site was mechanically stripped. Features exposed in this manner were excavated,

and their fill was waterscreened through one-quarter and one-sixteenth inch mesh. A one gallon soil sample was taken from each feature.

SITE 1P161

During the 1976 field season, five 10 by 10 foot squares were excavated at this site. Vertical control was maintained by 0.5 foot levels, except for the control square, which was excavated in 0.2 foot levels. The fill was first dry screened through one-quarter inch mesh, and then waterscreened through one-quarter inch mesh. The large amount of clay in the soil precluded screening through a smaller mesh. All features encountered in the test units were waterscreened through one-quarter inch mesh, and one gallon samples of soil were saved from each.

After the excavation of the test units, the midden was stripped from the site. Features were excavated and their fill was waterscreened through one-quarter inch mesh. Soil samples (one gallon) were saved from all features.

The site was stripped again in 1977 and additional features were excavated. At this time, about 13 gallons of fill from each non-burial or undisturbed feature were waterscreened through one-sixteenth inch mesh in addition to the one-quarter inch mesh. Soil samples were also saved from all features.

SITE 1Gr50

Nine 5 by 5 foot test units were excavated at this site. Vertical control was maintained by arbitrary 0.5 foot levels. The soil from excavation units was dry screened through one-quarter inch mesh. A bulldozer then removed the topsoil from a portion of the site. The fill from features was dry screened through one-quarter inch mesh and two gallons of soil from each feature were saved for special processing.

SITE 1P133

Twenty-six 5 by 5 foot test units were excavated during the 1977 field season at this site. All units were excavated in arbitrary 0.5 foot levels, and their fill was waterscreened through one-quarter inch mesh. All soil from features was waterscreened through one-quarter inch mesh. Fill from non-burial pits, as well as soil from structures, was waterscreened through one-sixteenth inch mesh. A single one gallon soil sample was saved from each feature, except Feature 51 and Structure 1. Feature 51 was a large stratified pit feature 4.5 feet in diameter and 4.3 feet deep. The first or NE half was dug in arbitrary 0.5 foot levels. Soil samples (one gallon) were saved from each level. The second or SW half was dug in natural zones, and one gallon soil samples were also saved

from each zone. Analysis of these samples indicated there were no vertical differences in distribution of plant remains. Therefore, this material was combined in Table 27. Structure 1 was a large circular structure. It was divided into quarters for horizontal control and three zones (daub layer, floor, and below floor) for vertical control. Soil samples (one gallon) were saved from each quadrant and level. However, only quadrant 4 and the central hearth were analyzed for plant remains. After the excavation of these units, the topsoil and midden were removed from a strip, 30 feet wide and 420 feet long, through the center of the site. All exposed features were treated as above.

LABORATORY PROCEDURES

Both the waterscreened samples and the soil samples provided large quantities of plant remains. For each site, features were selected for analysis, and in all cases, only a sample of the plant remains from the selected features could be analyzed. The sampling procedures differed from one site to the next, and these are detailed in Chapter V, in which plant remains from each site are discussed.

In general, all plant remains from the one-quarter inch waterscreen from features and excavation units selected for analysis were entirely sorted and weighed. The large quantity of charcoal recovered in the one-sixteenth inch waterscreen made sampling imperative in almost every case, however. It was decided, after analyzing several subsamples of the one-sixteenth inch plant remains from two features, and comparing the results, that a subsample of approximately 20 g would be representative of the plant remains in the entire sample. Of the 87 samples from features and excavation units which were subsampled in this manner, at least 10 percent of the charcoal was analyzed from 74 (85 percent). A Riffle-type sample splitter was utilized to divide the sample. Material poured into the sample splitter is divided by chutes into two representative samples. Material may be repoured until the desired amount is obtained. The charcoal was chemically floated out of the material from the one-sixteenth inch mesh, which contained small pieces of bone, shell, lithics, and ceramics. A zinc chloride solution was used, and procedures outlined by Struever (1968) were followed.

The soil samples were carefully washed through a 0.495 mm mesh to insure the recovery of small seeds. The charcoal was separated from the heavier debris by chemical flotation, using a zinc chloride solution with a specific gravity of 1.62.

All fractions were examined under a binocular microscope with a 7x to 40x magnification. Seed identification manuals (Fowells 1965; Martin and Barkley 1961; U.S.D.A. Forest Service 1948; Landers and Johnson 1976), personal field collections, and herbarium collections at the University of Alabama and the Northwestern University Archaeological Research Center in Kampsville, Illinois, were used for the identification of the plant remains.

The total contents of some features were saved for laboratory processing. These included all corn cob-filled pits excavated at Sites 1Gr2, 1Pi61, and 1Pi33, and a small acorn-filled pit at Site 1Pi61. The total fill from these features was carefully washed through a 0.495 mm mesh in the laboratory.

All uncarbonized plant remains including uncarbonized seeds were assumed to be modern contamination. Uncharred remains were not sorted.

CHAPTER IV

INHERENT METHODOLOGICAL DIFFICULTIES

Many interpretative problems are encountered when one attempts to infer patterns of human subsistence behavior from the botanical remains recovered from an archaeological site. The kinds and quantities of carbonized plant remains are affected by:

- (1) the potential for preservation of each plant part;
- (2) the method of plant gathering, processing, and the means and rate of utilization by a prehistoric population;
- (3) activities on a site after it has been abandoned by a prehistoric population; and
- (4) the recovery, laboratory processing, and identification methods of the archaeologist.

In order to be included in an open archaeological context, plant part remains must be thoroughly carbonized. Most plant parts burn to ashes when placed in a fire. Munson et al. (1971:427) categorize vegetal products by the likelihood of their preservation. Their first group includes dense plant parts which have a high inherent potential for preservation. These include nutshells, corn cobs, fruit pits, and the shells of gourds and some squashes. The second group of plants also have portions which are somewhat dense, but are usually ingested. The small, edible seeds of weedy plants, the nut meats, corn kernels, and squash seeds belong in this group. These would be carbonized accidentally and less frequently preserved than the first group. The third group consists of plant foods with a high water content that carbonize only infrequently. These are the tubers, pulpy fruits without pits, and "greens." Their occurrence is much less frequent than that of the first two groups.

Certain plants are more liable than others to be in a situation where they could be carbonized. Vegetal products which were dried or otherwise processed over or near a fire, or those used as fuel, would be more likely to occur as carbonized fragments than those not processed near a fire. Inedible parts of food plants would be more likely to be thrown into a fire than edible portions. Thus, nutshells, fruit pits, and corn cobs generally occur more often than corn kernels, nut meats, and the fleshy parts of fruits.

Utilization of a plant cannot always be inferred from the presence of a part in an archaeological sample. Since more modern seeds than carbonized prehistoric ones were found in samples from the Koster site, Asch et al. (1972:12) questioned whether the occurrence of the carbonized seeds might have been the result of natural dispersal and accidental burning rather than a true cultural by-product. At Site 1Gr1X1, 79 carbonized seeds and 425 modern seeds were recovered in the same samples. Site 1Gr2 produced 139

modern and 153 carbonized seeds. As Asch et al. (1972:12) suggest, a "background of prehistoric 'contamination' is to be expected among the carbonized seeds."

Activities on a site after it is abandoned may significantly affect the remains so that materials once present may not survive for the archaeologist. Various modern and prehistoric activities, such as pit digging, farming, fence and palisade construction, and animal burrowing greatly disturb the matrix of many sites.

Recovery techniques may create imbalances. The harshness of the waterscreen techniques certainly influences samples in favor of the more durable plant remains. Soil samples, taken at the excavator's discretion, do not necessarily reflect the variability in content throughout a feature. Often the upper portions of features are removed when sites are stripped, leaving samples which represent only fractions of the original residue.

Laboratory processing, especially the size of mesh used, also influences the contents of floral samples. The samples were carefully washed through a 0.495 mm screen to recover small seeds. The value of the soil samples for the recovery of small seeds is demonstrated by the 1G1X1 samples. Of 79 carbonized seeds, 32 were recovered in soil samples washed through a 0.495 mm mesh. Approximately 1,328 g of charcoal were analyzed from the waterscreened fill, but only 90 g from soil samples were analyzed. Although soil samples provided only 6.3 percent of the total weight of charcoal examined, 40.5 percent of the seeds were recovered from soil samples.

This situation occurred even more dramatically in samples from Site 1Pi61. Of 383 seeds recovered, 370 were found in "soil samples." Soil samples from this site provided 43.66 percent of the charcoal analyzed by weight, but 96.61 percent of the seeds recovered. Most features at this site were only waterscreened through one-quarter inch mesh, and not one-sixteenth inch, so we would expect fewer seeds in the waterscreened material. The fill from Feature 15, however, less the one gallon sample, was waterscreened through one-quarter inch mesh, and 13 gallons of the fill were screened through both the one-quarter and the one-sixteenth inch screens. Four seeds were identified from the one-quarter inch sample, two from the one-sixteenth inch screen, and 208 from the soil sample.

The soil samples yielded plant remains of all sizes, and, because different types of nutshells tend to fracture into different sizes of pieces, an attempt should be made to recover as much of this variation as possible. For example, walnut breaks into larger pieces than acorn, and while it is often recovered from the one-quarter inch screen samples, acorn is rarely recovered from this size screen. A comparison between the one-quarter inch samples and soil samples from each phase from Site 1Pi61 will demonstrate this (see Table 20). From Late Miller II contexts, no acorns were recovered in the one-quarter inch sample, but they formed 38.6

percent of the charcoal from the soil samples. The same situation is shown by samples from every other cultural period at the site, although the discrepancy is not so large as that in the Miller II samples. The true percentages are probably nearer those reflected in the soil samples, while the one-quarter inch waterscreened samples are heavily skewed by differential recovery. A one gallon sample of soil cannot be assumed to correctly represent all the contents of a feature, but several samples taken at regular intervals might.

Even if preserved and recovered, certain plant portions are very difficult to identify. Many can be identified only as a tuber, berry, nutshell, etc., but cannot be identified to a particular genus or species. The statistics will be biased, therefore, in favor of those fragments which are identifiable. For Sites 1Gr1X1 and 1Gr2, attempts were made to identify plant remains which did not pass through a one-sixteenth inch screen. If a nutshell fragment was too small to display characteristics identifying it as a hickory, walnut, or other nutshell, it was put into the "unknown" category. Therefore, there are large percentages of "unknown" fragments for these two sites, and most of the "unknowns" are small fragments of nutshells. As identification procedures were refined, only fragments which did not pass through a 2 mm screen were analyzed, and nutshells without diagnostic characteristics identifying them as to genus were placed in a taxon called "Juglandaceae." This was subsequently divided into hickory and walnut on the basis of their proportions in the identified material. The weights of components in the samples were approximated by multiplying the total sample weight by their percentage of occurrence in the charcoal fraction larger than 2 mm.

Although methods are being refined to insure that the contents of botanical samples as nearly as possible represent the composition of plant remains present at a site, the floral samples directly reflect neither the importance of each food item in the diet nor the entire spectrum of plants utilized. Keeping in mind the limitations imposed on interpretations as discussed above, some statements may be made when several samples from the same site or from the same archaeological context are available for comparison. The proportions of different plant components in one assemblage may not indicate their relative importance, but a change in the proportions from one assemblage to another may indicate changes in their frequency of utilization (Asch and Asch 1975:116). It may also reflect differences in preservation or recovery, differences in laboratory treatment, or a number of other things.

For certain classes of food plant remains, relative intensity of utilization may be indicated by their frequencies of occurrence on the site. The proportions of hickory, acorn, and walnut may be compared one to another because they are the same type of food remnants. The amount of seeds cannot be readily compared to nut shells, since they are dissimilar classes. Although the ratio of seeds to nuts at a site may not indicate their relative importance to subsistence, a change in the ratio from one phase to another may indicate a change in emphasis (Asch and Asch 1976b:13-14). Caution

should be used when interpretations are based on seed:nut ratios, because the presence of seeds may be the consequence of natural dispersal and accidental burning, and may not reflect utilization. Most of the seeds recovered from the Gainesville Lake area in this study could easily have been incorporated accidentally into the sample. For this reason, seed:nut ratios were not computed for this report.

Sample size is also of importance when making statements about subsistence. One feature or several features from a phase cannot be expected to reflect all the economic activities of that phase. The variability in contents between features analyzed from any particular phase, as reported in Chapter V, will substantiate this.

Plant remains have often been used as evidence of seasonal occupation of a site. The month or season in which a certain plant matures, however, may not necessarily be the season in which it was utilized. From ethnographic reports (Swanton 1946:363, 372-374), we know that corn, nuts, and all kinds of fruits which could be dried were stored for the winter months. Seeds often remain on plants long after they mature, so their inclusion in the archaeological record does not necessarily restrict the occupation to their season of maturity. Plant parts available in the winter and spring months are mostly vegetative, and these would carbonize only rarely. Caution should be used when making interpretations of seasonal occupations based on plant remains.

Therefore, only general statements about subsistence and settlement patterns may be made on the basis of floral remains from archaeological sites. The conclusions presented in the following chapters are tentative, and should be considered as hypotheses to be tested during further investigations in the area. The trends in subsistence and plant utilization discovered at these sites must be replicated at other sites before general statements about prehistoric subsistence in the central Tombigbee River Valley can be made.

CHAPTER V

ARCHAEOLOGICAL PLANT REMAINS

This chapter presents the botanical data from Sites 1Gr1X1, 1Gr2, 1Pi61, 1Gr50, and 1Pi33. Some interpretations of subsistence and seasonality of occupations at each site will also be offered. A summary of plant remains from each cultural period is given at the end of this chapter. Samples from several of the features examined were submitted for radiocarbon dating, and Table 7 lists the dates obtained.

A list of all plants represented in the samples is given in the Appendix, along with information on habitat, seasons of availability, and ethnographic records of their utilization by Indians of the United States.

SITE 1Gr1X1

Excavation uncovered three major components and three lesser ones. The major components consisted of Late Miller II and Miller III feature complexes and an Early Archaic matrix underlying the Woodland midden. Lesser components consisted of sparsely represented Late Archaic, Broken Pumpkin Creek, and Henson Springs components. Forty-nine features were excavated in 1976, and 25 of these were examined for botanical remains. The remainder were considered to be too highly disturbed for reliable analysis. One feature was analyzed from the Early Archaic period, two from the Broken Pumpkin Creek phase of the Middle Gulf Formational period, 13 from the Late Miller II subphase, one from the Early Miller III subphase, and eight from the Middle Miller III subphase.

There were approximately 8,325 g of plant remains from the waterscreened fill from these features. Thirteen percent (1,108 g) was sorted into plant components. The plant remains from the one-quarter inch waterscreen were entirely sorted, but subsamples were taken of the material from the one-sixteenth inch waterscreen. Percentages of components in the total sample were approximated on the basis of their percentage occurrence in the subsamples. The soil samples from these features yielded an additional 85 g of plant remains, which was scanned for additional components, particularly small seeds. Table 8 lists the contents of each feature, and a summary of the floral remains by provenience is given in Table 9. Table 10 gives percentages of the various nuts identified from each period expressed as percentages of the total nuts identified.

The waterscreened fill from excavation levels of Square 450NR500 provided 1,441 g of plant remains. The results of the analysis of the material from this unit are presented in Table 11.

Of this, 220 g were sorted. The soil samples taken from each level produced an additional 5 g of plant remains. There was a great deal of mixture in the midden at the site, and levels in the control square cannot be assigned to particular cultural phases or periods. It could be determined, however, that the midden from the surface through Level 4 was mixed Miller II and III, and that from Level 5 down was deposited during the Archaic stage.

Archaic stage

The only food plant remains recovered from features assigned to the Early Archaic period, Late Archaic period or Broken Pumpkin Creek phase, and excavation units assigned to the Archaic stage were hickory (Carya spp.) nutshell fragments and acorn (Quercus spp.) shell fragments. The absence of other food plant remains does not necessarily mean that they were not being utilized, however. The narrow spectrum reflected in the archaeological record is most probably the result of differential preservation and the small sample of botanical remains from this period. From the botanical evidence, it is suggested that the site was occupied at least sometime during the fall, when both hickory nuts and acorns are available, and possibly during other seasons if the nuts were stored for any length of time.

Woodland stage

Late Miller II subphase. The greater quantity of plant remains recovered from this period allows some discussion of subsistence. Of botanical remains analyzed, hickory (Carya spp.) comprised 10.09 percent, acorn (Quercus spp.) 1.1 percent, walnut (Juglans nigra) 0.16 percent, and wood charcoal 21.22 percent. The actual percentage of hickory is larger than 10 percent, however, since the greater part of the unknown material is smaller, fragmented pieces assignable to the Juglandaceae. Most of this may be hickory, since walnut otherwise comprises such a small percentage of the sample. This is the earliest occurrence of walnut at the site, and it is ubiquitous in the Late Miller II samples, occurring in 10 of 13 samples.

Thirty carbonized seeds were also identified from samples from this subphase: 7 persimmon (Diospyros virginiana), 1 pigweed (Amaranthus sp.), 1 maygrass (Phalaris caroliniana), 11 grape (Vitis sp.), 1 partridge-pea (Cassia fasciculata), 1 pokeweed (Phytolacca americana), 1 sumac (Rhus sp.), 1 palmetto (Sabal cf. minor), 1 honey locust (Gleditsia triacanthos), 1 hawthorn (Crataegus sp.), 2 fescue (Festuca sp.), 1 seed belonging to the sedge family (Cyperaceae) and 1 to the bean (Fabaceae) family. Also identified were 1 tuber fragment, 4 insect galls, the base of a monocot stem, possibly cat-tail (Typha sp.), grass stems, a possible Liliaceae bulb fragment, and some pine cone fragments.

No seeds were present in quantities large enough to argue convincingly for their use as food. The ubiquity of persimmon and

grape seeds (persimmon in 5 and grape in 6 of 13 features) is the best indication that these were indeed a food source. Utilization of a particular plant could be suggested if it could not have grown on or near the site, or if its seeds are too heavy to be windborne. All seeds found in Miller II contexts are from plants that could have grown either on the site or in the nearby forest. However, it is unlikely that the occurrence of persimmon, grape, or palmetto seeds in the samples can be attributed to natural dispersal. The tuber fragment, Liliaceae bulb fragment, and base of the cat-tail stem probably were also transported to the site by human hands. Therefore, there is a reasonable basis for suggesting the use of persimmons, grapes, tubers, bulbs, and possibly cat-tails during this phase.

The insect galls may be present accidentally. However, insect galls are eaten today in Mexico (Smith, C.E., personal communication), and it is possible that they were eaten by these Woodland peoples.

The seasons of availability of plants represented in the Miller II samples range from late spring through fall (see Appendix). The botanical remains suggest that the site could have been occupied from at least late spring through fall, and possibly longer.

Miller III phase. One feature analyzed from the Early Miller III occupation contained hickory (Carya spp.) nutshell fragments, acorn (Quercus spp.) fragments, and black walnut (Juglans nigra) shells. Plant remains assignable to the Middle Miller III subphase were recovered from eight features, and a large variety of plant remains were present. Hickory and acorn were still the major food plant components, comprising 8.28 percent and 1.64 percent respectively of the plant remains analyzed; walnuts were 0.05 percent. The remainder of the sample consisted mainly of wood charcoal and unknown fragments, mostly assignable to the Juglandaceae. Other components were 8 goosefoot (Chenopodium sp.) seeds, 4 pigweed (Amaranthus sp.) seeds, 2 beggar-lice seeds (Desmodium sp.), 7 maygrass (Phalaris caroliniana) seeds, 1 wildbean (Strophostyles sp.) seed, 2 fescue (Festuca sp.) seeds, 1 panic grass (Panicum sp.) seed, 1 sumac (Rhus sp.) seed, 1 passion flower or maypop (Passiflora incarnata) seed, 1 blackberry or dewberry (Rubus sp.) seed, 2 grape (Vitis sp.) seeds, 1 loblolly pine (Pinus taeda) seed, 1 persimmon (Diospyros virginiana) seed, 1 seed from the aster family (Asteraceae), 1 from the morning-glory family (Convolvulaceae), 2 insect galls, and 1 fragment of a pine cone. Sixteen corn (Zea mays) cupules, 1 corn kernel, and 7 kernel fragments were also identified. The goosefoot seeds are either Chenopodium bushianum Aellen or Chenopodium berlandieri Moq., and the pigweed seeds are probably Amaranthus retroflexus L.

Again there are no seeds present in amounts large enough to justify arguing for their utilization as food. A Chenopodium plant can produce 100,000 seeds (Herron 1953), so a single plant growing on the highly disturbed soil of the site could have been responsible

for the inclusion of the chenopod seeds. However, all plants represented in the samples from the Miller III phase, with the exceptions of maygrass and wildbean, are described by ethnographers (see Appendix) as having been utilized in some way by the American Indians.

There is a substantial increase in number and variety of carbonized seeds from herbaceous weedy plants in the Miller III samples. Seven of the 30 seeds (23 percent) identified from Late Miller II contexts were from weeds which would have thrived on highly disturbed soil, while at least 27 of 34 seeds identified from Miller III contexts (79 percent) were from such plants. Persimmon, honey locust, grape, loblolly pine, and palmetto all tend to spring up in old fields and woodland borders, but are also found in forest habitats, or in the alluvial bottoms (Harper 1944). The increase in seeds from herbaceous weedy plants could be an indication of increased clearing for agricultural fields during this subphase. The presence of corn in three Middle Miller III features suggests that corn may have been planted by the occupants of the site during this time.

The seeds recovered are from plants whose fruits mature from late spring through early fall. Sumac, fescue, maygrass, and amaranth seeds mature in late spring to early summer, but the seeds could remain on the plants through the fall. The presence of corn necessitates an occupation in the late spring and early fall, for planting and harvesting. The indications from the plant remains are that the site was occupied at least some time from late spring through the fall. It may also have been occupied during other seasons if we assume that many of the seeds and fruits represented, as well as corn, were preserved for some time rather than eaten at the time of reaping or collecting.

SITE 1Gr2

This site provided the most continuous period of occupation of any investigated in the lake area. Excavations produced substantial evidence of occupations associated with the Miller I, II, and III phases as well as the Late Mississippian period. Early Archaic, Late Archaic, and Broken Pumpkin Creek phase occupations were also sparsely represented.

Thirty-eight features were examined for botanical remains. One of these was assigned to the Broken Pumpkin Creek phase, 4 to the Early Miller I subphase, 1 to the Middle Miller I subphase, 1 to the Late Miller I subphase, 1 to the Early Miller II subphase, 8 to the Late Miller II subphase, 1 to the Early Miller III subphase, 10 to the Middle Miller III subphase, and 10 to the Late Mississippian period. The cultural affiliation of Feature 44 is uncertain, but it is either Late Miller II or Early Miller III.

The waterscreened fill from these features produced 7,569 g of charred plant remains, and 1,746 g (23 percent) were analyzed.

Material from the one-quarter inch waterscreen was entirely sorted, and subsamples were taken of the charcoal from the one-sixteenth inch screen. Percentages of components in the entire sample were approximated on the basis of their occurrence in portions analyzed. The soil samples provided an additional 214.6 g of plant remains, which was scanned for small seeds and other components not found in the larger waterscreened samples. Table 12 lists the contents of each feature, and a summary of the percentages of components in samples from each cultural period is given in Table 13. Table 14 gives the percentages of the various nuts in samples from each cultural period.

Floral remains were analyzed from all levels of the control square, 540N460E, with one exception: no material was available from the midden between 1.6 and 1.8 feet below surface.

The waterscreened fill from excavation levels provided 1,824 g of carbonized plant remains. Two hundred and ninety-four grams (16 percent) were analyzed. An additional 45 g of plant remains from soil samples were scanned. Results of this analysis are presented in Table 15.

Levels in the control square can be roughly associated with cultural periods. From the midden surface to a depth of 0.8 foot, the fill represents mainly Mississippian occupations. From 0.8 to 1.0 foot the midden is primarily Miller III. The midden from 1.0 to 2.0 feet below surface is Miller I and Miller III, with some Broken Pumpkin Creek ceramics in the lower levels. Material below 2.0 feet has been assigned to the Archaic stage.

Archaic stage

Plant remains from the Archaic stage were recovered from the control square (Table 15). Hickory (*Carya* spp.) nutshell fragments and acorn (*Quercus* spp.) shell fragments comprised the bulk of the food plant remains. Additional plant remains identified were 2 grape (*Vitis* sp.) seeds, pine cone fragments, 1 goosefoot (*Chenopodium* sp.) seed, and 1 corn (*Zea mays*) cupule. The corn cupule possibly filtered down from later levels in the midden, or fell out of the profile during excavation. Corn cupules and kernels were identified from several later levels in the square. These few plant remains limit the discussion of subsistence. Archaic peoples may have occupied the site in the late summer and utilized grapes, or in the fall to gather nuts. Occupation may have been longer if we assume that the nuts were stored.

Gulf Formational stage

Broken Pumpkin Creek phase. Floral remains from this phase were recovered from Feature 89 and from mixed levels of the control square. The only food plant component identified was hickory nutshell fragments. No discussion of subsistence is possible for this phase.

Woodland stage

Miller I phase. Food plant remains recovered from the Early Miller I features were hickory (Carya spp.) and acorn (Quercus spp.) nutshell fragments. One seed which belonged to the grass family was also identified. Hickory nutshell, acorn shell, and one persimmon seed (Diospyros virginiana) were recovered from Middle Miller I contexts. The single feature analyzed from a Late Miller I occupation produced hickory nutshell fragments, acorn shell fragments, and one seed identified to the Fabaceae (bean family). Other plant remains from the Miller I phase were recovered from the control square (see Table 15). Since there is mixing of Miller I and Miller III fills, no suggestions of subsistence may be based on this material. The plant remains suggest occupations during the fall. The paucity of plant remains does not permit specific statements about subsistence, other than to say that the mast resources were utilized.

Miller II phase. The single sample from the Early Miller II subphase contained hickory (Carya spp.) and acorn (Quercus spp.) nutshell fragments and, for the first time in a sample from the site, black walnut (Juglans nigra) shells. Hickory and acorn nutshells were the most abundant plant remains from the eight features assigned to the Late Miller II subphase, and a small amount of walnut shell was recovered. Eleven carbonized seeds were also identified from Late Miller II contexts: 2 grape (Vitis sp.), 1 persimmon (Diospyros virginiana), 1 pigweed (Amaranthus sp.), 1 goosefoot (Chenopodium sp.), 1 loblolly pine (Pinus taeda), 1 palmetto (Sabal cf. minor), 1 wood sorrel (Oxalis sp.), 1 dove weed (Croton sp.), 1 from the bean family (Fabaceae), and 1 from the grass family (Poaceae). The Miller II components suggest that the site was occupied from late summer through the fall. This does not preclude occupation at any other time, however, since most of the foods represented are storable.

Miller III phase. Feature 97, assigned to the Early Miller III subphase, contained the earliest non-problematical occurrence of maize in the Tombigbee River Valley. One corn (Zea mays) kernel fragment was recovered from this feature, in addition to hickory and acorn nutshells.

Material was analyzed from 10 features from Middle Miller III contexts. Of the plant remains analyzed, hickory (Carya spp.) and acorn (Quercus spp.) nutshell were the most abundant food plant remains. Other components identified were 1 knotweed (Polygonum sp.) seed, 1 grape (Vitis sp.) seed, 2 hawthorn (Crataegus sp.) seeds, 1 possible common bean (Phaseolus vulgaris), cane fragments (Arundinaria sp.), 2 bean family (Fabaceae) seeds, and 3 mint family (Lamiaceae) seeds. Five corn (Zea mays) kernel fragments (1 from Feature 69 and 4 from Feature 96) and 3 corn cupules (1 from Feature 94 and 2 from Feature 96) were also recovered. The possible bean is an earlier context than any previously report for the Southeast.

However, it is underdeveloped, and could possibly be from a later Mississippian occupation at the site. One level in the control square was primarily Miller III, and it contained a corn cupule and a bean family seed.

The plant remains from the Middle Miller III subphase suggest that the site was occupied at least sometime during the late spring and fall, for planting and harvesting the corn. Most of the seeds would mature in late summer through the early fall, with knotweed perhaps maturing earlier.

Mississippian stage

Late Mississippian period. The composition of floral remains from the Mississippian stage differs considerably from the preceding Woodland phases. This difference may be due to the types of pit features excavated from the Mississippian occupation. All but one were small, shallow, corn cob-filled pits which will be discussed in more detail below.

Of plant remains from Mississippian features, 69.75 percent was corn, 17.43 percent was pine cone fragments, 1.69 percent was hickory (Carya spp.) nutshells, 0.12 percent was acorn (Quercus spp.) shells, and 8.34 percent was wood charcoal. Also present were 104 loblolly pine seeds (Pinus taeda), 1 persimmon seed (Diospyros virginiana), 1 grape seed (Vitis sp.), 1 maypop (Passiflora incarnata) seed, and a tuber fragment, possibly groundnut (Apios americana).

The control square from midden surface to 0.8 foot was primarily Mississippian midden. Hickory nutshell fragments, 1 persimmon seed, 15 corn cupules, and 6 corn kernels were identified from the fill.

Twenty-two measurable maize cobs were recovered during the 1976 excavations at Site 1Gr2. Nickerson (1953:81-83) notes several measurements which are of significance in differentiating between races of maize. All cobs recovered were broken, so the shape of the ear and shank diameter could not be determined. Measurements of the width of the lower glume, cupule width, internode length, and the row number could be determined, though, and these are given in Table 16. These measurements were added to those taken on 80 cobs from previous excavations at Site 1Gr2 (Smith 1975). The average row number for all cobs is 10.82, and average cupule width is 5.5 mm.

Nine kernels were sufficiently intact to allow measurements of height, width, and thickness. These measurements are given in Table 17. It can be seen that the kernels are much wider than their height, with thickness and height being about equal.

Other than a single 10-rowed cob fragment recovered in a possible Miller I context during the previous excavations at the site (Smith 1975:281), the Woodland maize is insufficiently intact

to allow an adequate description. The Mississippian maize, however, is similar to that recovered from other Mississippian sites in the Southeast and the Mississippi Valley area. The distribution of row number for the 1Gr2 maize is: 11 percent are 8-rowed, 43 percent are 10-rowed, 41 percent are 12-rowed, 4 percent are 14-rowed, and 1 percent are 16-rowed. This distribution and the mean row number of 10.8 are similar to those for the maize described by Cutler and Blake (1973, 1974:63) from Mississippian sites in Tennessee, Georgia, Alabama, Arkansas, Mississippi, and Missouri, where the bulk of the cobs are 10- and 12-rowed, with smaller percentages of 8-, 14- and 16-rowed corn.

Cutler and Blake (1974:62) describe the maize from one of these sites (with the same mean row number and similar distribution of row numbers as the 1Gr2 maize) as "predominantly a derivative of early tropical flint and popcorn, similar to Chapalote and Reventador with some evidence of northern flint." The flints and popcorns are the earliest types of corn in the eastern United States and they continued to be grown long after other corns were introduced (Cutler 1965:107 as cited by Kohler 1976). They have small, tapered cobs, 12 to 14 rows of grain, and kernels that are taller than wide, while the northern flint corn has a large cob with an expanded base, 8 to 10 rows of grain, and crescent-shaped kernels that are wider than high (Brown and Anderson 1947; Cutler and Blake 1974:62). The maize from Site 1Gr2 exhibits characteristics of both types. The kernels are crescent-shaped and are wider than tall, while the cobs are mostly 10- and 12-rowed. The northern flint corn exhibits strong row pairing (Yarnell 1964) and some cobs from Site 1Gr2 display this trait.

Several of the Mississippian features analyzed were small, roughly circular, shallow pits (Table 18) which contained a preponderance of maize cobs and, in two cases, maize cobs and pine cone fragments. Because a large number of loblolly pine seeds was found in association with the cones, it can be confidently argued that some, if not all, of the cones were loblolly pine. The features cluster in a small area on the southeast periphery of the site, being interspersed with other Mississippian features and burial pits.

Given the similarity between the features at Site 1Gr2 and those identified in ethnographic and archaeological contexts by Binford (1972:33-51) as smudge pits for smoking hides, it is proposed to identify these features as members of the same class: "facilities employed in the task of smoking hides by the former occupants of the sites on which they were found" (Binford 1972:45).

These features present problems for the interpretation of Mississippian subsistence at the site. They are obvious examples of a situation in which differential preservation may bias the floral composition of samples to favor those plant parts intentionally burned as fuel. If these features are eliminated from the analysis, a very different picture of Mississippian plant utilization could be inferred. The only other Mississippian feature analyzed was Feature

120, and it contained only 0.47 percent corn. Hickory nutshells and acorn shells were the most abundant food plant remains in the feature. However, only 14.8 g of plant remains were recovered from this feature, and it cannot be assumed to reflect Mississippian subsistence any better than the other nine features.

The large amount of corn recovered suggests that the Mississippian peoples occupied the site at least during the late spring and fall, when crops were planted and harvested, and possibly during the summer, to tend the fields.

SITE 1Pi61

At least seven components were represented at Site 1Pi61. The first occupation was during the Early Archaic period, followed by occupations during the Late Archaic period, Broken Pumpkin Creek phase, Henson Springs phase, Miller I phase, Miller II phase, Miller III phase, and possibly Mississippian stage.

Thirty-five features were examined for botanical remains. One of these was assigned to the Early Archaic period, 6 to the Late Miller II subphase, 1 to the Miller III phase, 10 to the Early Miller III subphase, 16 to the Late Miller III subphase, and 1 to either the Late Miller III subphase or Mississippian stage. Four of the Late Miller III features (17, 28, 29 and 92) are semisubterranean structures.

Charcoal was recovered in the one-quarter inch waterscreen and in one gallon soil samples. The high amount of clay in the soil made waterscreening through the one-sixteenth inch screen extremely difficult, so only a sample of the fill from features was screened through the smaller mesh. Fifty-eight liters of soil from each of eight features analyzed were screened through the one-sixteenth inch mesh in addition to the one-quarter inch.

The botanical remains recovered in the one-quarter inch mesh were entirely sorted and quantified. The plant remains from the soil samples which were larger than 2 mm were also sorted, and the remainder scanned. One exception to this was Feature 15, where the large amount of charcoal recovered in the soil sample (227.8 g) made sampling imperative. In this case, 15.8 percent of the plant remains were sorted. The percentages of the various charcoal types in the total samples were approximated on the basis of their proportions in the fraction sorted. The charcoal recovered in the one-sixteenth inch waterscreen was scanned for additional components. Three of the Late Miller III structures were divided into horizontal units for excavations purposes. Plant remains from all units of Structure 1 (Feature 17) were analyzed, and those from odd-numbered units of Structure 3 and 4 (Features 29 and 92) were analyzed. The contents of each feature are given in Table 19. Table 20 gives the percentages of nuts and wood charcoal by cultural provenience, and Table 21 gives percentages of hickory, acorn, and walnut expressed as percentages of total nuts from each cultural period.

Archaic stage

Early Archaic period. One feature provided plant remains from this period. The remains from this feature suggest a heavy reliance on hickory nuts (Carya spp.) and acorns (Quercus spp.). One persimmon seed (Diospyros virginiana) was also identified. All plant remains present become available in the early fall, and it may be suggested that the site was occupied sometime during or after this season.

Woodland stage

Late Miller II subphase. Two hundred and fifty-nine grams of botanical remains were analyzed from soil samples from this subphase, and 181 g of plant remains recovered in the one-quarter inch waterscreen were analyzed. Feature 15 was also waterscreened through one-sixteenth inch mesh, and 20 g of charred floral remains recovered in this manner were scanned. Of plant remains sorted from the one-quarter inch waterscreen, 64.98 percent was hickory nutshell (Carya spp.), 23.11 percent was walnut shells (Juglans nigra), and 8.88 percent was wood. Of plant remains identified from soil samples, 38.26 percent was hickory nutshell, 38.6 percent was acorn nutshell, 1.64 percent was walnut shell, and 14.79 was wood charcoal. Also identified from Late Miller II features were 7 persimmon seeds (Diospyros virginiana), 195 goosefoot seeds (Chenopodium sp.), 4 grape seeds (Vitis sp.), 7 honey locust seeds (Gleditsia triacanthos), 1 pigweed seed (Amaranthus sp.), 1 maygrass seed (Phalaris caroliniana), and 1 palmetto seed (Sabal cf. minor).

The goosefoot seeds from Feature 15 range in size from 1 to 1.5 mm. Their prominent beaks, reticulate seed coats, and truncate margins assign them to either Chenopodium bushianum Aellen, or Chenopodium berlandieri Moq., according to the review of the genus as presented by Asch and Asch (1976a). Radford et al. (1968:418) classify both of these species under Chenopodium album L.

There seems to be a much greater reliance on acorns and walnuts during this subphase at the site than in earlier and later phases. Of nuts identified from this phase, 49.17 percent of those from soil samples were acorns, compared to 19.08 percent in the Early Miller III samples, and 11.2 percent in the Late Miller III samples. However, no acorn shells were recovered in the one-quarter inch sample from the Miller II phase, while 1.55 percent of those recovered in this screen from the Early Miller III subphase were acorns. Walnuts formed 26.24 percent of nutshells recovered from one-quarter inch samples from the Late Miller II subphase, as compared to 3.11 percent from the Early Miller III subphase, and 1.85 percent from the Late Miller III subphase. They also formed 2.09 percent of nuts from soil samples from the Late Miller II subphase, although they were completely absent from the Early Miller III soil samples, and were only 0.04 percent of those from the Late Miller III subphase.

Seeds of two types were present in the Late Miller II samples: those from edible fruits and those from weedy plants which thrive on disturbed soil. The one occurrence of a maygrass seed suggests an occupation in the late spring to early summer; all other plants represented bear fruits which mature from late summer to early fall.

Miller III phase. Feature 42 could not be assigned to a particular subphase of the Miller III phase, but it is of interest because it was a small, shallow pit, appearing to be in primary depositional context, which contained many (96 percent) charred acorns, with a pitted nutting stone on one edge. The acorns were whole, consisting of both the nut meats and shells. Measurements taken on 25 of the whole nuts demonstrate that the pit contained acorns from both the white and red oak groups. They range from 1.2 to 2 cm in length, but would have been larger before carbonization. Of oaks found in the area, these fall within the size range for white oak (Quercus alba), post oak (Quercus stellata), swamp red oak (Quercus shumardii), laurel oak (Quercus laurifolia), and black oak (Quercus velutina). This feature was, in all probability, a roasting pit.

Seventy-three grams of plant remains were analyzed from soil samples from the Early Miller III subphase, and 204.5 g were analyzed from the one-quarter inch waterscreen. Of plant remains analyzed from soil samples, 43.74 percent was hickory (Carya spp.) nutshells, 10.31 percent was acorn (Quercus spp.) shells, and 39.34 percent was wood charcoal. Of plant remains from the one-quarter inch waterscreen, 39.02 percent was hickory nutshell, 0.64 percent was acorn shells, 1.27 percent was black walnut shell (Juglans nigra), and 57.07 percent was wood charcoal. Four persimmon seeds (Diospyros virginiana), 106 maygrass seeds (Phalaris caroliniana), 2 pigweed seeds (Amaranthus sp.), 2 grape seeds (Vitis sp.), 2 fescue seeds (Festuca sp.), and 2 goosefoot seeds (Chenopodium sp.) were also identified.

The samples from the Early Miller III subphase show a decrease in the amounts of acorn and walnut when compared to the preceding subphase. Acorn still forms over 19 percent of the nuts identified, however. The seeds recovered from the samples suggest that the site was probably occupied at least during late spring and fall during this time.

Sixty-seven grams of plant remains from the one-quarter inch waterscreen and 236 g from soil samples were analyzed from the Late Miller III subphase. Portions of Features 17, 17A, 29, 29D, and 152 were also waterscreened through one-sixteenth inch mesh, and 182 g of charcoal recovered in this manner were scanned. Of charcoal from the one-quarter inch waterscreen, 31.69 percent was hickory (Carya spp.), 0.6 percent was walnut (Juglans nigra), and 58.15 percent was wood charcoal. Of charcoal from soil samples, 41.88 percent was hickory, 5.28 percent was acorn (Quercus spp.), 0.02 percent was walnut, 46.44 percent was wood charcoal, and 1.59 percent was corn (Zea mays). This is the first occurrence of corn at the site, and

it was identified from three features (Structures 3 and 4, and Feature 152). Expressed as a percentage of total food plant remains identified in soil samples, corn comprises 3.26 percent. The corn from Feature 152 is especially interesting, since it consists of around 300 kernel fragments. It is usually the inedible fragments of corn (cupules, glumes, etc.) that are recovered on archaeological sites instead of the edible kernels. Only two kernels from this feature were measurable. Both were 6 mm wide; one was 4 mm thick, and the other 5 mm.

The Late Miller III samples show a further decrease in amounts of acorn and walnut. Of food plant remains in soil samples, acorn is 10.83 percent and walnut 0.03 percent, both lower than in samples from previous subphases.

Also identified from Late Miller III samples were a fragment of a pine cone, and several seeds: 4 maygrass (Phalaris caroliniana), 1 knotweed (Polygonum sp.), 1 bedstraw (Galium cf. aparine), 3 goosefoot (Chenopodium sp.), and 1 grape (Vitis sp.).

Most of the seeds are from weedy plants associated with highly disturbed soil. The seasons of availability of these range from late spring to fall. These, coupled with the corn, suggest occupations during at least the spring and fall.

The cultural affiliation of Feature 1 is uncertain, but it may be assigned to either the Late Miller III subphase or the Mississippian stage. This feature was a small, shallow pit, 1.1 ft long, 1 ft wide, and 0.15 ft deep. It was extremely similar to the Mississippian features analyzed from Site 1Gr2, exhibited a primary depositional context, and contained corn cob fragments (79.38 percent) and pine cone fragments (10.31 percent). On the basis of its similarity, it is suggested that it belongs to the same class of feature as the Mississippian features from Site 1Gr2.

Four corn cobs were sufficiently intact to allow measurements, and these measurements are presented in Table 22. The cobs are similar to those from Site 1Gr2, and are 10- and 12-rowed. None of the measurements fall outside of the ranges of measurements taken on cobs from 1Gr2.

SITE 1Gr50

Excavations at Site 1Gr50 uncovered at least three sparsely represented components, and possibly a fourth. The upper zones contained material dating to the Miller II and III phases, and the lower zone contained Late Archaic and possibly Early Archaic debris. Plant remains were analyzed from four Late Archaic period features and from seven excavation units which contained material from the Early (?) Archaic period, the Late Archaic period, and the Miller III phase of the Late Woodland period.

Plant remains from excavation units were recovered only in the one-quarter inch dry screen, and were completely sorted and weighed.

Botanical remains from features were recovered in the one-quarter inch screen and in two gallon soil samples. The plant remains larger than 2 mm from the soil samples were sorted and weighed, and the remainder were scanned for small seeds and additional components. Percentages of plant remains in the total sample were approximated on the basis of their percentages in the fraction larger than 2 mm. Table 23 lists for each feature the total sample weight and the percentages of hickory, acorn, walnut, and wood charcoal present, and types of seeds identified. Table 24 gives this information for the excavation units analyzed. Table 25 summarizes the distribution of botanical remains for each cultural period, and Table 26 gives percentages of hickory, acorn, and walnut in each phase or period, expressed as percentages of total nuts recovered.

Archaic stage

A total of 2.8 g of botanical remains was identified from excavation unit levels assigned to the Early (?) Archaic period. Of this, 89.29 percent was hickory (*Carya*) nutshell, 7.14 percent was black walnut (*Juglans nigra*) shell, and 3.57 percent was wood charcoal. Probably due to the large screen size used, acorns and small seeds were not recovered. These are rarely recovered in the one-quarter inch screen, so their absence does not necessarily reflect non-utilization.

A total of 5.2 g of plant remains was identified from excavation units from the Late Archaic period. Hickory nutshell comprised 86.54 percent and wood charcoal formed the remaining 13.46 percent. Again, no acorns or seeds appeared in this fraction. However, 2.32 percent of the 21.95 g of plant remains in the soil samples from Late Archaic features was acorn nutshell, 80.05 percent was hickory nutshell, 0.14 percent was black walnut shells, and 10.02 percent was wood charcoal. Two pokeweed seeds (*Phytolacca americana*) were also recovered from the soil samples.

The narrow spectrum of plant remains identified in the samples from the Archaic stage is probably due to the small amount of charcoal recovered. The plant remains suggest that the site was occupied sometime during the fall. Archaeological evidence suggests that the material was deposited by small groups of people during brief encampments.

Woodland stage

Miller III phase. All plant remains analyzed from this phase were recovered in the one-quarter inch screen. Of the 3.3 g recovered, 18.18 percent was hickory (*Carya* spp.) nutshell, and the remaining 81.82 percent was wood charcoal. The paucity of plant remains does not permit specific statements about subsistence.

SITE 1P133

Three major components and two lesser components were present at Site 1P133. The major components consisted of: (1) pit features and possibly several burials which date to the Late Miller III-Terminal Miller III time period, (2) a Mature Mississippian (Moundville I) period cemetery and house, and (3) a Late Mississippian period (Moundville III) house and several burials. The smaller components were represented by sparse and widely scattered artifacts dating to the Middle Woodland and Late Archaic periods.

Five features and a concentration of corn in the midden were examined for botanical remains. Feature 6 was a Late Mississippian structure (Number 1), and Feature 6A was the central hearth from within this structure. Feature 39 is from a Mississippian occupation at the site, and Feature 51 is from a Late Miller III occupation. The cultural affiliation of Feature 14 is uncertain, but it is either Late Miller III or Mississippian, as is the concentration of corn in Square 585R35.

The total fill from Features 6A, 14, and 39 was saved for laboratory processing, and was carefully washed through a 0.495 mm mesh to insure recovery of small seeds. The concentration of corn in Levels 2 and 3 of Square 585R35 was also taken out in a block, so the total amount of charcoal associated with it was completely recovered. Feature 6 (Structure 1) was excavated in quarters, and one of these (Quad 4) was selected for analysis. From this quad, plant remains were recovered in the one-quarter inch and one-sixteenth inch waterscreens, and from one gallon soil samples. The plant remains from the one-quarter inch screen and those from the soil samples which were larger than 2 mm were entirely sorted and weighed. Ten percent of the plant remains from the one-sixteenth inch waterscreen was sorted, and the remainder scanned. Plant remains were also recovered in the one-quarter inch and one-sixteenth inch waterscreens from Feature 51, and soil samples were taken at 0.5 foot levels in one-half of the feature, and from each of the four zones or lenses observed in the second half. All plant remains in the one-quarter inch waterscreen and those larger than 2 mm from soil samples were completely sorted, and a sample of the plant remains from the one-sixteenth inch screen was scanned. Tables 27 and 28 give the total weight of each sample, percentages of nuts, corn, and wood present, and additional components identified.

Woodland stage

Late Miller III subphase. The only feature which may definitely be assigned to the Late Miller III subphase is Feature 51. Of food plant remains recovered from soil samples from this feature, hickory (Carya spp.) nutshells were 54.83 percent, acorn (Quercus spp.) shells were 43.17 percent, and corn (Zea mays) was 2 percent. Two corn kernels, 13 kernel fragments, 2 glumes, and 18 cupules were identified from soil samples, and 61 cupules and 23 kernel fragments

were recovered in the sample from the one-sixteenth inch waterscreen. This feature contained the only black walnut (Juglans nigra) fragments recovered from features at the site. They formed less than 1 percent of the one-quarter inch sample, however.

A variety of seeds were also recovered from this feature: 2 persimmon (Diospyros virginiana), .2 fescue (Festuca sp.), 1 grape (Vitis sp.), 8 maygrass (Phalaris caroliniana), 6 pigweed (Amaranthus sp.), 26 goosefoot (Chenopodium sp.), 4 from the bean family (Fabaceae), and 3 from the grass family (Poaceae). Most are from herbaceous weedy plants which would have flourished on highly disturbed soil, such as in fields cleared for agriculture.

The presence of corn in Feature 51 suggests that, during the Late Miller III subphase, the site was occupied during both late spring and early fall, for planting and harvesting. Most of the seeds present would have ripened from mid-summer to early fall, with the possible exceptions of maygrass and fescue. These usually ripen earlier, maygrass from May to June, and fescue from April to July. The plant remains suggest an occupation of the site during late spring, early fall, and probably during the summer. It could also have been occupied during other seasons, because most of the foods represented by the samples are storable.

Mississippian stage

Feature 14, from either a Late Miller III or Mississippian occupation, and Feature 39, assigned to the Mississippian stage, are very similar to the small, roughly circular, shallow Mississippian pits excavated at Sites 1Gr2 and 1Pi61. Feature 14 measured 0.8 by 0.8 foot, and was 0.2 foot deep, and Feature 39 was 0.7 foot in depth, and measured 0.9 by 1 foot across. Feature 14 contained a preponderance of corn cobs, and Feature 39, corn cobs and pine cones. It may be argued that they belong to the same class of feature as those from Site 1Gr2, and were possibly used for the task of smoking hides.

Only four maize cobs and 11 kernels were sufficiently intact to allow measurements. These measures are given in Tables 29 and 30. The corn recovered from Site 1Pi33 is very similar to that recovered from Site 1Gr2. All cobs display 12 rows of kernels, the average cupule width is 5.2 mm, and they exhibit strong row pairing. The kernels, as at Site 1Gr2, are wider than their height, with height and thickness being about equal.

Feature 6 (Structure 1) provided one of the two opportunities in this report to examine a Mississippian feature which is not a small, corn cob-filled pit. All features from the Mississippian stage described in this report, with the exception of Feature 120 at Site 1Gr2, are shallow pits filled with corn cobs and pine cones. Feature 6 presents a much different picture. In the one-sixteenth inch samples in which corn occurs, it never forms over 5.4 percent of the charcoal. When expressed as a percentage of the total food

plant remains recovered from the one-sixteenth inch waterscreen, however, it forms 27.83 percent. The remainder consists of 62.99 percent hickory nutshells, and 9.18 percent acorn shells. This is a much higher percentage of corn than in any Late Woodland period feature or group of features analyzed from the Lake area.

Feature 6 also produced a large number (622) of chickweed seeds (*Stellaria* cf. *pubera*), 5 bean family (Fabaceae) seeds, and 5 unknown seeds. Chickweed seeds ripen in late spring to early summer, their presence suggesting that the site was occupied during this time. No ethnographic references could be located which indicated that this particular species of chickweed was used by the American Indians. *Stellaria media* was used by the Chippewa, however, as a medicine for sore eyes (Densmore 1928:293).

The central hearth (Feature 6A) contained only 0.2 g of plant remains, which included 6 pieces of wood, and 12 chickweed seeds.

Archaeological evidence suggests that the site was a permanent settlement during this time, but botanical remains show evidence of occupation only during the late spring or early summer and during the fall. It does appear that the Woodland occupants of the site planted and harvested corn but continued to rely on locally available wild food resources; the increase in amount of corn recovered from subsequent Mississippian contexts suggests that it became a more important part of the diet in those times.

SUMMARY

Botanical remains were analyzed from 107 features, which represented occupations of the central Tombigbee River Valley from the Early Archaic period through the Late Mississippian period. Table 31 summarizes the cultural distribution of features analyzed from each site. Almost 5,500 g of plant remains were sorted or scanned, and 1,361 seeds were recovered. Of these, 1,264 were identified to at least their taxonomic family. A brief summary of plant remains from each cultural period will be given.

Archaic stage

Hickory nutshells, acorn shells, and one persimmon seed were recovered from Early Archaic features, and Late Archaic features contained hickory nutshells, acorn shells, black walnut shells, and two pokeweed seeds. The Archaic midden at Site 1Gr2 contained grape and goosefoot seeds, pine cone fragments, and a corn cupule. The cupule is probably intrusive from a later occupation at the site.

The paucity of samples from this period makes anything more than general statements impossible. All nuts and seeds present mature in late summer to early fall, indicating that the sites could have been occupied during these seasons. The absence of many food plant remains from Archaic contexts is probably more a reflection of

the small number of samples available rather than of non-utilization.

Gulf Formational stage

Broken Pumpkin Creek phase. A single feature was analyzed from the Broken Pumpkin Creek phase, and it contained only hickory nut-shell and wood charcoal. On the basis of this feature, nothing credible may be said concerning plant utilization or subsistence during this phase.

Woodland stage

Miller I phase. Samples from Miller I occupations at 1Gr2 contained evidence of at least the same narrow range of plant resources identified in the sparse collections from the Archaic stage. Since this is probably due to the sparse components present for both cultural units, the collections may be less comparable than is now apparent. In addition to hickory and acorn nutshells, which were recovered from the Early, Middle, and Late Miller I subphases, a grass seed was identified from an Early Miller I feature, a persimmon seed from a Middle Miller I feature, and a bean family seed from a Late Miller I feature. Jenkins and Curren (1975:18-19) suggest that the site was used as a base camp by the Miller I peoples, and postulate that it was occupied during the summer and fall when the river was at its lowest level and shellfish were easily obtainable. The plant remains suggest fall occupations.

Miller II phase. A single feature was analyzed from an Early Miller II subphase occupation at Site 1Gr2, and it contained hickory, acorn, and walnut shells. A more substantial sample was available for analysis from Late Miller II occupations, at Sites 1Gr1X1, 1Gr2, and 1P161. In addition to nutshells of hickory, acorn, and walnut, there were 15 kinds of seeds identified: grape, palmetto, pigweed, pine, persimmon, goosefoot, wood sorrel, dove weed, maygrass, partridge pea, sumac, pokeweed, honey locust, hawthorn, and fescue. Insect galls, a possible groundnut tuber fragment, the base of a monocot stem (possibly cat-tail), and a lily family bulb were also recovered.

Several of the seeds identified are from plants which thrive on highly disturbed soils, suggesting clearing activities during this period. The seasons of maturation of the seeds range from late spring to fall. This evidence, and the presence of a large structure at Site 1Gr1X1, suggest that occupations during the Late Miller II subphase were perhaps for longer periods of time than those of previous subphases.

Miller III phase. Three sites showed evidence of occupation during the Early Miller III subphase: 1Gr1X1, 1Gr2, and 1P161.

Hickory nutshells, acorn shells, and black walnut shells were identified, along with six kinds of seeds: persimmon, maygrass, pigweed, goosefoot, fescue, and grape. An Early Miller III feature at Site 1Gr2 furnished the earliest substantiated evidence of corn agriculture in the valley.

Samples from Middle Miller III contexts at Site 1Gr1X1 and 1Gr2 contained hickory, acorn and walnut shells, insect galls, a lily family bulb, and 15 kinds of seeds: goosefoot, pigweed, beggar-lice, maygrass, wildbean, fescue, panic grass, knotweed, hawthorn, sumac, maypop, blackberry or dewberry, grape, loblolly pine, and persimmon. Corn cupules and kernels, and a possible common bean were also recovered. The bean identification is not certain; but if the identification is correct, it is the earliest archaeological occurrence of a bean in the lower Southeast.

Most of the features analyzed from the Late Miller III subphase were from Site 1Pi61. Only one feature was analyzed from Site 1Pi33. Hickory, acorn, and walnut shells, corn cupules and kernels, and the following seeds were identified: maygrass, bedstraw, goosefoot, grape, fescue, persimmon, knotweed, and pigweed.

The amount of corn in samples increases slightly from the Early Miller III subphase through the Late Miller III subphase. A single kernel fragment was recovered from an Early Miller III feature. Six Middle Miller III features contained 18 cupules, 1 kernel, and 12 kernel fragments while four Late Miller III features furnished 64 cupules and 326 kernel fragments. There are also large numbers of seeds from weedy plants which could have flourished in fields cleared for agriculture. Although corn was present in the valley as early as the Early Miller III subphase, it never formed a large proportion of any Late Woodland sample. Wild plant remains dominate all samples.

The presence of corn suggests that the sites were occupied at least during late spring or early summer and during the fall, for planting and harvesting. The seeds identified from samples mature from late spring through the fall.

Mississippian stage

Thirteen Mississippian features from two sites, 1Gr2 and 1Pi33, contained corn cob fragments, pine cone fragments, a tuber fragment, possibly groundnut, hickory nutshell, acorn shells, and seven kinds of seeds: persimmon, loblolly pine, grape, maypop chickweed, pigweed, and goosefoot. Cultivated plant remains far outnumber wild ones, but this may be due in part to the types of features analyzed. Only two features were not small corn cob and pine cone-filled pits; these presumably had a specific and limited technological function. The other two features suggest that wild plant resources still played a major part in subsistence. The absence of non-burial pit features from the Mississippian stage complicates attempts to describe subsistence.

CHAPTER VI

CONCLUSIONS

A substantial record of plant utilization in the central Tombigbee River Valley was recovered from the Late Miller II subphase of the Middle Woodland period through the Late Mississippian period. During this time, tropical cultigens appeared in the area and the transition from a gathering economy to a mixed gathering and agricultural economy occurred. The field evidence may be used to discuss some apparent changes in subsistence patterns through time. Seasonal subsistence activities, environmental zones exploited, and the evidence for seed utilization are also suggested.

The evidence for agriculture in the central Tombigbee River Valley will first be documented. The earliest substantiated occurrence of corn is from an Early Miller III feature at Site lGr2 with a radiocarbon date of A.D. 910±55. Earlier occurrences in the Archaic and Miller I middens at Site lGr2 (this report:p29; Smith 1975) are tenuous because the midden was somewhat disturbed by aboriginal pit digging activities. Corn was present in three Middle Miller III subphase features at Site lGr1Xl and in three at Site lGr2. Additional corn fragments were identified from three Late Miller III subphase features at Site lPi6l and from one Late Miller III feature at Site lPi33. Another feature from Site lPi6l, datable to either a Miller III or Mississippian occupation, contained predominantly corn cob fragments. Ten Mississippian features at Site lGr2 and two at Site lPi33 produced corn, in addition to corn reported previously (Smith 1975) from Sites lGr2 and lPi12. The only other evidence of corn agriculture in the Tombigbee River drainage is from the Cofferdam site in Lowndes County, Mississippi (Blakeman et al. 1976). Corn cupules and one kernel were recovered from two Middle Miller III subphase features, and two radiocarbon samples from one of the features yielded dates of A.D. 750 and A.D. 1180. Other possible identifications of corn from the site, associated with Archaic and Transitional Archaic-Woodland contexts, are considered tenuous by the investigators.

Twenty-seven common beans (Phaseolus vulgaris) were identified by Smith (1975:279) from Site lPi12, and one possible bean was recovered in a Middle Miller III context at Site lGr2, radiocarbon dated to A.D. 1130±45. This latter identification is not certain, and the context in which it occurs is earlier than for any other bean reported from the state. If properly identified, it is the earliest reported bean in the lower Southeast. To the best of the author's knowledge, there is only one other record of beans in the Southeast prior to late prehistoric times: from two Mississippian features at the Pittman-Alder site in southeastern Tennessee (Faulkner and Graham 1965; Yarnell 1976:8).

Corn appears in the central Tombigbee River Valley during the Early Miller III subphase, and occurs in slightly larger amounts in the Middle and Late Miller III subphases. The frequency of the corn remains suggests that it never was a main carbohydrate source in the diet of the Late Woodland populations. Even disregarding the small corn cob-filled pits, corn forms a higher percentage of food plant remains from Mississippian features, but hickory is still dominant. Beans appear possibly as early as the Middle Miller III subphase and definitely by Mississippian times.

Along with the gradual increase in amount of cultigens, the data shows certain other trends. Samples from the Late Miller II subphase and Miller III phase contain larger numbers and an increased variety of seeds from herbaceous annuals than samples from earlier time periods. At Site 1Gr1X1, Miller II samples contained several of this type of seed, but Miller III samples contained a higher number and also more variety. In the Middle Miller III samples, plants such as wildbean (Strophostyles sp.), beggar-lice (Desmodium sp.), blackberry or dewberry (Rubus sp.), panic grass (Panicum sp.), and maypop or passion flower (Passiflora incarnata) are represented for the first time. Large numbers of seeds from herbaceous annuals occur in Late Miller II, and Early and Late Miller III samples from Site 1Pi61, but there is no increase from the Miller II to Miller III samples. Seeds from weedy annuals are sparsely represented in samples from Site 1Gr2.

The presence of these seeds from herbaceous annuals and the variety suggest that there were clearing activities during the Late Miller II and Miller III time periods, probably associated with both agricultural fields and living areas. All would have flourished in such open, disturbed habitats. The greater number and variety in Miller III samples from Site 1Gr1X1 may indicate increased clearing at the site during this time.

There are also changes in the relative proportions of nut types in samples from the Late Miller II subphase through the Late Miller III. Hickory nutshells occur in all features, and form the largest proportion of nuts identified from all subphases. Acorn shells are generally the next most abundant food plant remains. They occur in most features, but in smaller amounts than hickory nutshells. At Sites 1Gr1X1 and 1Gr2, acorn levels differ only slightly from one subphase to the next, except they are present in a higher amount in Feature 44, at Site 1Gr2, associated with either the Late Miller II or Early Miller III subphase. At Site 1Pi61, the proportion of acorn shells in samples declines from over 49 percent of nuts identified from soil samples from the Late Miller II subphase to 11 percent of those from the Late Miller III.

Walnut shells are consistently more abundant in Late Miller II features than in earlier and later features. They occurred in a single Archaic feature, in 59 percent of features analyzed from the Late Miller II subphase, in 33 percent of those from the Early Miller III, in 16 percent of those from the Middle Miller III subphase, and in 24 percent of those from the Late Miller III. This

gradual decrease in walnuts was observed in samples from the three sites which together have substantial records of occupation during the Miller I, II, and III phases, Sites 1Gr1X1, 1Gr2, and 1Pi61. In all three cases, walnuts occur in more features and form the highest proportion of nuts in the late Miller II subphase samples, and the proportion gradually declines through subsequent subphases. No walnut shells were identified from Mississippian samples analyzed from Site 1Gr2 and 1Pi33.

Therefore, three general trends are evident in the data: (1) a gradual increase in amounts of corn in samples, beginning with its earliest occurrence in an Early Miller III context; (2) an increase in number and variety of seeds from herbaceous annuals beginning in the Late Miller II subphase and continuing through the Miller III phase; and (3) a large increase in amounts of walnut in Late Miller II samples, followed by a steady decrease in later samples, accompanied by either slight fluctuations in the proportions of acorns, or a steady decrease as at Site 1Pi61.

Although there is an increase in number of seeds from weedy annuals in Late Miller II and Miller III samples, their densities are low in most samples. They may be present only as a consequence of clearing for village construction or agricultural fields. Their inclusion may also indicate utilization. The vegetative parts of several were used by the American Indians (Appendix) for greens (goosefoot, pokeweed, pigweed, wood sorrel), for dye (sumac), for medicine (knotweed, chickweed), or for smoking (knotweed, sumac), and the seeds may be by-products of such utilization. There were concentrations of goosefoot, maygrass, and chickweed seeds, however, perhaps indicating utilization of these seeds. One hundred and ninety-five goosefoot (Chenopodium sp.) seeds were identified from a late Miller II feature at Site 1Pi61, 91 maygrass (Phalaris caroliniana) seeds from an Early Miller III feature at the same site, and 622 chickweed (Stellaria cf. pubera) seeds from a Late Mississippian structure at Site 1Pi33. Chickweed was used medicinally by the Chippewa (Densmore 1928:293), and Fernald and Kinsey (1958:190) state that the greens are suitable as a substitute for spinach. To the author's knowledge, however, this is the first occurrence of chickweed seeds on an archaeological site in the United States. Chenopodium and Phalaris seeds have occurred in numerous archaeological contexts, including fecal specimens from Salts Cave, Kentucky (Watson and Yarnell 1966) and from Newt Kash Hollow, also in Kentucky (Jones 1936). There is thus indisputable evidence of their use as food in prehistoric times.

Fowler (1971) and Struever (1962) have suggested that Chenopodium was cultivated prehistorically in eastern North America. Asch and Asch (1976a:24) suggest that "changes in morphology and removal to new habitats are potentially two of the better kinds of archaeological evidence for cultivation of a plant." The Chenopodium seeds from the archaeological samples from the Tombigbee Valley are within the size range of modern wild plant seeds of the genus. Chenopodium is native, and would have flourished in open, man-made habitats. Therefore, evidence of

cultivation along these lines is lacking. However, cultivation does not always result in larger seed size, but may instead result in larger numbers of seeds per plant (Asch and Asch 1976a:24-25). Cultivation of Chenopodium by the aboriginal occupants of the sites cannot be ruled out, nor can it be substantiated.

The more frequent occurrence of walnuts and acorns in Late Miller II samples than in earlier and later ones is difficult to explain. The difference may be due to factors of preservation, or differential recovery, or it may reflect a differential utilization of walnuts and acorns during the Late Miller II subphase. This phenomenon was apparent at the three sites with substantial records of occupation during this time, so it is possible that it reflects a real difference. This phenomenon will be further discussed in Volume V, where the floral and faunal data will be correlated. It should be noted, however, that gathering and processing acorns and walnuts requires more work than gathering hickory nuts: walnuts trees are widely spaced throughout a forest (Fowells 1965:204), while the tannic acid must be removed from acorns of the red oak group to make them edible.

Although there are differences in the relative proportions of hickory, acorn, and walnut remains in the samples, the botanical remains indicate that the fall nut harvest was the primary carbohydrate source during the Woodland stage. Hickory nuts and walnuts are similar in their nutritional significance. Though mainly important in the diet as a carbohydrate source, they contain large amounts of protein and fat. Acorns are more similar to corn, because they are high in carbohydrates and low in fats. Table 32 gives the nutritional composition of the nuts and maize. The carbohydrate supply may have been supplemented by the harvest of seeds of weedy annuals in the late spring and summer months. The small amount of maize in the samples suggests its use as a supplementary source of carbohydrates during the Woodland stage. Corn supplies many more grams of carbohydrates than an equal amount of nuts, and the botanical remains indicate that it was a primary carbohydrate source in the later Mississippian stage, replacing to some degree that supplied by the nuts. However, nuts still maintained their significance, occurring in all Mississippian features analyzed. The determination of their level of utilization is complicated by the absence of non-burial pit features from this stage.

Some indications were found for the harvesting of fleshy fruits, which would have provided sugars, vitamins, and minerals in the diet. Seeds of persimmons and grapes were the most frequent in the samples, with minor occurrences of sumac, maypop, hawthorn, and blackberry or dewberry. It is likely that many other fruits were utilized at their site of growth rather than at a habitation site.

Jenkins and Curren (1975:23) suggest that the Miller III peoples "were on the verge of depleting their wild resources and were probably ready to accept agricultural or horticultural products as a major staple of their diet." However, the archaeological

samples give no indication that floral resources were being depleted. Heavy exploitation does not deplete renewable foods such as nuts and fruits. The weedy annuals produce so many seeds that intensive gathering would not cause a smaller supply the next year. In terms of wild plants, then, it would be impossible to over-exploit a forest environment. The population could increase to a point where a particular environment could no longer support it, but that population, unless it were destroying major portions of the environment, could not over-exploit the floral resources. The clearing of lands for fields and village construction would have encouraged the growth of numerous potentially economically important plants.

Several other general indications from the floral samples may be discussed. First, it appears that all habitats in the general vicinity of the sites were exploited. Hickories are common in several forest types, from the flood plain to the uplands. One sample of acorns from Site lPi6l allowed some probable species identifications to be made; those identified would be found in a variety of habitats, from alluvial, mesic, and xeric woods. Seeds from several plants which grow in the "prairie" or "grassland" zone were present; however, they are not restricted to this zone. Plants which grow in low, swampy places, on stream banks, in bottomland woods, deciduous upland woods, woodland borders, clearings, and grasslands are represented in the samples. All of these habitats are present in the general vicinity of all sites, at least within the 10 km radii mapped. It appears that, during all cultural periods, the inhabitants did not go far to gather the spectrum of plants represented in the samples. With the exceptions of the tropical cultigens, all plants are locally available.

Although such resources as mulberries, plums, chestnuts, and beechnuts were probably available to prehistoric populations in the valley, since they were present in the area in the early nineteenth century (Chapter II), they do not occur in any samples. The fleshy parts of mulberries and plums would carbonize only rarely, so their absence is not unusual. They could also have been consumed at their site of growth, giving the seeds no opportunity to be carbonized. Chestnuts and beechnuts, however, would carbonize as readily as acorns. They are only minor parts of the forest, so would not be expected to occur in large numbers. Their absence does not necessarily indicate non-utilization.

Some interpretations of seasonal subsistence activities and seasons of occupation may also be discussed. Of the various ethnographic reports cited by Swanton (1946:255-265), the authors all agree on certain points; the Southeastern Indians, in early historic times, remained in or near their villages from around March to sometime in October, when they would go to the higher lands to hunt, perhaps leaving a few people behind to protect the village. The Choctaw dispersed to streams and lakes after planting the crops in the spring, returning for the Green Corn Dance in early summer and for the fall harvest (Linneccum 1904 as cited by Campbell 1959:10). Although these references cannot be assumed to describe the seasonal

activities of the earlier Woodland and Mississippian peoples, the botanical evidence suggests that they may have been similar. The presence of hickory and other nutshells shows residence in the fall at all sites, during all periods represented. With the appearance of corn and indications of more permanent structures, there are occurrences of seeds which mature from late spring to the fall. Although there is a lack of plant remains indicative of winter and early spring occupation, this cannot be precluded. Most plant parts available during these seasons (sap, flower buds, greens) would carbonize only rarely, and would be largely unrecognizable in a carbonized state.

SUMMARY

This paper presents a statement of the investigation of pre-historic plant utilization in the central Tombigbee River Valley. Sources of information were archaeological proveniences attributed to a sequence ranging from early Archaic through Mississippian times. The collections are often sparse and unevenly distributed between cultural horizons. In drawing conclusions, it is realized that these must be treated with caution. We still lack much substantiating data and consistent collecting procedures. Nevertheless, we may make these few general statements:

(1) A complete inventory of utilized plants may not be represented in the archaeological record because of differential preservation. Various cultural and natural processes affect the quality, quantity, and range of preserved botanical residue.

(2) The narrow range of plant remains associated with Archaic, Broken Pumpkin Creek, and Miller I proveniences probably reflects both the small component sizes during these time periods as well as underrepresented samples, rather than a true representation of plants actually utilized. If the sample is adequate, one could suggest short-term seasonal occupations of the sites.

(3) Nuts played a consistently important role in the subsistence pattern from the Archaic through the Mississippian stage. Their dominance in all samples from the Archaic through the Late Woodland period suggests strongly that they were the principal carbohydrate source.

(4) The greatest exploitation of walnuts and acorns may occur during the Late Miller II subphase; it appears that the frequency becomes less in the succeeding Miller III phase.

(5) The frequency and variety of seeds from herbaceous annuals in Late Miller II and Miller III samples may indicate their utilization as food, or their remaining as by-products of utilization of the vegetative parts of the plants they represent. Their occurrence also suggests disturbance associated with field clearance, or midden accumulation.

(6) Corn was introduced into the valley at least as early as the Early Miller III subphase and possibly earlier.

(7) Wild plants dominate the food pattern until the Mississippian stage. Late Woodland peoples practiced a mixed economy, but the evidence does not suggest that maize was heavily used.

(8) The association of a possible bean with a Late Woodland feature suggests that beans may have arrived in the lower Southeast earlier than the Mississippian stage.

(9) In Mississippian times, corn was a main, if not the main, carbohydrate base for the diet, which still included hickory nuts and acorns.

(10) All plant remains, with the exception of the tropical cultigens, represent local wild plants. Not a single plant remain was identified which would have been alien to the flora of the early nineteenth century or out of place in today's environment for that matter. A stable environment is therefore suggested for the period of human occupation in the valley represented by the archaeological samples.

(11) Studies, such as this, are suggestive rather than conclusive. This study will be viewed as part of a comprehensive archaeological investigation. Plant foods have a limited seasonal availability and many may be stored to be eaten later, out of their season. Seasonality of plant resources cannot be tied to seasonality of residence without other supporting information. Therefore, this study alone can in no way substantiate settlement patterns; nor should it be expected to.

(12) Field collecting and laboratory processing procedures must be kept consistent and attempts should be made to investigate analogous features in order to limit interpretative discrepancies.

Suggested Cultural and Chronological Nomenclature
for the Central Tombigbee Drainage

Date	Stage	Period	Arch. Culture	Phase	Subphase	Contemporary Archaeological Cultures			
						Lower Mississippi Valley	W. A. in Tombigbee Valley	Mobile Bay- Delta	Date
1735	Historic	Fully Historic Protohistoric	?	?	?	Late	Late	Late	1540
1540									
1400 AD	Mississippian	Late Middle Early	Soundville	E. Soundville	Soundville III Soundville II Soundville I Miller Soundville III Miller Soundville II Miller Soundville I	Late	Soundville	Soundville Bottle Creek Late	1400 AD 1300 1200 1100
1300									
1200									
1100									
1000	Woodland	Terminal Woodland	Terminal Miller	Gainesville	Miller Soundville III Miller Soundville II Miller Soundville I	Early	Soundville	Soundville Bottle Creek Late	1000 900 800 700 600 500 400 300 200 100
900									
800									
700									
600									
500									
400									
300									
200									
100									
100 BC	Gulf Formational	Late	Alexander	Penson Springs	Miller Soundville III Miller Soundville II Miller Soundville I	Early	Soundville	Soundville Bottle Creek Late	100 BC 100 AD
100 AD									
500 BC	Gulf Formational	Middle	Wheeler	Broken Pumpkin Creek	Miller Soundville III Miller Soundville II Miller Soundville I	Early	Soundville	Soundville Bottle Creek Late	500 BC 500 AD
500 AD									

Table 1.

Table 2. Species Composition of Floodplain Forest

Species	Number of Individuals	Percent
Hickory (<u>Carya</u> spp.)	83	16.40
Red Oak (<u>Quercus</u> <u>rubra</u>)	49	9.68
Tupelo Gum (<u>Nyssa</u> <u>aquatica</u>)	38	7.50
Post Oak (<u>Quercus</u> <u>stellata</u>)	33	6.52
Ash (<u>Fraxinus</u> spp.)	32	6.32
Pine (<u>Pinus</u> spp.)	29	5.73
White Oak (<u>Quercus</u> <u>alba</u>)	28	5.53
Hackberry (<u>Celtis</u> <u>occidentalis</u>)	23	4.55
Elm (<u>Ulmus</u> spp.)	22	4.35
Sweetgum (<u>Liquidambar</u> <u>styraciflua</u>)	21	4.15
Spanish Oak (<u>Quercus</u> <u>falcata</u>)	20	3.95
Maple (<u>Acer</u> spp.)	16	3.16
Willow Oak (<u>Quercus</u> <u>phellos</u>)	16	3.16
Black Oak (<u>Quercus</u> <u>velutina</u>)	10	1.98
Hornbeam (<u>Ostrya</u> <u>virginiana</u>)	7	1.38
Bay (<u>Magnolia</u> spp., <u>Persea</u> <u>borbonia</u>)	7	1.38
Linden (<u>Tilia</u> spp.)	6	1.19
Sassafras (<u>Sassafras</u> <u>albidum</u>)	6	1.19
Sycamore (<u>Platanus</u> <u>occidentalis</u>)	6	1.19
Cypress (<u>Taxodium</u> <u>distichum</u>)	6	1.19
Blackjack Oak (<u>Quercus</u> <u>marilandica</u>)	6	1.19
Birch (<u>Betula</u> <u>nigra</u>)	5	.99

Table 2. (Continued)

Species	Number of Individuals	Percent
Water Oak (<u>Quercus nigra</u>)	5	.99
Mulberry (<u>Morus</u> spp.)	4	.79
Persimmon (<u>Diospyros virginiana</u>)	4	.79
Chinquapin (<u>Castanea pumila</u>)	3	.59
Ironwood (<u>Carpinus caroliniana</u>)	3	.59
Redbud (<u>Cercis canadensis</u>)	3	.59
Dogwood (<u>Cornus florida</u>)	3	.59
Chestnut (<u>Castanea dentata</u>)	2	.40
Willow (<u>Salix</u> spp.)	2	.40
Cottonwood (<u>Populus deltoides</u>)	2	.40
Walnut (<u>Juglans nigra</u>)	1	.20
Holly (<u>Ilex</u> spp.)	1	.20
Laurel Oak (<u>Quercus laurifolia</u>)	1	.20
Locust (<u>Gleditsia triacanthos</u>)	1	.20
Beech (<u>Fagus grandifolia</u>)	1	.20
Swamp Oak (<u>Quercus</u> sp.)	1	.20
Total	506	100.01

Table 3. Species Composition of Slope Forest

Species	Number of Individuals	Percent
Post Oak (<u>Quercus stellata</u>)	56	17.34
Black Oak (<u>Quercus velutina</u>)	46	14.24
Hickory (<u>Carya</u> spp.)	45	13.93
White Oak (<u>Quercus alba</u>)	37	11.46
Pine (<u>Pinus</u> spp.)	36	11.15
Red Oak (<u>Quercus rubra</u>)	22	6.81
Blackjack Oak (<u>Quercus marilandica</u>)	21	6.50
Spanish Oak (<u>Quercus falcata</u>)	12	3.72
Gum (<u>Nyssa</u> spp.)	12	3.72
Redbud (<u>Cercis canadensis</u>)	6	1.86
Water Oak (<u>Quercus nigra</u>)	4	1.24
Maple (<u>Acer</u> spp.)	4	1.24
Plum (<u>Prunus</u> spp.)	4	1.24
Persimmon (<u>Diospyros virginiana</u>)	3	.93
Sweetgum (<u>Liquidambar styraciflua</u>)	2	.62
Mulberry (<u>Morus</u> spp.)	2	.62
Sassafras (<u>Sassafras albidum</u>)	2	.62
Ash (<u>Fraxinus</u> spp.)	2	.62
Cedar (<u>Juniperus virginiana</u>)	2	.62
Linden (<u>Tilia</u> spp.)	2	.62
Dogwood (<u>Cornus florida</u>)	1	.31
Haw (<u>Virburnum</u> spp., <u>Crataegus</u> spp.)	1	.31
Sourwood (<u>Oxydendrum arboreum</u>)	1	.31
Total	323	100.03

Table 4. Species Composition of Upland Forest

Species	Number of Individuals	Percent
Blackjack Oak (<u>Quercus marilandica</u>)	117	30.15
Post Oak (<u>Quercus stellata</u>)	109	28.09
Red Oak (<u>Quercus rubra</u>)	47	12.11
Hickory (<u>Carya</u> spp.)	34	8.76
Black Oak (<u>Quercus velutina</u>)	31	8.00
White Oak (<u>Quercus alba</u>)	10	2.58
Pine (<u>Pinus</u> spp.)	9	2.32
Ash (<u>Fraxinus</u> spp.)	6	1.55
Black Gum (<u>Nyssa sylvatica</u>)	5	1.29
Elm (<u>Ulmus</u> spp.)	4	1.03
Sassafras (<u>Sassafras albidum</u>)	3	.77
Sweetgum (<u>Liquidambar styraciflua</u>)	2	.52
Water Oak (<u>Quercus nigra</u>)	2	.52
Red Haw (<u>Viburnum</u> spp., <u>Crataegus</u> spp.)	2	.52
Persimmon (<u>Diospyros virginiana</u>)	1	.26
Mulberry (<u>Morus</u> spp.)	1	.26
Buckeye (<u>Aesculus</u> spp.)	1	.26
Hackberry (<u>Celtis occidentalis</u>)	1	.26
Redbud (<u>Cercis canadensis</u>)	1	.26
Plum (<u>Prunus</u> spp.)	1	.26
Hawbush (<u>Viburnum</u> spp., <u>Crataegus</u> spp.)	1	.26
Total	388	100.02

Table 5. Species Composition of Grassland

Species	Number of Individuals	Percent
Blackjack Oak (<u>Quercus marilandica</u>)	19	57.58
Post Oak (<u>Quercus stellata</u>)	10	30.30
Red Oak (<u>Quercus rubra</u>)	2	6.06
White Oak (<u>Quercus alba</u>)	1	3.03
Black Oak (<u>Quercus velutina</u>)	1	3.03
Total	33	100.00

Table 6. Frequencies of Abundant Nut Crops
for Single Trees

Species and Common Name	Frequency of Abundant Crops (in years)
<u>Carya aquatica</u> (water hickory)	1-2
<u>Carya cordiformis</u> (bitternut hickory)	3-5
<u>Carya laciniosa</u> (shellbark hickory)	2
<u>Carya tomentosa</u> (mockernut hickory)	2-3
<u>Juglans nigra</u> (black walnut)	3-5
<u>Quercus alba</u> (white oak)	4-10
<u>Quercus falcata</u> (Spanish oak)	1-2
<u>Quercus nigra</u> (water oak)	1-2
<u>Quercus lyrata</u> (overcup oak)	3-4
<u>Quercus phellos</u> (willow oak)	1-2
<u>Quercus rubra</u> (red oak)	2-5
<u>Quercus shumardii</u> (shumard oak)	2-3
<u>Quercus stellata</u> (post oak)	2-3
<u>Quercus velutina</u> (black oak)	2-3

Source: Fowells 1965; U.S.D.A. Forest Service 1948.

Table 7. Radiocarbon Dates from Features,
Sites lGr1x1, lGr2, lPi61, lPi33

Feature	Site lGr1x1
Feature 42	Sample #1001, A.D. 680 $\pm$ 75 Late Miller II
Feature 5	Sample #1141, A.D. 1180 $\pm$ 40 Middle Miller III
Site lGr2	
Feature 70	Sample #1161, A.D. 880 $\pm$ 50 Middle Miller III
Feature 90	Sample #1163, A.D. 1130 $\pm$ 45 Middle Miller III
Feature 97	Sample #1166, A.D. 910 $\pm$ 55 Early Miller III
Site lPi61	
Feature 92, Structure 4	Sample #1002, A.D. 1030 $\pm$ 55 Late Miller III
Feature 17, Structure 1	Sample #1003, A.D. 1240 $\pm$ 80 Late Miller III
Feature 15	Sample #1005, A.D. 420 $\pm$ 170 Late Miller II
Feature 25	Sample #1004, A.D. 910 $\pm$ 50 Early Miller III
Site lPi33	
Feature 51, Zone B	Sample #1231, A.D. 1030, $\pm$ 55 Late Miller III
Feature 51, Zone D	Sample #1232, A.D. 1030 $\pm$ 55 Late Miller III
Feature 6, Structure 1	Sample #1233, A.D. 1410 $\pm$ 45 Late Mississippian

Table 8. Floral Remains from Features, Site 1GrlX1

Feature	Total g Charcoal	Percent of Total Weight					Seeds, ^a Other
		<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood	Unknown	
Early Archaic period							
Feature 6	23.10	4.66	0.51	-	3.95	90.87	
Late Archaic period or Broken Pumpkin Creek phase							
Feature 1	2.00	25.50	3.50	-	9.00	62.00	
Feature 4	27.95	1.79	0.04	-	20.72	77.46	
Late Miller II subphase							
Feature 2	117.97	6.04	0.70	-	19.83	73.43	
Feature 13	433.60	27.26	1.51	0.01	6.70	64.52	
Feature 27	52.30	1.36	0.90	0.25	33.37	64.13	
Feature 34	193.01	6.44	0.67	-	26.93	65.97	1 <u>Diospyros virginiana</u> , 1 <u>Amaranthus</u> sp., 1 <u>Thalictrum</u> <u>caroliniana</u> , 1 unknown
Feature 35	250.59	13.52	0.87	0.38	22.19	63.04	2 <u>Vitis</u> sp., 1 <u>Carya</u> <u>fraxinulata</u> , 1 <u>Eriogonum</u> <u>americanum</u>
Feature 37	90.59	2.26	1.64	0.41	20.80	74.89	1 <u>Vitis</u> sp., 1 <u>Diospyros</u> <u>virginiana</u> , 1 unknown, 1 <u>Urtica</u> frag., 1 insect gall
Feature 39	213.56	7.28	1.79	0.05	14.28	76.61	1 <u>Vitis</u> sp., 1 <u>Rhus</u> sp., 1 unknown, 2 insect galls
Feature 42	606.15	4.75	0.71	0.20	26.75	67.59	2 <u>Diospyros virginiana</u> , 1 <u>Sabal</u> cf. <u>minor</u> , 1 <u>Gleditsia</u> <u>triacanthos</u> , 1 <u>Cyperaceae</u> , 3 unknown, base of monocot (<u>Typha</u> ?) stem
Feature 43	44.27	2.48	0.43	1.13	26.99	68.96	4 <u>Vitis</u> sp., 1 <u>Diospyros</u> <u>virginiana</u> , 1 insect gall?, 1 <u>Liliaceae</u> bulb frag.?
Feature 45	17.64	5.44	-	0.34	21.03	73.19	1 <u>Crataegus</u> sp.?, 2 unknown, <u>Pinus</u> cone frags.
Feature 46	103.08	4.28	2.34	-	19.22	74.17	1 unknown
Feature 47	60.64	3.31	0.31	0.82	26.58	68.96	1 <u>Vitis</u> sp., 2 <u>Festuca</u> sp., 1 <u>Fabaceae</u>
Feature 48	191.55	6.45	1.20	0.03	33.15	59.18	2 <u>Diospyros virginiana</u> , 2 <u>Vitis</u> sp., 2 unknown, grass stem
Early Miller III subphase							
Feature 32	89.70	8.24	1.17	0.11	8.78	81.69	

Table 8. (Continued)

Feature	Total g Charcoal	Percent of Total Weight					Seeds, ^a Other
		Carya	Quercus	Juglans	Wood	Unknown	
Middle Miller III subphase							
Feature 5	793.01	4.34	1.97	-	31.42	62.26	7 <i>Chenopodium</i> sp., 3 <i>Amaranthus</i> sp., 1 <i>Desmodium</i> sp., 1 <i>Phalaris caroliniana</i> , 2 unknown, 1 <i>Zea mays</i> cupule
Feature 10	2,806.04	14.65	1.50	0.09	28.36	55.39	1 <i>Amaranthus</i> sp., 1 <i>Festuca</i> sp., 1 <i>Strigaster</i> sp., 1 unknown, 1 <i>Convolvulaceae</i>
Feature 19	55.10	3.23	1.76	-	40.09	54.92	1 <i>Desmodium</i> sp., 1 <i>Panicum</i> sp.
Feature 21	46.51	4.64	1.81	0.11	37.09	56.35	1 <i>Rhus</i> sp.
Feature 25	262.01	4.37	1.59	-	51.45	42.59	1 <i>Rhus</i> sp., 1 <i>Festuca</i> sp., 1 <i>Asteraceae</i> , 1 insect gall
Feature 38	425.36	1.80	2.04	0.06	57.36	38.70	2 <i>Vitis</i> sp., 13 <i>Zea mays</i> cupules, 5 <i>Zea mays</i> kernel frags., 1 insect gall
Feature 41	110.83	4.57	1.14	-	40.64	53.66	1 <i>Passiflora incarnata</i> , 1 <i>Pinus taeda</i> , 1 <i>Pinus</i> cone frag.
Feature 44	1,308.60	0.54	1.64	-	61.86	35.97	1 <i>Prosopis virginiana</i> , 6 <i>Phalaris caroliniana</i> , 1 <i>Chenopodium</i> sp., 1 unknown, 2 <i>Zea mays</i> cupules, 1 <i>Zea mays</i> kernel, 2 kernel frags.

^aAll are seeds unless otherwise noted.

Table 9. Floral Remains by Cultural Provenience, Site 1GrlX1

Cultural Provenience	Percent of Total Weight					Wood	Unknown
	Carya	Quercus	Juglans	Zea			
Early Archaic period (1 feature)	4.66	0.51	-	-		1.95	90.87
Late Archaic period or Broken Pumpkin Creek phase (2 features)	3.37	0.27	-	-		19.93	76.43
Late Miller II subphase (13 features)	10.09	1.10	0.16	-		21.22	67.44
Early Miller III subphase (1 feature)	8.24	1.17	0.11	-		8.78	81.69
Middle Miller III subphase (8 features)	8.28	1.64	0.05	p ^a		39.61	50.12

^aIndicates present, but weight negligible.

Table 10. Nuts by Cultural Provenience,
Site 1Gr1X1

Cultural Provenience	Percent of Total Nuts by Weight		
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>
Early Archaic period (1 feature)	89.17	10.83	-
Late Archaic Period or Broken Pumpkin Creek phase (2 features)	92.66	7.34	-
Late Miller II subphase (13 features)	88.89	9.66	1.45
Early Miller III subphase (1 feature)	86.53	12.30	1.17
Middle Miller III subphase (8 features)	83.05	16.46	0.48

Table 11. Floral Remains from Excavation Levels,
Square 450NR500, Site 1Gr1X1

Level	Depth Below Surface	Total g Charcoal	Percent of Total Weight					Other
			<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood	Unknown	
2	0.5-1.0	616.20	5.51	.17	.19	6.71	87.42	
3	1.0-1.5	338.20	14.18	.22	-	4.57	81.03	1 Liliaceae bulb, 1 insect gall
4	1.5-2.0	277.50	16.70	.20	-	3.02	80.08	
5	2.0-2.5	199.50	14.25	.03	-	2.59	83.13	
6	2.5-3.0	7.00	44.29	.14	-	5.71	49.86	
7	3.0-3.5	1.60	18.75	1.88	-	6.25	73.12	
8	3.5-4.0	1.00	40.00	1.00	-	10.00	41.00	

Table 12. Floral Remains from Features, Site 1Gr2

Feature	Total g Charcoal	Percent of Total Weight							Seeds, ^a Other
		<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	<u>Ala</u>	<u>Pinus</u>	Wood	Unknown	
Broken Pumpkin Creek Phase									
Feature 89	1.85	10.81	-	-	-	-	5.41	83.78	
Early Miller I subphase									
Feature 37	170.84	6.89	0.22	-	-	-	53.78	39.11	
Feature 38	50.90	7.52	0.63	-	-	-	19.00	72.85	
Feature 39	60.35	8.82	4.76	-	-	-	34.58	51.85	1 Poaceae
Feature 45	90.43	13.16	0.53	-	-	-	21.12	65.19	
Middle Miller I subphase									
Feature 43	92.20	4.40	0.95	-	-	-	30.01	64.63	1 <u>Diospyros</u> <u>virginiana</u>
Late Miller I subphase									
Feature 92	70.15	3.79	0.56	-	-	-	62.95	33.00	1 Fabaceae
Early Miller II subphase									
Feature 42	178.70	21.54	0.62	0.62	-	-	21.65	55.58	
Late Miller II subphase									
Feature 35	136.69	10.88	0.26	-	-	-	40.41	48.45	
Feature 40	209.85	18.17	0.28	0.05	-	-	24.26	57.24	1 <u>Vitis</u> sp., 1 Fabaceae
Feature 41	232.45	13.22	1.05	-	-	-	38.52	47.21	
Feature 54	621.90	13.71	0.55	0.03	-	-	74.16	61.55	1 <u>Sabal</u> cf. <u>major</u> , 1 <u>Amaranthus</u> sp., 1 <u>Vitis</u> sp., 1 <u>Pinus taeda</u>
Feature 55	211.90	14.12	0.31	-	-	-	16.89	68.69	
Feature 61	155.11	26.40	0.61	-	-	-	17.50	55.50	1 <u>Diospyros</u> <u>vir-</u> <u>giniana</u> , 1 <u>Chenopodium</u> sp.
Feature 80	136.09	16.81	0.69	-	-	-	20.44	62.07	1 <u>Cxalis</u> sp.
Feature 83	155.71	8.99	0.22	-	-	-	7.17	83.62	1 Poaceae, 1 <u>Croton</u> sp.
Late Miller II- Early Miller III subphase									
Feature 44	621.12	11.42	5.39	0.03	-	-	37.39	45.77	
Early Miller III subphase									
Feature 97	784.84	28.36	1.72	-	p	-	43.48	26.45	

Table 12. (Continued)

Feature	Total g Charcoal	Percent of Total Weight							Seeds, ^a Other	
		Carya	Quercus	Juglans	Zea	Pinus	Wood	Unknown		
Middle Miller										
III subphase										
Feature 47	51.00	14.29	0.57	-	-	-	37.12	48.62		
Feature 65	356.41	11.28	0.28	-	-	-	53.74	34.69	1 unknown	
Feature 69	30.80	4.03	1.07	-	p	-	60.32	34.58		
Feature 70	116.93	19.21	0.20	-	-	-	45.05	35.54	1 <i>Polypodium</i> sp., 1 <i>Vitis</i> sp.	
Feature 77	187.62	20.00	0.55	-	-	-	45.74	33.71	2 unknown	
Feature 90	851.46	8.80	0.63	-	-	-	64.84	25.73	1 possible <i>Phaseolus vulgaris</i> , 1 <i>Crataegus</i> sp., 2 Fabaceae, 3 Lamiaceae	
Feature 94	707.94	10.50	1.16	-	p	-	51.98	36.36		
Feature 96	234.98	12.96	1.02	-	p	-	46.14	39.87	1 <i>Crataegus</i> sp., cane frags. cf. <i>Arundinaria</i>	
Feature 100	312.70	20.65	1.19	-	-	-	48.05	30.11		
Feature 108	11.20	32.05	2.95	-	-	-	23.30	41.70		
Late Mississippian period										
Feature 24	41.60	1.37	0.14	-	-	76.71	21.78	-		
Feature 72	9.01	0.11	-	-	-	88.79	9.54	1.55		
Feature 73	155.10	0.52	0.10	-	-	16.43	62.58	20.29	0.12	42 <i>Pinus taeda</i> , 1 <i>Vitis</i> sp., 1 <i>Eospyros virginiana</i>
Feature 74	364.20	0.16	0.08	-	-	99.20	-	0.30	0.25	1 <i>Passiflora</i> <i>incarnata</i>
Feature 118	46.70	16.66	0.15	-	-	38.63	4.15	17.62	22.78	1 tuber frag. cf. <i>Arios americana</i>
Feature 120	14.80	8.92	0.47	-	-	0.47	-	41.96	48.18	4 unknown
Feature 121	21.60	1.02	0.51	-	-	94.95	-	3.01	0.51	
Feature 123	12.10	0.50	-	-	-	94.38	-	5.12	-	
Feature 124	12.40	0.89	-	-	-	92.82	-	3.55	2.74	
Feature 125	49.50	1.58	0.16	-	-	38.04	56.20	4.02	-	62 <i>Pinus taeda</i>

Note. "p" indicates present, but weight negligible. ^aAll are seeds unless otherwise indicated.

Table 13. Floral Remains by Cultural Provenience, Site 1Gr2

Cultural Provenience	Percent of Total Weight						Unknown
	Carya	Quercus	Lupinus	Seca	Pinus	Wood	
Broken Pumpkin Creek 1000 (1 feature)	10.81	-	-	-	-	5.41	33.78
Early Miller I subphase (1 feature)	8.81	1.08	-	-	-	37.99	52.12
Middle Miller I subphase (1 feature)	4.40	0.95	-	-	-	30.01	64.63
Late Miller I subphase (1 feature)	3.79	0.26	-	-	-	62.95	33.00
Early Miller II subphase (1 feature)	21.54	0.62	0.62	-	-	21.65	55.56
Late Miller II subphase (8 features)	14.88	0.52	0.02	-	-	24.08	60.50
Late Miller II-Early Miller III subphase (1 feature)	11.42	5.39	0.03	-	-	17.34	45.77
Early Miller III subphase (1 feature)	28.36	1.72	-	p	-	43.48	26.45
Middle Miller III subphase (10 features)	12.47	0.80	-	p	-	54.14	32.60
Late Mississippian period (10 features)	1.69	0.12	-	69.75	17.43	8.34	2.67

Note. "p" indicates present, but weight negligible.

Table 14. Nuts by Cultural Provenience, Site 1Gr2

Cultural Provenience	Percent of Total Nuts by Weight		
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>
Broken Pumpkin Creek Phase (1 Feature)	100.00	-	-
Early Miller I subphase (4 Features)	89.04	10.96	-
Middle Miller I subphase (1 Feature)	82.19	17.81	-
Late Miller I subphase (1 Feature)	93.66	6.34	-
Early Miller II subphase (1 Feature)	94.59	2.70	2.70
Late Miller II subphase (8 Features)	96.53	3.37	0.10
Early Miller III subphase (1 Feature)	94.29	5.71	-
Middle Miller III subphase (10 Features)	93.97	6.03	-
Mississippian stage (10 Features)	93.52	6.48	-

Table 15. Floral Remains from Excavation Levels,
Square 540N460E, Site 1Gr2

Depth Below Surface (feet)	Total g Charcoal	Percent of Total Weight				Seeds, Other
		<u>Carya</u>	<u>Quercus</u>	<u>Wood</u>	<u>Unknown</u>	
0.0-0.8	319.24	5.20	-	16.87	77.93	15 <u>Zea mays</u> cupules, 6 <u>Zea mays</u> kernel frags., 1 <u>Diospyros virginiana</u>
0.8-1.0	75.27	7.59	0.34	36.55	55.52	1 <u>Fabaceae</u> , 1 <u>Zea mays</u> cupule
1.0-1.2	541.10	15.24	0.52	40.56	43.68	1 <u>Pubus</u> sp., 1 <u>Vitis</u> sp., 4 <u>Phalaris caroliniana</u> , 4 <u>Zea mays</u> cupules
1.2-1.4	105.50	9.54	0.17	47.36	42.93	1 <u>Zea mays</u> cupule
1.4-1.6	160.95	9.49	0.57	44.56	45.36	1 unknown, <u>Pinus</u> sp. cone frags.
1.8-2.0	161.80	14.00	0.58	35.83	49.59	1 <u>Pinus taeda</u> , <u>Pinus</u> sp. cone frags.
2.0-2.2	133.20	24.68	0.56	18.62	56.14	1 <u>Vitis</u> sp., 3 unknown
2.2-2.4	62.50	51.47	0.22	13.97	34.34	
2.4-2.6	83.90	36.84	-	16.77	46.39	1 <u>Vitis</u> sp., 1 <u>Pinus</u> sp. cone frag.
2.6-2.8	116.45	47.81	0.07	10.58	41.54	1 <u>Chenopodium</u> sp., <u>Pinus</u> sp. cone frags.
2.8-3.0	35.00	49.83	0.20	13.26	36.71	
3.0-3.2	18.10	32.65	0.39	36.35	30.61	
3.2-3.4	3.10	38.71	0.97	19.35	40.97	1 <u>Zea mays</u> cupule
3.4-3.6	2.90	50.00	1.03	10.71	38.26	
3.6-3.8	2.80	42.31	1.07	23.08	33.54	
3.8-4.0	1.30	23.08	0.77	30.77	45.38	
4.0-4.2	0.70	28.57	1.43	28.57	41.43	

^aAll are seeds unless otherwise noted.

Table 16. Maize Cobs from Site 1Gr2

Feature No.	Cob Length (cm) ^a	Row No.	Width of Lower Glume (mm)	Width of Cupule (mm)	Internode Length (mm)
Feature 24	3.20	8	n.m.	7.0-8.0	4.0
	3.50	12	3.5	5.0	3.5
	4.10	n.m.	5.0-6.0	n.m.	5.0
	2.20	n.m.	4.0	8.0-9.0	3.0
	2.30	10	4.0-4.5	6.0-8.0	3.5-4.0
Feature 74	2.80	10	2.0-2.5	4.0	2.5
	2.70	8	4.0	7.0	3.0
	2.70	10	3.5-4.0	6.0-7.0	4.0
	2.30	10	4.0-5.0	7.0	3.0
	2.20	12	3.0-3.5	5.0-5.5	3.0
	2.90	10	3.5-4.5	6.0	3.5
	3.80	12	3.5-4.0	6.0-6.5	3.5
	1.90	12	3.0	5.0	3.0
	1.90	10	4.0	6.0-6.5	3.0
	3.70	8	4.0	7.0-7.5	2.5
	4.80	12	2.5-3.0	5.0	3.0
	3.10	10	5.0	8.0-9.0	4.0
	2.40	10	4.5-5.0	6.5	3.0
Feature 73	1.10	8	2.5-3.0	4.0-4.5	3.0
	1.60	8	3.0-4.0	5.5	3.0
	1.00	8	3.0	6.0	3.0
Feature 125	1.60	10	4.5-5.0	6.5	3.0

Note. n.m. indicates not measurable.

^a All are broken lengths.

Table 17. Maize Kernels from Site 1Gr2

Feature	Height (mm)	Width (mm)	Thickness (mm)
Feature 24	n.m. ^a	4.0 (est.)	3.0 (est.)
Feature 74	4.0	5.0	4.0
	4.0	4.5	3.0
	4.0	5.5	3.0
	4.5	6.0	3.0
	3.0	3.5	2.5
	3.0	5.5	3.5
Feature 73	5.0	7.0	5.0
	4.5	6.0	5.0

^aNot measurable.

Table 18. Mississippian Features, Site 1Gr2

Feature	Length (feet)	Width (feet)	Depth (feet)
Feature 24	.90	.90	.30
Feature 72	.75	.75	.50
Feature 73	1.50	1.20	.55
Feature 74	1.45	1.35	.55
Feature 118	1.40	1.55	.55
Feature 121	.95	.90	.30
Feature 123	.65	.65	.45
Feature 124	.50	.50	.40
Feature 125	1.50	1.55	.55

Table 19. Floral Remains from Features, Site 1P161

Feature	Total g Charcoal	Percent of Total Weight					Seeds, ^a	Other
		<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood	Unknown		
Early Archaic period								
Feature 206								
1/4"	42.20	90.76	-	-	9.24	-	1	<u>Diospyros virginiana</u>
1/16" ^b	24.10							
s.s.	12.70	95.35	2.33	-	1.16	1.16		
Late Miller II subphase								
Feature 15								
1/4"	64.70	52.09	-	37.25	6.18	4.48	4	<u>Diospyros virginiana</u> ,
1/16" ^b	20.00						2	unknowns
s.s.	227.80	35.40	42.86	1.86	13.66	6.21	ca. 195	<u>Chenopodium</u> , 3
								<u>Vitis</u> sp., 4 unknowns, 5
								<u>Gleditsia triacanthos</u> , 1
								<u>Sabal</u> cf. <u>minor</u>
Feature 21								
1/4"	91.00	78.13	-	15.93	3.63	2.31	1	<u>Diospyros virginiana</u> ,
s.s.	2.20	28.57	14.29	-	28.57	28.57	3	unknowns
							2	<u>Gleditsia</u> sp., 1
								<u>Diospyros virginiana</u> , 1
								<u>Amaranthus</u> sp.
Feature 27								
1/4"	21.10	51.66	-	7.58	38.39	2.37		
s.s.	3.80	25.00	25.00	-	25.00	25.00	1	<u>Phalaris caroliniana</u>
Feature 58								
s.s.	9.80	67.74	6.45	-	19.35	6.45	1	<u>Vitis</u> sp., 3 unknown
Feature 65								
s.s.	2.80	30.77	7.69	-	46.15	15.38		
Feature 228								
1/4"	4.50	46.67	-	37.78	15.56	-		
s.s.	12.50	74.60	1.59	-	19.05	4.76		
Miller III phase								
Feature 42								
1/4"	123.30	.65	96.27	-	2.35	.73	1	<u>Gleditsia triacanthos</u>
1/6"	59.60	-	96.90	-	2.33	.78		
Early Miller III phase								
Feature 22								
1/4"	41.70	91.13	.48	5.52	2.40	.47		
s.s.	16.20	89.11	.99	-	3.96	5.94	1	<u>Diospyros virginiana</u> , 1
								unknown
Feature 25								
1/4"	61.60	22.08	1.79	.16	75.49	.49	1	<u>Diospyros virginiana</u>
s.s.	10.50	58.82	2.94	-	29.41	11.82		
Feature 31								
1/4"	7.00	50.00	-	-	48.57	1.43		
s.s.	1.30	50.00	12.50	-	25.00	12.50		
Feature 54								
1/4"	32.20	12.42	-	-	82.92	4.66		
s.s.	4.90	11.76	5.88	-	76.47	5.88		
Feature 63								
1/4"	27.50	34.91	-	-	61.45	3.64	14	<u>Phalaris caroliniana</u> , 1
s.s.	13.50	33.77	7.79	-	54.55	3.90	1	<u>Amaranthus</u> sp., 3 unknowns
Feature 76								
1/4"	10.00	57.00	-	2.00	38.00	3.00	91	<u>Phalaris caroliniana</u> , 1
s.s.	10.50	30.00	48.00	-	18.00	2.00		<u>Vitis</u> sp., 2 <u>Festuca</u> sp., 1
								<u>Amaranthus</u> sp., 2 unknowns

Table 19. (Continued)

Feature	Total g Charcoal	Percent of Total Weight					Seeds, ^a Other
		Carya	Quercus	Juglans	Wood	Unknown	
Feature 128							
1/4"	5.60	57.14	-	-	37.50	5.35	
s.s.	.65	37.50	1.67	-	29.16	31.67	1 <i>Diospyros virginiana</i> , 1 <i>Vitis</i> sp.
Feature 195							
1/4"	1.20	8.33	-	-	91.67	-	
ss.	8.25	9.41	1.18	-	82.35	7.06	1 <i>Chenopodium</i> sp.
Feature 222							
1/4"	8.60	2.33	-	-	97.67	-	
s.s.	2.45	13.33	6.67	-	66.67	13.33	1 <i>Diospyros virginiana</i>
Feature 230							
1/4"	9.10	20.88	-	-	74.73	4.40	
s.s.	4.30	19.05	4.76	-	66.67	9.52	1 <i>Chenopodium</i> sp., 1 <i>Phalaris caroliniana</i>
Late Miller III							
subphase							
Feature 16							
s.s.	0.90	33.33	16.67	-	33.33	16.67	
Feature 17							
(Structure 1)							
Unit 1							
1/4"	2.20	22.73	-	-	77.27	-	
1/16" ^b	6.30						
s.s.	4.70	8.33	8.33	-	75.00	8.33	
Unit 2							
s.s.	1.50	60.00	10.00	-	20.00	10.00	
Unit 3							
1/4"	3.70	2.70	-	-	70.27	27.02	
1/16" ^b	8.90						
s.s.	2.70	16.67	16.67	-	50.00	16.67	1 <i>Phalaris caroliniana</i>
Unit 4							
1/4"	0.10	-	-	-	100.00	-	
s.s.	4.60	58.33	8.33	-	25.00	8.33	2 unknowns
Feature 17A							
1/4"	3.20	34.38	-	-	59.38	6.25	
1/16" ^b	48.60						
s.s.	7.40	28.57	4.76	-	59.52	7.14	1 <i>Phalaris caroliniana</i> , 1 unknown
Feature 17B							
s.s.	3.58	5.71	2.86	-	85.71	5.71	
Feature 28							
(Structure 2)							
1/4"	2.00	-	-	-	100.00	-	
s.s.	4.25	37.04	3.70	-	44.44	14.81	
Feature 29							
(Structure 3)							
16" ^b	14.80						
s.s.	7.00	42.11	5.26	-	42.11	10.53	1 unknown
Unit 1							
s.s.	6.45	26.09	4.35	-	52.17	17.39	1 <i>Polygonum</i> sp.
Unit 5							
s.s.	3.65	26.67	13.33	-	53.33	6.67	1 <i>Phalaris caroliniana</i> , 1 unknown
Unit 7							
s.s.	7.20	35.71	7.14	-	50.00	7.14	1 unknown
Unit 9							
s.s.	6.50	31.25	6.25	-	50.00	12.50	
Unit 11							
s.s.	5.17	35.68	.15	--	62.31	1.76	1 <i>Zea mays</i> cupule
Unit 13							
1/16" ^b	12.90						
s.s.	9.30	42.86	3.57	-	50.00	3.57	1 <i>Zea mays</i> cupule, 1 <i>Phalaris caroliniana</i> , 1 unknown

Table 19. (Continued)

Feature	Total g Charcoal	Percent of Total Weight					Seeds, ^a Other
		<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood	Unknown	
Unit 15 s.s.	4.00	53.33	6.67	-	33.33	6.67	1 unknown
Unit 17 s.s.	1.97	55.51	2.59	-	38.23	3.67	1 unknown
Unit 19 s.s.	5.80	40.94	4.68	-	52.63	1.75	1 <u>Galium cf. aparine</u>
Feature 29							
Unit 21 s.s.	10.00	23.08	2.56	-	66.67	7.69	1 <u>Chenopodium</u> sp.
Unit 27 s.s.	6.65	68.57	2.86	-	22.86	5.71	
Unit 29 s.s.	6.30	53.33	6.67	-	33.33	6.67	1 <u>Pinus cone frag.</u> , 1 <u>Chenopodium</u> sp.
Unit 31 1/4"	.20	100.00	-	-	-	-	
s.s.	3.17	49.40	2.14	-	46.43	2.02	2 unknowns
Unit 33 s.s.	3.58	32.69	.12	-	65.98	1.21	1 unknown
Unit 35 1/16" ^b	36.80						
s.s.	5.20	50.00	7.14	-	35.71	7.14	1 <u>Vitis</u>
Wall Trench 1 1/16" ^b	51.00						
s.s.	5.70	55.56	5.56	-	27.78	11.11	
Wall Trench 2 s.s.	5.10	38.46	7.69	-	46.15	7.69	
Feature 29D 1/16" ^b	.40						
s.s.	7.60	77.14	2.68	-	17.14	2.86	
Feature 29E s.s.	1.56	69.15	1.43	-	25.64	4.41	
Feature 55 1/4"	29.00	29.35	-	100	68.24	4.35	
s.s.	6.00	50.00	3.67	-	33.33	7.14	
Feature 57 1/4"	6.80	76.47	-	-	20.23	13.24	
s.s.	4.90	74.08	4.85	-	19.23	8.64	
Feature 59 (Structure 4)							
Unit 1 s.s.	3.10	24.69	12.35	100	49.06	12.35	
Unit 5 s.s.	2.45	30.77	7.69	-	40.15	19.38	1 unknown
Unit 14 s.s.	6.11	44.68	3.45	-	49.42	3.45	2 unknowns
Unit 18 s.s.	2.50	52.03	0.34	-	41.19	6.44	1 <u>Chenopodium</u> sp.
Unit 15 1/4"	6.10	-	-	-	100.00	-	
s.s.	6.70	38.10	4.76	-	47.62	9.52	
Unit 17 s.s.	4.77	38.94	2.65	-	45.13	13.27	
Unit 18 1/4"	6.30	62.50	-	-	25.00	12.50	
s.s.	4.55	38.10	4.76	-	47.62	9.52	1 unknown
Unit 21 s.s.	1.40	20.00	20.00	-	40.00	20.00	

Table 19. (Continued)

Feature	Total g Charcoal	Percent of Total Weight				Unknown	Seeds, ^a	Other
		<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood			
Unit 23								
1/4"	.30	33.33	-	-	66.67	-		
s.s.	2.95	47.06	5.88	-	35.29	11.76		
Unit 25								
s.s.	3.05	31.58	5.26	-	42.11	21.05	1 <u>Zea mays</u> cupule	
Feature 92A								
1/4"	.10	-	-	-	100.00	-		
s.s.	5.60	11.76	2.94	-	82.35	2.94	3 unknowns	
Feature 125								
1/4"	1.30	-	-	-	100.00	-		
s.s.	24.90	54.35	2.90	-	37.68	5.07		
Feature 152								
1/4"	2.90	6.90	-	-	34.48	58.62		
s.s.	5.95	17.54	1.75	-	14.04	3.51	63.16% <u>Zea mays</u> kernels (ca. 303 frags.)	
1/16" ^b	2.40							
Feature 166								
1/14"	13.60	40.44	-	.74	50.00	8.82		
s.s.	12.10	22.22	3.70	-	62.96	11.11		
Feature 201								
s.s.	2.38	67.86	1.40	-	28.83	1.91		
Late Miller III subphase or Mississippian stage								
Feature 1	39.80	1.25	-	-	9.06	-	79.4% <u>Zea mays</u> cupules, glumes, and kernels; 10.31% <u>Pinus</u> cone frags.	

Note. s.s. indicates soil sample.

^aAll are seeds unless otherwise noted.

^bThis fraction scanned, not sorted.

Table 20. Floral Remains by Cultural Provenience, Site 1Pi61

Cultural Provenience	Percent of Total Weight					Unknown
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	<u>Zea</u>	Wood	
Early Archaic period (1 feature)						
1/4"	90.76	-	-	-	9.24	-
s.s.	95.35	2.33	-	-	1.16	1.16
Late Miller II subphase (6 features)						
1/4"	64.98	-	23.11	-	8.88	3.03
s.s.	38.26	38.60	1.64	-	14.79	6.71
Early Miller III subphase (10 features)						
1/4"	39.02	0.64	1.27	-	57.07	2.00
s.s.	43.74	10.31	-	-	39.34	6.61
Late Miller III subphase (16 features)						
1/4"	31.69	-	0.60	-	58.15	9.56
s.s.	41.88	5.28	0.02	1.59	46.44	4.79

Note. s.s. indicates soil sample.

Table 21. Nuts by Cultural Provenience, Site 1Pi61

Cultural Provenience	Percent of Total Nuts by Weight		
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>
Early Archaic period (1 Feature)			
1/4"	100.00	-	-
s.s.	97.58	2.42	-
Late Miller II subphase (6 Features)			
1/4"	73.76	-	26.24
s.s.	48.74	49.17	2.09
Early Miller III subphase (10 Features)			
1/4"	95.34	1.55	3.11
s.s.	80.92	19.08	-
Late Miller III subphase (16 Features)			
1/4"	98.15	-	1.85
s.s.	88.77	11.20	0.04

Note. s.s. indicates soil sample.

Table 22. Maize Cobs from Feature 1, Site 1Pi61

Cob Length (cm) ^a	Number of Rows	Width of Lower Glume (mm)	Cupule Width (mm)	Internode Length (mm)
2.5	12	4.5-5.0	7.0	3.0-3.5
3.3	12	4.0-4.5	6.0-6.5	3.0-3.5
3.7	10	3.5-4.0	6.0-7.0	3.0
1.5	10	3.5-4.0	6.0	3.0-3.5

^a All are broken lengths.

Table 23. Floral Remains from Features, Site 1Gr50

Feature	Total g charcoal	Percent of Total Weight					Seeds
		Carya	Quercus	Juglans	Wood	Unknown	
Feature 3							
1/4"	0.1	100.00	-	-	-	-	
s.s.	4.2	88.89	pa	-	3.70	7.40	1 <i>Phytolacca americana</i>
Feature 4							
s.s.	6.05	83.72	1.40	0.47	6.05	8.37	
Feature 5							
1/4"	0.4	75.00	-	-	25.00	-	
s.s.	6.1	65.00	5.00	-	20.00	10.00	1 <i>Phytolacca americana</i> 1 seed frag.
Feature 7							
s.s.	5.6	85.71	2.04	-	8.16	4.08	

Note. s.s. indicates soil sample.

^a Indicates present only in fraction smaller than 2 mm.

Table 24. Floral Remains from Excavation Units, Site 1Gr50

Excavation Level	Total g Charcoal	Percentage of Total Weight		
		<u>Carya</u>	<u>Juglans</u>	Wood
Early (?) Archaic period				
Sq. 110L40				
Level 4	1.0	80.00	20.00	-
Level 5	0.1	100.00	-	-
Sq. 215R30				
Level 4	0.1	-	-	100.00
Sq. 410L45				
Level 4	0.4	100.00	-	-
Level 5	0.3	100.00	-	-
Sq. 445L25				
Level 4	0.9	100.00	-	-
Late Archaic period				
Sq. 110L40				
Level 3	2.0	100.00	-	-
Sq. 355R5				
Level 3	1.0	70.00	-	30.00
Sq. 410L45				
Level 3	1.4	100.00	-	-
Sq. 445L25				
Level 3	0.8	50.00	-	50.00
Miller III phase				
Sq. 60R10				
Level 2	0.1	100.00	-	-
Sq. 110L40				
Level 2	0.8	37.50	-	62.50
Sq. 290L40				
Level 2	0.7	-	-	100.00
Sq. 410L45				
Level 2	0.8	25.00	-	75.00
Sq. 445L25				
Level 1	0.9	-	-	100.00

Table 25. Floral Remains by Cultural Provenience, Site 1Gr50

Cultural Provenience	Percent of Total Weight				
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>	Wood	Unknown
Early Archaic period					
Excavation Units					
1/4"	89.29	-	7.14	3.57	-
Late Archaic period					
Excavation Units					
1/4"	86.54	-	-	13.46	-
4 Features					
1/4"	80.00	-	-	20.00	-
s.s.	80.05	2.32	0.14	10.02	7.47
Miller III phase					
Excavation Units					
1/4"	18.18	-	-	81.82	-

Note: s.s. indicates soil sample.

Table 26. Nuts by Cultural Provenience, Site 1Gr50

Cultural Provenience	Percent of Nuts by Weight		
	<u>Carya</u>	<u>Quercus</u>	<u>Juglans</u>
Early Archaic period			
Excavation Units	92.57	7.41	-
Late Archaic period			
Excavation Units	100.00	-	-
Soil samples	97.02	2.82	0.17
Miller III phase			
Excavation Units	100.00	-	-

Table 27. Floral Remains from Features, Site 1Pi33

Feature	Total g Charcoal	Percent of Total Weight						Seeds, ^a Other
		Carya	Quercus	Juglans	Zea	Wood	Unknown	
Late Miller III subphase								
Feature 51								
1/4"	89.11	20.54	0.12	0.11	-	79.23	-	1 <i>Diospyros virginiana</i>
1/16"	1,024.20 (11.28% scanned)							1 <i>Festuca</i> sp., 1 <i>Phalaris caroliniana</i> , 1 <i>Vitis</i> sp., 1 <i>Chenopodium</i> sp., 1 <i>Diospyros virginiana</i> , 3 <i>Fabaceae</i> , 3 unknown seeds, 61 <i>Zea mays</i> cupules, 23 <i>Zea mays</i> kernel frags.
s.s.	95.44	8.62	6.79	-	0.31	73.20	4.70	25 <i>Chenopodium</i> sp., 1 <i>Festuca</i> sp., 7 <i>Phalaris caroliniana</i> , 6 <i>Amaranthus</i> sp., 1 <i>Fabaceae</i> , 3 <i>Podaceae</i> , 28 unknown
Late Miller III subphase or Mississippian stage								
Feature 14	83.2	0.19	0.10	-	99.61	.10	-	1 <i>Festuca</i> sp., 1 unknown
Mississippian stage								
Feature 39	49.7	1.94	0.97	-	63.00	11.53	0.97	20.66% <i>Pinus</i> cone frags., 16 <i>Pinus taeda</i> , 1 <i>Quercus</i> sp., 1 <i>Amaranthus</i> sp.
Late Mississippian period								
Feature 6								
1st level below daub								
1/4"	0.2	-	-	-	-	100.00	-	
1/16"	10.35	5.36	1.79	-	5.36	78.57	5.36	243 <i>Stellaria</i> cf. <i>pubera</i> , 1 <i>Fabaceae</i> , 1 unknown
s.s.	0.76	25.00	-	-	-	50.00	25.00	27 <i>Stellaria</i> cf. <i>pubera</i>
1st level below daub								
1/4"	0.1	-	-	-	-	100.00	-	
1/16"	9.44	10.43	0.87	-	3.48	76.52	6.96	145 <i>Stellaria</i> cf. <i>pubera</i> , 2 <i>Fabaceae</i> , 1 unknown
s.s.	0.2	33.33	33.33	-	-	33.33	-	24 <i>Stellaria</i> cf. <i>pubera</i>
2nd level below daub								
1/4"	84.5	1.07	-	-	0.12	98.82	-	
1/16"	159.7	9.86	1.41	-	4.23	76.06	7.04	172 <i>Stellaria</i> cf. <i>pubera</i> , 2 <i>Fabaceae</i> , 3 unknowns
s.s.	0.2	(3)	(2)	-	-	57.14	42.86	11 <i>Stellaria</i> cf. <i>pubera</i>
Feature 6A	0.2	-	-	-	-	(6)	(8)	12 <i>Stellaria</i> cf. <i>pubera</i>

Note. Parentheses indicate number of fragments; s.s. indicates soil sample.

^a All are seeds unless otherwise indicated.

Table 28. Floral Remains from Concentration of Corn, Site 1Pi33

Level	Total g Charcoal	Percent of Total Weight				
		Carya	Quercus	Juglans	Zea	Wood
2	22.19	0.26	0.26	0.13	95.14	1.04
3	33.44	-	p ^a	-	99.62	0.38

^aPresent, but weight negligible.

Table 29. Maize Cobs from Feature 14, Site 1Pi33

Cob Length (cm) ^a	Row No.	Width of Lower Glume (mm)	Cupule Width (mm)	Internode Length (mm)
2.2	12	2.5	4.0-5.0	3.0
1.9	12	3.5-4.0	5.0-5.5	3.0-3.5
1.6	12	3.0-4.0	5.5-6.0	3.0
1.0	12	3.0	5.0-5.5	2.5

^aAll are broken lengths.

Table 30. Maize Kernels from Site 1Pi33

Feature No.	Height (mm)	Width (mm)	Thickness (mm)
14	2.5	4.5	3.5
	5.0	8.0	5.0
	3.0	4.0	2.5
	3.0	4.0	n.m.
	2.5	4.0	3.0
	n.m.	4.0	3.0
	n.m.	4.0	3.0
	n.m.	4.5	3.5
	n.m.	4.0	3.5
51	5.0	8.0	5.5
	5.0	8.0	n.m.

Note. n.m. indicates not measurable.

Table 31. Cultural Assignments of Features Analyzed
From Sites 1Gr1x1, 1Gr2, 1Pi61, 1Gr50, and 1Pi33

	1Gr1x1	1Gr2	1Pi61	1Gr50	1Pi33	Totals
Mississippian		10			3	13
Late Miller III			16		1	17
Middle Miller III	3	10				13
Early Miller III	1	1	10			12
Late Miller II	13	8	6			27
Early Miller II		1				1
Late Miller I		1				1
Middle Miller I		1				1
Early Miller I		4				4
Broken Pumpkin Creek		1				1
Late Archaic				4		
Early Archaic	1		1			2
Uncertain	2	1	2		1	6

Table 32. Composition of Foods per 100 Grams

Food	Water (percent)	Food Energy (calories)	Protein (g)	Fat (g)	Carbohydrate	
					Total (g)	Fiber (g)
Corn						
raw, field, whole-grain	13.8	348	8.9	3.9	72.2	2.0
Hickory nuts	3.3	673	13.2	68.7	12.8	1.9
Black Walnuts	3.1	628	20.5	59.3	14.8	1.7
Acorns						
white oak	47.3	221	2.8	3.3	43.9	1.3
red oak	38.2	299	3.4	12.9	42.1	1.9

Sources: Watt and Merrill 1963; Wainio and Forbes 1941

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APPENDIX

HABITAT, SEASONS OF AVAILABILITY, AND ETHNOGRAPHIC RECORDS OF
UTILIZATION OF PLANTS REPRESENTED IN ARCHAEOLOGICAL SAMPLES

APPENDIX

HABITAT, SEASONS OF AVAILABILITY, AND ETHNOGRAPHIC RECORDS OF UTILIZATION OF PLANTS REPRESENTED IN ARCHAEOLOGICAL SAMPLES

Scientific Name Common Name	Habitat	Season(s) of Availability	Ethnographic Utilization
<u>Amaranthus</u> spp. Amaranth, Pigweed	cultivated fields, waste ground	seeds: June- first greens: spring- summer	seeds boiled or dried and then pinched; leaves eaten (Yanovsky 1936:23)
<u>Apocynum</u> americana Med. Groundnut	bottomland woods and thickets	tubers: year- round	tubers eaten: "an important food for all tribes within its range" (Yarnell 1964:53)
<u>Arundinaria</u> sp. Southern Cane	bogs, low woods, savannahs, dry woods	seeds: summer	used in making baskets, mats, building materials, or backing for wattle walls; fishing traps or traps, spears, arrows, rebs, corn cobs, knives, blow- guns, arrow shafts, darts, shields, crackles, rattles, etc. eaten (Swanton 1946:244-247; Yanovsky 1936:17)
<u>Carya</u> spp. Hickory	deciduous woods, in varied habi- tats	nuts: fall	nuts eaten, prepared in many ways; wood used in house construction, arrow shafts, fishing implements, tools, etc. Bark used in house covering, and for fire making for boiling pottery; pot- ties made from "red hickory," bark made from "switch hickory" or "white hickory" (Swanton 1946:245, 246-247)
<u>Cassia fasciculata</u> Michx. Partridge Pea	weedy places, woodland borders	fruits: summer- fall	
<u>Chenopodium</u> spp. Lamb's quarters, Goosefoot	cultivated fields, waste ground	greens: early summer seeds: late summer- fall	"Young leaves used for greens or boiled with fat; seeds ground to flour and made into bread or mush" (Yanovsky 1936:22)
<u>Crataegus</u> spp. Hawthorn	alluvial woods, xeric woodlands and thickets	fruits: late summer-fall	"Fruit squeezed by hand, made into cakes and stored for winter . . ." (Yanovsky 1936:31). Root, fruit, and bark used medicinally. Arms used for food, technology, and stored to attract deer. Thorns gathered for sewing (Yarnell 1964:169, 170)
<u>Croton</u> sp. Dove Weed	fields and pastures	fruits: summer- fall	<u>C. torymbulosus</u> : "Infusion of flowering tops used as beverage . . ." (Yanovsky 1936:40)
<u>Desmodium</u> spp. Beggar Lice	fields, waste places, woods, woodland borders	fruits: late summer-fall	<u>D. nudiflorum</u> : Root used for medicine (Banks 1953:7 as cited by Shea 1971: 627)
<u>Diospyros virginiana</u> L. Persimmon	dry deciduous forests, old fields	fruits: fall	Fruit eaten; leaves of bread made from fruit and stored for winter; comb made from root (Swanton 1946:266, 363, 564)
<u>Festuca</u> spp. Fescue	fields, waste places	seeds: summer	<u>Festuca octoflora</u> and <u>F. ovina</u> : seeds eaten (Yanovsky 1936:8)
<u>Galium</u> cf. <u>aparine</u> L. Bedstraw	meadows, waste places, wood- lands	fruits: April- May	Used for medicinal beverage (Yarnell 1964:160)
<u>Gleditsia triacanthos</u> L. Honey Locust	woods, woodland borders	fruits: fall	"Pulpy pods contain sugar; beer made by fermenting sweet pods . . ." (Yanovsky 1936:36)
<u>Juglans nigra</u> L. Black Walnut	rich woods	nuts: fall	"Nuts eaten plain or with honey, or cook- ed into soup . . ." (Yanovsky 1936:17). Used in dyeing (Yarnell 1964:67)
<u>Oxalis</u> spp. Wood Sorrel	woodlands and thickets, waste places	greens and seeds: late spring to fall	Leaves, flowers and bulbs eaten (Yanovsky 1936:40)

APPENDIX. (CONTINUED)

Scientific Name Common Name	Habitat	Season(s) of Availability	Ethnographic Utilization
<u>Panicum</u> spp. Panic Grass	varied habitats; woods, waste places, fields, marshes	seeds: late spring to fall	"Seeds ground, kneaded with water into cakes and dried in the sun; also used for gruel and mush . . ." (Yanovsky 1936:8)
<u>Passiflora incarnata</u> L. Maypop, Passion Flower	fields and thickets	fruits: mid- summer-fall	Fruit eaten, cake prepared from pulp (Swanton 1946:41, 285)
<u>Phalaris caroliniana</u> Walt. Maygrass	ditches, waste places	seeds: summer	
<u>Phytolacca americana</u> L. Pokeweed	waste ground, clearings	greens: spring fruits: fall	"Leaves and stalks used for food . . ." (Yanovsky 1936:23)
<u>Pinus taeda</u> L. Loblolly Pine	low woods, old fields	seeds: fall	<u>Pinus</u> spp.: Seeds, sap, cambium of many species used for food. Wood used for house frames, skin boats, and rafts, in making canoes and bows, for torches in fire-fishing, and as tinder; bark used as house covering; pine cones used for fuel (Swanton 1946:245, 421, 425-426; Yanovsky 1936:5-6; Fernald and Kinney 1958:77-79; Hilgner 1951:131-132 as cited by Binford 1972:44; King 1947:99 as cited by Binford 1972:55)
<u>Polygonum</u> spp. Knotweed	disturbed habi- tats, woodland borders, allu- vial woods, marshes, dry and wet habitats	greens: spring seeds: summer, fall	Young shoots eaten; seeds eaten, parched and ground into meal; roots used for stews and soups (Yanovsky 1936:70). Used for medicinal beverage and smoked to attract deer (Yarnell 1964:157)
<u>Quercus</u> spp. Oak	swamps; alluvial mesic, and xeric woods	nuts: fall	Acorns eaten; dried, ground, and perco- lated with water to remove bitter tan- nins; oak used for firewood, kindling, mortars, backings for wattle walls, bows, fish traps, beds, frames for boats, bark used for covering houses, dyes, and soak- ed with skins in the tanning process (Yanovsky 1936:19; Swanton 1946:245-246)
<u>Rhus</u> spp. Sumac	woodlands, thickets, old fields, wood- land borders	fruits: early summer-fall	Fruit eaten, used for beverages, medicine and dye; fresh roots peeled and eaten raw; leaves used as an adulterant of tobacco (Swanton 1946:245, 385, 606; Yanovsky 1936:40)
<u>Rubus</u> spp. Blackberries, Dewberries	old fields, clearings, woodland borders	fruits: summer	Fruit eaten, dried and stored (Yarnell 1964:59; Swanton 1946:244; Yanovsky 1936:34-35)
<u>Sabal minor</u> (Jacq.) Pers. Palmetto	low woods	fruits: fall	Leaves used for basketry (Swanton 1946: 246)
<u>Stellaria</u> cf. <u>pubera</u> Michx. Giant Chickweed	rich woods	fruits: early summer	
<u>Strophostyles</u> sp. Wildbean	fields, woods, clearings	fruits: late summer-fall	
<u>Typha latifolia</u> L.	shallow water of lakes, ponds, river banks and wet ditches	rootstocks: late fall to spring new shoots: spring and early summer flowering spikes: spring seeds: summer to fall	"Young roots, shoots, bases of stems, flowering ends, and seeds eaten. . ." (Yanovsky 1936:6). Mats made from cat- tail flags (Swanton 1946:247)
<u>Vitis</u> spp. Grape	low woods, stream banks	fruits: late summer-early fall	Fruit eaten fresh or dried (Swanton 1946:287); Yanovsky 1936:43). Also used for medicine (Yarnell 1964:65). Grape vines used as cord (Swanton 1946: 244)

AN ANALYSIS OF THE FAUNAL REMAINS
FROM THE GAINESVILLE LAKE AREA

by
Anne Woodrick

with
A ZOOARCHAEOLOGICAL ANALYSIS OF 4,991 BONE AND SHELL
ARTIFACTS FROM THE GAINESVILLE LAKE AREA

by
Cailup B. Curren, Jr.

Part II
of
Biocultural Studies
in the Gainesville Lake Area

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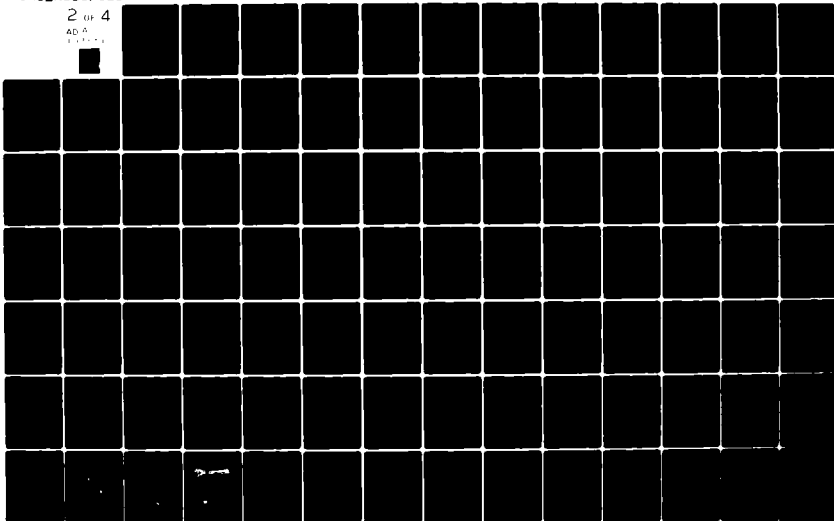
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CHAPTER I

INTRODUCTION

The 1976-1977 archaeological excavations in the Gainesville Lake area along the Tombigbee River in west Alabama produced a substantial amount of archaeological debris. Excluding burials and postmolds, the number of features from each excavated site is as follows: Site lGr1Xl, 52; Site lGr2, 128; Site lPi33, 61; and Site lPi61, 174. It was not feasible to attempt the identification and analysis of all of the recovered faunal material.

Included in the faunal analysis are the control unit squares from Sites lGr1Xl and lGr2, and selected features from all sites. Features chosen for analysis were those which did not have discernible intrusions and which contained ceramics from predominantly one cultural phase or subphase. Burials and postmolds were excluded because, in most instances, their fill could not be clearly assigned to a specific cultural phase.

The number of features analyzed for each site is presented in Table 1. Jenkins (this report: Vol. 2) has distinguished the various subphases of the Woodland stage as shown in Fig. 1. As Table 1 indicates, most, 95 percent, of the features are associated with the Woodland stage. Only 0.6 percent by count of the identified bone is in an Archaic or Mississippian context. Consequently, the focus of this report will be to describe the subsistence system represented by the zooarchaeological remains from the Late Miller II subphase through the Late Miller III subphase.

Two major changes which might be reflected in the animal procurement system occurred in the Central Tombigbee drainage during the Woodland stage. The first of these is a noted increase in the indigenous population (Jenkins et al. 1975; Blakeman 1975; Blakeman et al. 1976). This phenomenon is characterized by the more frequent occurrence of base camps along the Tombigbee River for each subsequent subphase of the Woodland stage. The later Woodland sites are larger and the later middens contain a denser quantity of debris (Jenkins et al. 1975). The second change is a shift, not fully developed until the Mississippian period, toward the utilization of domestic cultigens.

The increase in population could be reflected in the animal procurement in two ways. First, there may be an overall increase in the numbers of animals collected. Verification of this would be an increase in the density of animal bone in the later subphases while the relative percentages of animals exploited during each subphase may or may not remain equal. Another possibility is that the increase in population could cause competition between adjacent groups of hunters and gatherers for the preferred species, probably

white-tailed deer. If competition did develop, changes in the types as well as quantities of food sources may occur. One noticeable shift in the subsistence system is the utilization of cultigens beginning in the Early Miller III subphase. This may or may not affect the types and numbers of animal species exploited. But just as the causes or reasons for the shift to cultigens cannot be stated simply, any changes which might occur in the animal procurement system cannot be directly tied to the increase in population. This report will document the faunal remains for each of the subphases for each site. Trends, if any can be delineated, will be summed at the end of each site and in the final section.

CHAPTER II

PROCEDURES AND METHODS

Before describing the faunal remains from each of the sites, the various methods used in this analysis must be made clear. The lack of certain animals in the comparative collection posed a special problem, especially regarding what was to be considered as an identified piece of bone. For the purpose of this report, bone was counted as identified when it could be placed into one of the following categories: Odocoileus virginianus (white-tailed deer); mammal-other, identified to at least the genus level and usually to the species level; turtle, identified to family or genus and occasionally species; bird, either identified as Meleagris gallopavo (turkey) or bird-other; and fish, identified to family, genus and species level. In the case of fish bone from Sites 1P161 and 1P133, the majority of the fish bone is identified at a class level only. Not included as identified bone, but considered in the interpretations of the animal remains from each of the sites was the bone included in the categories large mammal, medium-sized mammal, small mammal, large bird and medium-sized bird. The bones in these categories were long bone fragments, ribs, vertebrae, metapodials, indeterminate cranial fragments, phalanges and other bones which are difficult to identify to the species level, but indicate the portions of the animal's skeleton which were found at the site.

Excavated feature fill was washed through a one-quarter inch mesh screen underlain by a one-sixteenth inch mesh screen. Faunal material was caught in both screens. Additional washing of the bone in the one-quarter inch mesh screen was done for 1P161 and 1P133. Although the additional washing did not increase the ability to identify particular bone pieces, it may have increased the frequency in which the modification of bone was noted. For example, the occurrence of butchering and skinning marks is much higher on bone which had been washed in the laboratory.

An aspect of faunal reports not often adequately dealt with has been the analysis of the one-sixteenth inch debris. Struever (1968) argued that the one-quarter inch mesh screen was not small enough to recover the full size range of debris. At the Apple Creek Site in Illinois, Parmalee, Paloumpis, and Wilson (1972) demonstrated that in the analysis of such small bone, the quantity of fish bone doubled and the frequency and size of fish remains was altered. From the Bellefonte Site in northeastern Alabama, the identification of the bone from the 3/32 in mesh added the following species to the animals identified from the site: freshwater crab, wild turkey, fox squirrel, chipmunk and hispid cotton rat (Curren et al. 1977).

The problem with the identification of the one-sixteenth debris is twofold: sampling and time. The following procedure was utilized

in processing the one-sixteenth inch debris. The material from each excavation unit was completely rinsed to prevent miscalculations due to the presence of dirt in the sample. Also, dirty samples tended to minimize the effects of the zinc chloride flotation process. The debris was dried, weighed and then all or part of it, depending upon the total weight of the sample, was chemically floated to separate the light fraction botanical remains from the heavy fraction bone, lithic and ceramic remains. Once the heavy fraction dried, the faunal remains had to be picked from the other debris. The time involved in this separation was substantial, about five hours per 100 grams of material. A heavily concentrated solution of zinc chloride was used in an attempt to separate the faunal remains from the other debris. This, however, was not effective as fired clay fragments floated as often as did the faunal material, and some of the heavier bone pieces never floated. Once separated from the other heavy fraction debris, the faunal remains were then divided into their respective class categories--mammal, bird, fish, reptile, amphibian, and unidentifiable. The unidentifiable group for each sample contained the majority of the bone for this screen size. Separation into the various animal class categories involved another four to seven hours per feature.

In the quantification of the one-sixteenth inch debris, the large features where only a 1 to 5 percent sample was analyzed were of special concern. For Feature 10 at Site 1Gr1X1, in which the estimated one-sixteenth inch bone weight was 1850 grams, four 1 percent samples were examined. The four samples closely approximated each other in their representation of the various animal classes. In the occurrences of fish and small mammal bones, the number of total elements for each species was consistent for each sample but the elements varied. It would seem that an estimate might be made for the total elements of each species, but it would be unwise to assume that any single element will be represented more than once.

The one-sixteenth inch bone was analyzed from five features from Site 1Gr1X1 and 20 features from Site 1Gr2. The bone from the samples was separated into the class groupings, but no weight was recorded. Tables 2-3 summarize the results. Most of the identifiable bone from all features was fish. Unfortunately, due to the lack of any comparative skeletons, the bone could only be given a class level identification. Elements included in the small mammal category are ribs, metapodials, phalanges, vertebrae. These are difficult bones to identify to the species level; however, they indicate that the small mammals (squirrel and rabbit size) are represented by more than the skull and long bone fragments identified in the one-quarter inch screened debris.

As Table 2 indicates, if only the one-quarter inch bone were analyzed, the greatest discrepancy at Site 1Gr1X1 would be the underrepresentation of fish bone. This held for all of the cultural phases. One species of fish, Pylodictus olivaris (flathead catfish), which had not been identified from the one-quarter inch debris on the site, was identified from Feature 10. Most of the identifiable elements of fish bone appeared to represent fish that were smaller

sized than the estimated length of fish in the one-quarter inch mesh screen as will be seen below.

This same trend, increase in fish bone and apparent smaller sizes of fish, is obvious from the one-sixteenth material analyzed at Site 1Gr2 (Table 3). In addition, four features from this site would have been assumed to have not contained fish bone at all if the one-sixteenth inch debris had not been examined. Elements of frog/toad and the small mammals occurred at a greater frequency in the one-sixteenth inch samples.

At Site 1P133, the one-sixteenth inch bone, represented by Feature 51 only, was separated into the class groupings and the weight was recorded for each category. The results are presented in Table 4. The unidentifiable category was not included in the table, but the percentages are based upon the inclusion of that category's weight.

The mammal and fish bone were represented in almost equal frequencies in the one-sixteenth inch samples, but in the one-quarter inch samples the mammal bone was far more frequent than the fish. The turtle bone was represented about equally in the one-sixteenth inch and one-quarter inch screen sizes; however, turtle elements from the one-sixteenth inch debris were rarely identified to the species or genus level. The bird bone was underrepresented in the one-sixteenth inch debris, both in weight and, not included in the table, in the frequency of identifiable elements.

Based on the above information, it is assumed that if the one-sixteenth inch bone sample is not included in a faunal analysis the following data will be lost: (1) all the fish sizes will not be recorded; (2) the frequency of fish bone will be underestimated; (3) the occurrence of fish bone in a particular feature may be completely overlooked; (4) some species of fish will not be identified (it is hypothesized that these will mainly be members of the Centrarchidae and Cyprinidae families); (5) some skeletal elements of the small animals--frogs/toads, squirrels, rabbits--will be missed, which could possibly affect the minimum number of individuals count for these species.

The purpose of the content description of the one-sixteenth inch debris has been to demonstrate the importance this size range of debris has for the interpretation of subsistence activities. Fish, although not a major food source, take on more significance when the one-sixteenth inch bone is included. For example, the reconstructed length of fish found at all of the sites include fish estimated at around 10 cm based on estimations from the one-sixteenth inch samples, and up to 72 cm from the one-quarter inch debris.

In the discussions of the faunal remains from each of the four sites and the summary remarks of the subsistence activities during the various phases, the one-sixteenth inch bone is not included. The basis for this exclusion of important information was that not all of the features had the one-sixteenth bone processed and that none of

the fish bone found in the one-sixteenth samples could be identified due to the lack of comparative skeletons. It is hoped the possible bias resulting from this exclusion will be kept in mind by the reader when the faunal listings in subsequent chapters are given.

CHAPTER III

INHERENT METHODOLOGICAL DIFFICULTIES AND DIFFERENTIAL RECOVERY

DIFFERENTIAL RECOVERY

In any report concerning the reconstruction of prehistoric subsistence practices, certain precautionary measures must be taken into consideration. It cannot be assumed that all the activities and food products associated with subsistence of a prehistoric group will leave evidence included in the archaeological record. This is aptly stated by Cohen (1977:73):

The archaeological record is only a fractional sample of past human behavior and its residue. The archaeologist certainly cannot count on total recovery, nor can he presume with any assurance that the degree of sampling error is the same for all the periods studied. There will always be some differential preservation or recovery from various periods.

In addition, various human and animal activities, as well as natural phenomena result in differential distribution, treatment and preservation of animal elements on a site. The recognition of these various problem areas is a necessity before any interpretation of the faunal remains is given. Archaeological sampling, rate of decay, canid or scavenger activity, and human activity have probably affected the parts of the animals, as well as which animal species are recovered in the excavated archaeological debris. Unfortunately, it is not possible to assess the extent to which these factors have influenced the faunal material included in the analysis.

The archaeological sampling factor can be discussed at three levels: the selection of the sites to be excavated, field excavation procedures and laboratory sampling. At each level a part of the whole subsistence system is fragmented, and information necessary for the reconstruction of the entire system is affected.

Based upon field excavations and archaeological site surveys initiated in 1970 through 1975, Jenkins, Curren and DeLeon (1975) studied the settlement patterns of the Early Archaic stage through and including the Mississippian stage. The Archaic groups were identified as "restricted wanderers" which as defined by Beardsley (1955:136) are "communities that wander about within a territory . . . movement within the territory may be erratic or may follow a seasonal round, depending on the kind of wild resources utilized." Gulf Formational and Woodland stage groups were interpreted as "central-based wandering" peoples. This type of settlement system is defined by Beardsley (1955:138) as "a community

that spends part of each year wandering and the rest at a settlement or 'central base'." Both the restricted wandering and central-based wandering settlement types involve movement of peoples throughout the year. It is thus unlikely that one site type, for example, a base camp or transitory camp located along the Tombigbee River, would be representative of the total seasonal subsistence round. Sites included in this analysis are all located along the river and thus may indicate certain seasons of exploitation only.

The Mississippian stage sites in the Gainesville Lake area are considered to be farmsteads and transitory camps (Jenkins *et al.* 1975). Although considered sedentary horticulturists, hunting and gathering activities were part of the subsistence system. Although the sites may have been occupied for longer lengths of time, perhaps even throughout the year, faunal material may be associated with other site types such as butchering camps (Wood 1968). The identification of some Mississippian sites in the Lake area as transitory indicates that some activities were carried out in locations other than the home base. Thus, it is entirely possible that the Mississippian sites located along the river do not represent the entire animal exploitation activities in which the prehistoric peoples engaged.

The sampling errors that could have occurred during the excavation of the sites include: (1) only portions of Sites 1Gr1X1 and 1Pi33 were excavated; (2) during the midden stripping process, the tops of features were removed; and (3) test squares which included midden samples of bone were located only in certain parts of the site. In all three cases, the possibility exists that certain classes of faunal material were not included in the archaeological debris or that the various species are under or overrepresented.

In the laboratory, the features selected for analysis may have distorted the faunal remains to some extent. In addition, as already discussed, the exclusion of the one-sixteenth inch screen debris may bias the faunal sample in favor of the larger animals. The control units were analyzed from Sites 1Gr1X1 and 1Gr2, but excluded samples of the bone and shell remains from the midden at Sites 1Pi61 and 1Pi33. Sampling of the faunal material had to exist at all of these levels due to a variety of reasons, including length of excavation time and length of laboratory analysis. These possible sampling errors are included here only to point out that the full range of faunal variation may not be represented by the analysis.

A second factor which may affect the presence of certain faunal remains on the site is the occurrence of dogs or scavengers. Ethnographic studies have shown that scavengers, especially dogs, can distort the presence of animal bone on village sites. Lyon (1970: 214) states that "medium-sized dogs may totally devour the bone of small animals and destroy identifiable portions of the bone of medium-sized animals, leaving only the remains of large animals in condition for identification." Casteel cautions that total destruction is not often the case. He points out that even in the ingestion of animal bone, for example fish, bone is not destroyed

(1971:467). Casteel agrees with Lyon in that "the type of distortion that could enter into the interpretation of bone debris due to destruction of bones by dogs should be considered in attempting to reconstruct the economy of any archaeological culture" (Lyon 1970:215; Casteel 1971). Bonnicksen (1973) cites canine activity as a problem which affects the parts of moose bone recovered from the village of Calling Lake Creek.

The extent to which the activity of dogs and possibly other scavengers have affected the distribution and presence of animal bone on each of the sites cannot be demonstrated. However, a description can be given of the gnawing patterns as indicated by the bone which bore indications of gnawing. It is probable that small mammal, fish, reptile, and amphibian bone was also either gnawed or ingested. Another possibility is that bone from all classes of animals was deposited by dogs or scavengers in a location away from the village area.

Bonnicksen (1973) described how dogs manipulate and sometimes fracture bone. He stated that dogs will hold the diaphysis of a long bone with their forepaws and attack the bone at the epiphyseal end. Diagnostic features of canine gnawing include tooth perforation marks, gnawing and scooping out, crunching and splintering and spiral fracturing directed from the epiphyseal ends. He notes that the thin walled compact bone at the epiphyseal ends of long bones, or softer bones such as the ilium, scapula or ribs are attacked. Miller (1975) mentioned that it is a habit of predators and scavengers to chew off the epiphyseal ends of long bones. Miller (1975) described the marks made by the canine tooth of carnivores as rough in outline with small fractures in the bone around the periphery of the opening. This accurately describes the marks referred to as canine tooth perforations in this analysis. If animal bone has been ingested, the surface of the bone may be scalloped, the edge may be very sharp and circular and holes may occur in the body (Bonnicksen 1973).

Bone considered to be gnawed from the Gainesville Lake area showed canine tooth perforations and was often broken in a rough and jagged manner along an edge portion. In all, 144 pieces of bone had been gnawed and 1 piece was considered to have been ingested. The fragment thought to have been ingested was a femur from a rabbit. It showed the characteristic sharp edges, along with a pitted surface. Deer (Odocoileus virginianus) fragments were the most commonly gnawed bone, with raccoon (Procyon lotor), opossum (Didelphis marsupialis), and beaver (Castor canadensis) bones also included in this category (Table 5).

Patterns of gnawing were recognized on the innominate, vertebrae and long bones of the deer. All of the innominates were gnawed in the following manner. The anterior edge of the ilium was consumed to where the bone thickens. The broken edge was characterized by a jagged line with several canine tooth perforations along the edge of the bone. The posterior portion of the ischium was removed in the same manner and for most of specimens the pubis bone was completely missing, and the assumption is that it was gnawed off. Long bones

were commonly gnawed on either the distal or the proximal ends. In two cases, a distal radius and a proximal humerus, the epiphyseal portion of the bone, was completely consumed. On vertebrae, the centrum and the dorsal and lateral processes had been gnawed. Gnawed bone from animals other than deer did not follow any specific patterning. Bone was either represented by just one or two pieces of gnawed bone or else the gnawing location varied.

Domesticated dog burials and indications of canine activity occur on all the sites. Gnawed bone was identified from features associated with the Broken Pumpkin Creek phase through the Late Miller III subphase. Gnawed bone was found in midden areas and in features. Bone from the Early and Middle Archaic periods, and the Mississippian stage features did not have any indications of gnawing, nor were either of the two dog burials associated with these cultural periods. This does not indicate that canids or scavengers were not present on the sites during these periods. It is more likely a result of the small faunal samples from these time periods. Outside of the Gainesville Lake area, dogs have been dated to the earlier Archaic periods (McMillan 1976; Struever 1977; E.M. Futato, personal communication). Dogs have also been found in Mississippian context (Parmalee and Bogan 1978).

Bone preservation varied significantly from site to site and from one cultural period to another. The preservation of bone from features that have a Miller II through Mississippian association is remarkably good. This is probably the result of the greater frequency of mussel shell fragments occurring along with the bone. The acidity of the soil is neutralized by the calcium content of the mollusks (Curren 1975:241). When mussel shell is lacking or occurring only occasionally, the bone tends to be crumbly with burned bone in a much higher frequency (over 75 percent). The midden from Site 1Gr1X1 had very little mussel shell included in it, and consequently the bone preservation was poor. The bone from the midden at Site 1Gr2 was in very good condition except for the Archaic zones which contained little shell. Basically, it can be concluded that bone in association with mussel is generally in very good condition and probably no significant differential preservation of animal classes occurred. However, where there was no mussel shell recovered along with the bone, differential preservation probably occurred, biasing the sample to some extent in favor of the larger animals and bone which had been burned.

A difficult assessment to make in regard to differential recovery of animal bone is the degree to which the activities and beliefs of the prehistoric peoples influenced the distribution of animal bones. A wide range of activities is feasible, and examples from ethnographic studies may or may not be relevant.

In a study of the Calling Lake Cree in Canada, Bonnicksen (1973) mentions the kinship patterns of the people influence which parts of the moose skeleton were recovered from the village site. In this situation, the moose meat is divided between relatives within the framework of a reciprocity system. Meat sharing has been described

as existing in various groups of hunters and gatherers, but actual ethnographical data on the distributions of animal parts to specific individuals and factors which determine who gets what is lacking.

The intentional and unintentional burning of animal bone as a result of activity will lead to differential recovery of bone on a site. The larger mammal bone can withstand longer exposure to burning than the small animal bone. Burned bone is commonly found on all the sites. The percentage of burned bone in each feature was calculated to see whether or not differences in burned bone existed between the sites or between the cultural phases. For each phase at each site, there are features which contained no burned bone and features in which the burned bone occurs at a low frequency (10 to 25 percent), as well as features in which all of the bone is burned. Another possible explanation is that burned bone may well have been accidental, tossed into hearths or even thrown on the fire as fuel. Burning bone is included in Swanton's account of the Indians of the Southeastern United States. Swanton states that the Indians carefully preserved the bones of the animals they ate and burned them "as being of the opinion that if they omitted that custome the game would leave their country, and they should not be able to maintain themselves by their hunting" (1946:314).

Certain elements of an animal's skeleton may be lacking or underrepresented because of the utilization of particular elements for tools or "ceremonial purposes." The low number of deer ulnae from all the sites may very well be due to the selection by the prehistoric people for that bone to modify into an awl or similar artifact. As stated by Read (1971: 54), "the lower jaws and the long bones, in particular, are the most likely parts of an ungulate to be used for tools."

Preferential treatment may have existed for certain animals which were regarded with high esteem. Bone artifacts are often made of cougar, bobcat and bear elements, and these elements are bones such as lower jaws and teeth which are not as frequently fashioned into artifacts when belonging to other more commonly encountered animals. Parmalee et al. (1972:39) state that artifacts such as worked canine teeth and cut jaw and skull sections, belonging to the cougar, bobcat and bear, are often recovered as part of burial paraphernalia. These bones may have had some special significance for the prehistoric hunters in the Eastern United States.

Another example of special treatment may be the disposal of bear bone. There is a total lack of postcranial elements of the black bear from all of the sites. Parmalee discusses this phenomena which occurs on prehistoric sites throughout the Midwest. According to Parmalee et al. (1972:39), bear, even though probably included as part of the prehistoric diet, warranted special attention as the "unwanted remains were discarded in places other than in the general village midden or refuse pits."

Additional examples of factors leading to the differential recovery of animal remains from archaeological sites could be cited.

However, it is not the purpose of this study to include a thorough investigation of such activities. What is important in this report is the identification of the relative importance of specific animal species and the ways in which these animals may have been utilized during each of the major cultural phases. The bone and shell remains from the Gainesville Lake area sites must be recognized as only an indeterminate portion of the total subsistence system.

FEATURE DESIGNATION: PRIMARY AND SECONDARY FAUNAL ASSEMBLAGES

For the purpose of discussing the subsistence activities during the specific phases, features have been divided into two groups: primary and secondary. The secondary features are those pits which are believed to have a greater probability of containing faunal material that was not purposely thrown into them. In the case of multicomponent sites, this means that bone from earlier periods could unintentionally be included in later pits. Of course, this point could be argued for all features, but it is contended that it is much more likely to be the case with the secondary pits. This would be an especially important consideration when taking into account the distribution of elements and species on a site during a specific cultural phase.

The bone found in secondary pits is generally characterized as unidentifiable and burned, often calcined. In all but three cases, no more than 70 pieces of bone are present and the weight of bone is less than 50 g. For all the secondary pits, the bone density by weight is substantially lower than in the primary features. Table 29 compares the bone density in secondary versus primary features for Site 1P161. This distinction between features applies only in reference to faunal remains. Several of these secondary pits contain concentrations of other materials such as charred nuts, corn cobs, and ceramics.

Primary features, on the other hand, account for 97 percent of the analyzed bone by count and 98 percent by weight. Very little information is considered to be lost in this separation and greater confidence in the utilized data is assumed. Fifty-six percent of all the features examined from the four sites are classed as primary. Table 6 breaks down the number of secondary and primary features for each site and Table 36 lists the number of primary and secondary features analyzed from each subphase. The primary features provide the raw material for most of this analysis. However, in comparing the various sites to each other for consideration of questions pertaining to resource availability around the sites, the secondary features are included.

ESTIMATION OF MINIMUM NUMBER OF INDIVIDUALS

A minimum number of individuals is estimated for the mammal species and turkeys, and at Sites 1Gr1X1 and 1Gr2, for fish species.

The minimum number of individuals from each site is figured for every subphase, i.e., Late Miller III, Early Miller I, etc. Only bones from the primary features are included in the tabulation of the minimum number count. The minimum number of individuals during a specific phase is that number of individuals which are necessary to account for all of the skeletal elements of a particular species, and in this case genus, when considering Sciurus and Sylvilagus, recovered from the site (Grayson 1973:423). Both species of Sciurus (S. carolinensis and S. niger) and both species of Sylvilagus (S. floridanus and S. aquaticus) are probably represented in the faunal remains from the sites, but because comparative skeletal material was not available the bone remains of these animals cannot be identified at the species level. The minimum number of individuals for rabbits and squirrels has been estimated at the genus level and probably these figures underestimate the number of rabbits and squirrels represented in the faunal assemblage.

In order to estimate the minimum number of mammals, the long bone portions, proximal or distal, are divided into right and left groups which were further subdivided by whether or not the epiphysis had fused. For the deer, age also is estimated according to the stage of tooth eruption in the mandible (Severinghaus 1949). Estimated age (in months) is recorded up to the point at which the permanent dentition had completely erupted, approximately two years. Information from the mandibles is then combined with the estimated number of individuals based on the long bones, innominates, tarsals and carpals. In a couple of instances, all the long bones are noted as having completed epiphyseal fusion, which represents mature specimens, but one or more of the mandibles indicates that a juvenile must be included in the sample. An additional individual is added to the total MNI count based on the postcranial material.

For fish, the estimated length of the skeleton is determined by comparing the archaeological material with modern skeletons. This data combined with the divisions of fish elements into left and right groups determines the minimum number of individuals. For turtles, no estimate of minimum numbers is recorded because the majority of turtles could not be identified due to the lack of comparative material. It was possible to identify some turtle bone to family, genus, and species level; however, this probably does not give an adequate indication of the actual numbers of species.

An important part of this analysis is to compare the exploitation of animal species during the different prehistoric phases. It is necessary then to note any variations either in the selection of specific animals or in the increased or decreased preference for any given class of animal species. For example, do fish as a class of animals become more important in the diet of a group at any time? Because the minimum number of individuals cannot be estimated for fish and turtles from all the sites, the minimum number of individual count is not considered as a fair comparison of any changes which might be noted. Two types of comparison will be used: percentages based on the count of the elements and percentages based on the weight of the pieces. Although far from desirable, it

is felt that these two methods can be indicative of possible changes in faunal exploitation during the Woodland period.

CHAPTER IV

SITE 1Gr1X1

A total of 24 features and six grid square units were analyzed from Site 1Gr1X1. The total analyzed bone from the site is 15,522 fragments which weigh 10,051 g. The six grid squares examined for animal remains include 400NR700, 440NR500, 450NR500, 460NR500, 480NR500 and 500NR600. A total of 188 pieces of bone represents all of the faunal material found throughout the levels excavated from these squares. The numbers of bone pieces found in each of the levels is presented in Table 13. Level two from Square 460NR500 contained the majority of the bone, 109 fragments. In this level there are two identifiable fragments: one tooth of Odocoileus virginianus and one caparace fragment from Terrapene carolina. The bone in the squares is not well preserved and 72 percent by count of the bone is burned. Only a few mussel shell fragments are included in the fill. The lack of the mussel shell could account for the poor preservation of the bone and for the high percentage of burned bone recovered, burned pieces having a better chance of being preserved.

Two of the analyzed features contained Archaic debris; one is identified as an Early Archaic feature and the other as either a Late Archaic period or Broken Pumpkin Creek phase pit. Both of these features were considered secondary pits and contained little faunal material. There are no identifiable bones in the Early Archaic feature. Six identifiable bones, five from one-sixteenth inch debris, are associated with the Archaic or Broken Pumpkin Creek pit fill. All of the identified bones are squirrel and probably represent one individual. Because only one feature, a primary pit, is associated with the Early Miller III subphase, little can be concluded about the exploitation of the animal species during this time period at this site. Remains of only three species of animals were identified: Odocoileus virginianus, Meleagris gallopavo, and Sylvilagus spp. No fish or turtle bones and two bird bone pieces are recorded.

Associated with the Late Miller II subphase are 13 features, 11 primary pits and 2 secondary pits. Eight features, one secondary and seven primary, are defined as Middle Miller III pits. The majority of the discussion of faunal remains at Site 1Gr1X1 must, therefore, be concerned with these subphases. All of the bone identified from the features is summarized in Tables 7-12.

An adequate number of features exists from Late Miller II and from Middle Miller III to compare the exploitation preferences for these two subphases. Before this comparison begins, one comment regarding the density of animal bone should be noted. The volume of fill represented by the Late Miller II features is 198.317 cu ft and for Middle Miller III features is 192.788 cu ft. The density of bone

by weight, however, is much greater for the Late Miller II subphase; 35.2 g per cu ft of fill compared to 15.7 g of bone per cu ft for the Middle Miller III pits. The comparison of the density of bone by count of pieces shows the same trend; there are 50.1 bone pieces per cu ft of fill for the Late Miller II subphase features, and 28.2 bone pieces per cu ft of fill for the Middle Miller III features. During both the Late Miller II and Middle Miller III occupations, deer constitutes the majority of the identified animal elements. Deer, however, decreases in relative frequency in the Middle Miller III subphase, from 83.5 percent of the animal bone identified to 49.8 percent (Table 7). This decrease is also represented by bone weight. Weight is recorded for the categories deer (including long bone fragments identified as large mammal), mammal-other identified elements, turtle, fish, and bird, and percentages of each category have been calculated. In the Late Miller II subphase, deer represents 90.4 percent of the bone, and in the Middle Miller III subphase this category contains 72.9 percent of the bone. The minimum number of deer decreases from eight to two individuals.

The importance of mammals overall declines in the latter subphase. Mammals represent 88.5 percent of the identified bone in the Late Miller II subphase and only 72.4 percent in the Middle Miller III subphase. However, the number of animals in the mammal-other category increases in the later subphase, from 0.7 percent by weight to 3.9 percent. The minimum number of individuals in the mammal-other category also increases, from ten animals represented by six species to fifteen animals represented by eight species. In both subphases, the most numerous animal in the mammal-other group is the squirrel.

Turtle bone shows a marked increase during the later subphase as demonstrated by the percent based on identified elements and on an increase from 4.8 percent by weight to 15.8 percent by weight. Bird bone is approximately the same for the two phases. By weight, bird bone increases slightly from 2.1 percent in the Late Miller II subphase to 3.7 percent in the Middle Miller III subphase. The minimum number of individuals for turkeys decreases from four to two, for Late Miller II and Middle Miller III, respectively (Table 7).

Although the minimum number of individuals decreases from the earlier subphase to the later subphase, the percentage of fish (based on the identified pieces of bone) increases in the later subphase (Table 7), and the percentage calculated from the weight of the fish bone increases from 1.9 percent in the Late Miller II phase to 3.7 percent in the Middle Miller III phase. The same fish families are found in both of the subphases. Most of the fish represented in the sample are estimated to be over 30 cm in length (Table 12).

Two deer mandibles from the Late Miller II subphase contain dentition which had not completely erupted. The posterior dorsal portion of one mandible is comparable in size to a mandible of a deer in the comparative collection which is estimated to be within a couple of months of birth. The second mandible is a fragment with the deciduous third premolar and the first and second permanent

molars. According to Severinghaus (1949) the estimated age on this mandible is sixteen to seventeen months. For the two other deer mandibles from a Late Miller II subphase context, the dentition is permanent and in both cases the teeth indicate heavy wear. On the third premolar, the infundibulum appears as a narrow crescent-shaped design which according to Severinghaus (1949) is indicative of deer over five and a half years. Two mandibles from Middle Miller III context have permanent dentition with light to moderate wear, indicating an approximate age of perhaps between two and five years. At least one of the eight deer from the Late Miller II subphase features is a male, as one pair of frontal bones have the antler bases attached.

In the Late Miller II subphase, at least two of the turkeys are male; the sexing is based on the presence of the spur on the tarsometatarsus. For the Middle Miller III subphase, one of the two turkeys is male based on the same criterion. No other determinations of sex are possible for the remaining animal species.

Twenty species of freshwater mussels have been identified from the feature fill associated with the Late Miller II subphase (Table 14). The two most frequent species are Fusconaia ebena and Quadrula pustulosa which together accounted for just over 50 percent of the minimum number of valves. About 30 percent of the valves are included in an unidentifiable category. This includes valves which could not be identified because either the shell is poorly preserved or the valves did not match any of the mollusk species in the comparative collection. The total weight of the mussel shell from this phase is 16,929.3 g and the density of shell is 85.4 g per cu ft.

Sixteen species were identified from the Middle Miller III subphase. Fusconaia ebena and Quadrula pustulosa again represented about half of the estimated minimum number of individuals. Twenty-two percent of the valves are in the unidentifiable category. The total weight of shell from this phase is 8,016.7 g yielding a density of 41.6 g per cu ft. There does not seem to be any change in the selection of the species of freshwater naiads from the Late Miller II subphase to the Middle Miller III subphase. For both phases, Fusconaia ebena and Quadrula pustulosa are the most common valves.

CHAPTER V

SITE 1Gr2

Forty-one features and one grid square unit, 54ON460E, have been analyzed from Site 1Gr2. This is the only site of the four for which previously published zooarchaeological data exists (Curren 1975). Faunal material is more abundant for the Woodland stage than in either the Archaic or Mississippian stages. Six features, two primary and four secondary, have been analyzed from the Miller I phase. All nine Miller II features were designated as Late Miller II subphase. Seven of these are primary and the remaining two are secondary. One feature, a primary pit, is considered to be Late Miller II-Early Miller III. All of the 23 features in Miller III phase context are from the Middle Miller III subphase. Of the 23 features representing this period, only five are classed as primary pits with the remaining eighteen pits put into the secondary group. One feature each is attributed to the Mississippian and Broken Pumpkin Creek phase occupations. Both are classed as secondary.

A total of 13,248 bone pieces weighing 8,068.6 g was analyzed. The primary pits constituted 91.4 percent of the analyzed bone by count and 94 percent by weight. Table 15 includes all the identified bone from the primary features from the Early Miller I, Late Miller II, and Middle Miller III phases. Tables 16-19 give the elements identified.

The control block, Square 54ON460E, contains 3,787 bone fragments that are distributed throughout the fifteen levels. The identified bones, by class, are presented in Table 20. Mussel shell is associated primarily with material from the upper seven levels. The remaining levels, except 1.8-2.0 ft, are Archaic and contained very little mollusk debris which probably has affected the preservation of bone in these zones.

Zone A (0.0-0.5) contains recent and Mississippian debris. Two of the animal species identified from this zone, Sus scrofa (domesticated pig) and Canis cf. familiaris (domesticated dog) are considered to be recent material. The dog bone fragment could possibly be associated with the Mississippian occupation, but this could not be determined. Other species, attributed to the Mississippian stage include: Odocoileus virginianus (white-tailed deer), Didelphis marsupialis (opossum), Procyon lotor (raccoon), Sciurus spp. (squirrel), Sylvilagus spp. (rabbit), Chelydra serpentina (snapping turtle), Lepomis cf. magalotis (longear sunfish), Ictalurus natalis (yellow bullhead), Ictalurus punctatus (channel catfish), and Trionyx spp. (soft-shelled turtle). Each of the fish species is represented by only one individual. The reconstructed lengths of these fish skeletons are estimated to be: sunfish, 13 cm; bullhead, 22-23 cm; and the channel catfish, 24-25 cm.

Zone B (0.5-0.8) represents debris primarily from the Middle Miller III subphase. Twelve species have been identified: Odocoileus virginianus (white-tailed deer), Castor canadensis (beaver), Procyon lotor (raccoon), Sciurus spp. (squirrel), Erethizon dorsatum (porcupine), Didelphis marsupialis (opossum), Meleagris gallopavo (turkey), Terrapene carolina (box turtle), Trionyx spp. (soft-shelled turtle), Amia calva (bowfin), Ictiobus bubalus (small-mouth buffalo), and Aplodinotus grunniens (freshwater drum). Each of the fish is represented by a single individual and the estimated lengths of the skeletons are 37 cm for the bowfin, 24 cm for the small-mouth buffalo, and 33-36 cm for the drum fish. The occurrence of the porcupine, represented by a complete upper molar tooth, is noteworthy. Porcupine has been identified from the Stanfield Worley Site (Parmalee 1962) located in northern Alabama, but has not been identified from an archaeological site in the central part of the state. The prehistoric range of this animal is not thought to have extended as far south as the Gainesville Lake area (Olsen 1968; Gilbert 1973). Level 0.8-1.0 ft also includes animals associated primarily with the Middle Miller III subphase. Only one species could be identified, Odocoileus virginianus (white-tailed deer).

Five species are found in the midden level 1.0-1.2 ft which represents primarily Late Miller I and Middle Miller III subphases. In addition to Odocoileus virginianus, other species identified are Castor canadensis (beaver), Didelphis marsupialis (opossum), Meleagris gallopavo (turkey) and Sciurus spp. (squirrel). Level 1.2-1.4 ft, Late Miller I subphase, has only two identified species, Odocoileus virginianus and Meleagris gallopavo. The next Late Miller I subphase level, 1.4-1.6 ft, includes remains of three identifiable animals, Odocoileus virginianus, Procyon lotor and Meleagris gallopavo.

Odocoileus virginianus is the only species identified from Level 1.6-1.8 ft and Level 1.8-2.0 ft. In addition to deer, Level 2.0-2.2 ft includes identifiable bones from Meleagris gallopavo. Level 2.2-2.4 ft is represented by Odocoileus virginianus and Terrapene carolina (box turtle). No species are identified from Level 2.4-2.6 ft. Odocoileus virginianus is found in Level 2.6-2.8 ft and Procyon lotor is identified from Level 2.8-3.0 ft.

No species are identified from the feature fill associated with the Broken Pumpkin Creek phase, nor are there any species identified from the Mississippian feature. The early Miller I primary pit indicates that deer is the most important animal as it represents 66.7 percent of the identified elements (Table 15). Three other species are associated with the deer: squirrel, opossum and bowfin. This information is based on only a small sample, two features, and can only be assumed to be a tentative indication of the exploitation preference of animal species during this time period.

During the Late Miller II subphase, deer constitutes the majority of the animal bone identified, 74.4 percent of the identified elements. This percentage of deer to the overall identified species

decreases in the Middle Miller III subphase to 31.5 percent. The minimum number of deer also decreases from five to one. Mammals as a class decrease from a percentage of 87.9 in the Late Miller II subphase to 74.0 percent in the Middle Miller III subphase. In the mammal-other category, in the Late Miller II subphase, there are fifteen individuals representing nine species. This represents 13.5 percent of the identified animal pieces. Raccoon is the mammal most often identified. In the Middle Miller III subphase there are seven individuals in the mammal-other category belonging to six species which represent 42.5 percent of the identified animals. The rabbit genera constitutes the greatest number of animals.

Identified turkey bone is comparable for the two phases, comprising 4.0 percent of the Late Miller II subphase identified bone and 5.6 percent of the Middle Miller III subphase identified bone (Table 15). Turtles are likewise represented in relatively equal percentages, 4.8 percent for Late Miller II subphase and 5.5 percent in Middle Miller III subphase.

Fish, however, increased from 3.7 percent of the identified bone in the Late Miller II subphase to 14.9 percent in the Middle Miller III subphase (Table 15). A minimum number of fish was not calculated as the bone identification is not considered to be complete. Of the bone which has been identified, the estimated length of fish from the Late Miller II subphase is 42-45 cm for one individual of Ictiobus bubalus. The fish in the Middle Miller III subphase are estimated as Moxostoma cf. carinatum, one individual greater than 41 cm, and one specimen 20-22 cm; Aplodinotus grunniens, one individual 18-20 cm, one 22-23 cm, one 27-30 cm and one 42-45 cm.

The results of the identified bone from the control square seem to confirm the observations noted in the features. There appears to be a decrease in the exploitation of deer throughout the Woodland stage. This trend is extended into the Mississippian stage. Concurrently, there is an increase in the number of other mammals taken as well as an increase in the percentage of fish in the diet. Bird and turtle are represented by relative equal percentages throughout the Woodland stage, and turtle bone becomes the most frequent bone identified to class in the Mississippian zone from the control unit, increasing from 8.4 percent of the identified bone in Zone B to 17.0 percent in Zone A. However, as the Mississippian zone includes recent material, some of the turtle bone in this zone may be historic.

The mollusk fauna from this site has been identified from the features and the species are included in Table 21. As at Site 1Gr1X1, the two most common species are Fusconaia ebena and Quadrula pustulosa. However, the unidentifiable valves from this site constituted the highest percentage of minimum number of individuals for all the phases. This is indicative of the poor quality of preservation of the shellfish remains, not the inability to identify the specimens.

Only seven mussel species are found in the Early Miller I features and the density of shell in these pits is 55.5 g per cu ft.

There are 12 species of mussels identified from Late Miller II context and the density of the shell in these features is 136.1 g per cu ft of fill. Sixteen species are identified in the Middle Miller III features and the density of shell in this phase is 71.2 g per cu ft of fill. The exploitation of shellfish at this site apparently seems to increase during the Late Miller II subphase and begins to decline in the Middle Miller III subphase.

One deer mandible from the Late Miller II subphase is suitable for an age estimation. The second and third deciduous premolars indicate moderate to heavy wear and the permanent first molar was very slightly worn. Following Severinghaus (1949) the estimated age at death of the deer was approximately 11-12 months.

The bone content in primary features, as indicated by both the density of bone by weight and the density of bone by count, is much greater for the Late Miller II subphase pits than it is for the Middle Miller III subphase pits. For the former subphase, the density of bone by weight is 39.8 g of bone or 60.9 pieces of bone per cu ft of fill. In the latter subphase, there is 6.6 g of bone or 14.1 bone fragments per cu ft of feature fill. In addition, only 22 percent of the Middle Miller III subphase features are classed as primary, indicating that most of the features associated with the Middle Miller III subphase contain very little faunal material. On the other hand, seven out of nine, or 77.8 percent of the features in the Late Miller II subphase are classed as primary. This difference also has been noted for Site 1Gr1X1.

It can be postulated that the prehistoric groups in the later phase deposited their animal refuse in places other than pit features. The density of bone for the control square was calculated to see whether or not the midden contains a higher percentage of bone debris than the features for the Middle Miller III phase. The density of bone by weight is somewhat higher, 8.3 g per cu ft of fill for Zone B, but not enough higher in this particular area to account for a primary location of refuse deposition.

CHAPTER VI

SITE 1Pi33

The faunal material analyzed from Site 1Pi33 was from Feature 51 and Structure 1. Summary data is presented in Tables 22-25. Also, measurements taken on some skeletal parts of a domesticated dog burial, Feature 4, are given in Table 26. The total amount of bone analyzed is 5,220 fragments or 4,468.2 g of bone. Time was not sufficient to identify the invertebrate material from this site. Based upon general observation of the mollusk remains from Feature 51, the species represented by the invertebrate material from Site 1Pi33 do not vary from the species list included in the data from Sites 1Gr1X1 and 1Gr2. Structure 1, a Late Mississippian house, was excavated in three vertical levels. The first level contained a large amount of daub and charcoal indicating that the structure had been burned.

A total of 220 bones weighing 86.7 g was recovered from the structure fill. The daub or first level includes only 9 percent of the faunal material. Only one identifiable fragment was recognized, a molar or premolar root fragment, probably from Odocoileus virginianus. None of the bone material can be readily identified to a class other than mammal. All the bone material is burned, and is characterized by the colors white or blue-white. According to Ubelaker (1978:34) human bone is calcined when temperatures exceed 800 degrees centigrade. Even though the cortical bone on large mammals is denser than human bone, the calcined bone in this level obviously has been subjected to very intense heat. This burning could have occurred when the structure burned. Such a situation would produce enough heat to cause the calcined condition of the bone. Of course, some of the bone might have been burned prior to the house fire.

The second level, or the first level below the daub, included 10 percent of the bone material. There are two identifiable pieces of bone: a carapace or plastron fragment from a turtle and one metacarpal fragment from Odocoileus virginianus. Except for the single fragment of turtle bone, all other bone appears to be mammal fragments. Ninety-seven percent of the bone in this level is burned, and in addition to white and blue-white, burned bone is characterized by the colors black, blue-gray and brown. The colors black and brown indicate exposure to less intense heat than the white and blue hues. Again, it is probable that the structure fire caused the burned condition of these bones.

The third level, or the second level below the daub, contains 81 percent of the bone found associated with the house. Only 57 percent of this bone has been burned. The ten identifiable pieces of bone include: one right ilium fragment, two molar or premolar fragments,

one right ulna fragment, and three unidentifiable long bone fragments from Odocoileus virginianus, a distal phalange from a medium-sized mammal, a fish vertebra and a plastron or carapace fragment from a turtle. This level contains the largest amount of bone and it was probably the level least affected by the burning, as is indicated by the lower percentage of burned bone. It also contains fragments identified as other than mammal bone. This might indicate that mammal bone fragments, which constitute 100 percent of the first level bone, are the last to be consumed in a fire. Any interpretation of the relative importance of one animal class to another cannot be considered reliable when the bone material providing the base for the comparison is recovered from a context where the debris almost certainly has been subjected to burning.

The distribution of the bone material across the floor of each level has been examined. No apparent clustering either of bone or animal parts exists within a given level. For each of the three levels, the bone is horizontally distributed about equally. The amount of bone contained in the first and second levels probably does not represent the total amount of bone which existed in the house floor fill prior to the burning. Nor does the bone in the first two levels represent the relative amounts of each of the animal classes used: fish, bird and reptile bone may be destroyed sooner by fire than the more compact mammal bone, especially the large mammal bone.

Feature 51 contains more pieces of bone than any other feature analyzed for this report. This feature had associated within its fill 5,000 bone fragments which weigh 4,381.5 g. The density of bone in the pit is 51.8 g cu ft. The density of mollusks is 676.3 g per cu ft. The identified bones from this feature are summarized in Table 22, which also indicates the relative importance of the various animal species and classes.

The percentages of the various animal classes which comprise the faunal remains from this feature by count (weight) are: deer, 26.1 (71.9) percent; fish, 22.2 (2.3) percent; bird, 21.7 (12.2) percent; mammal-other, 8.5 (6.5) percent; and snake 3.1 (0.2) percent. Percentages by both weight and count are given because fish take on added significance when the count of bone is used to figure the percentage. Deer, although still assuming the highest percentage, may be put in clearer perspective. In any estimation of amount of meat provided by each of these classes, the percentage of weight of bone may more closely approximate the relative contribution of meat from the various categories to the diet.

Two deer mandibles from Feature 51 can be assigned an estimated age. On one the estimated age at death of the deer was five to seven months and on the other the estimated age was between 16 and 17 months at death based on Severinghaus' criteria (1949). Another specimen includes teeth, both premolars and molars which were extremely worn, practically to the dorsal surface of the mandible. This probably represents an elderly individual.

A domesticated dog burial was found in Feature 4. This feature was at the base of Level 3 in grid Square 520 R 10. The feature was

a small basin-shaped pit with insloping sides and a rounded bottom. The maximum length of the pit was 1.4 ft, maximum width 1.5 ft, and depth 0.4 ft. The fill was characterized by a light brown mottled sand and some amounts of mussel shell, ceramic and lithic debris were contained in the fill. This feature is dated as a Late Miller III subphase pit.

The dog is a mature individual because all of the long bone and vertebrae epiphyses are completely fused and only a faint line exists to indicate where the epiphyses union occurred. None of the bones are burned, nor are any cut marks observed on the bones. Associated with the burial were four, possibly five, fetuses (a total of 188 pieces), which are assumed to be those of pups. No comparative material exists in the collection to verify this. All of the dog skeleton can be accounted for, but many of the bones have been fractured recently and not many measurements are possible. Measurements which were taken are included in Table 26.

CHAPTER VII

SITE 1P161

Thirty-five features, four structures, and one dog burial have been analyzed from Site 1P161. The features are divided according to subphase context. The analyzed features include: Archaic, one secondary feature; Late Miller II, four primary and four secondary; Early Miller III, thirteen primary and two secondary; and Late Miller III, four primary and seven secondary. A total of 11,607 bone fragments that weighed 15,329.5 g were analyzed.

All of the structures are associated with the Late Miller III subphase. Structure 1 (Feature 17) was excavated in four quads and two cross section balks, an east and west cross section. The western cross section balk fill contains 43.0 percent of the bone from this structure and all of the identified species. The majority of the bone from this unit may be associated with the fill of Feature 95 which is intruded by the structure. Other than remains of Odocoileus virginianus, identified mammal species include Didelphis marsupialis, Sciurus spp. and Urocyon cinereoargenteus. The remainder of the bone is evenly distributed in the quads (Table 30).

Structure 2 (Feature 28) was excavated in four quads. Only four pieces of bone, 3.9 percent of the total, are associated with the north quad. The remaining bone is evenly distributed across the floor of the structure. In addition to Odocoileus virginianus, elements of Procyon lotor and Canis cf. familiaris have been identified.

Structure 3 (Feature 29) had 447 bones, the largest number of faunal remains associated with any structure on the site (Table 30). Bone was found in equal proportions across the floor. Seven identified species include Odocoileus virginianus, Castor canadensis, Didelphis marsupialis, Canis cf. familiaris, Sylvilagus spp., Sciurus spp., and Mephitis mephitis. Structures 3 and 4 were excavated by dividing the structures into 2 by 2 ft horizontal units.

The faunal remains from Structure 4, (Feature 92) were evenly dispersed across the floor. Included in the species list from the structure are elements from Odocoileus virginianus, Canis cf. familiaris, Sylvilagus spp., Didelphis marsupialis, and Mephitis mephitis. The remains of the Canis cf. familiaris which represent one individual could possibly be the remaining portions of a dog burial. None of the canid bones are burned and all of them have been recently fractured by grading activities. Six bones were identified as dog and three bones from the same area are identified as medium-sized mammal (rib, canine tooth and metapodial). These bones were found adjacent to one another. A possible explanation for the partial recovery of the skeleton is that in the midden stripping process, the rest of the skeleton of the dog was graded away.

The density of bone and shell debris in the primary features from this site is high for all of the phases. For the Late Miller II subphase features, the density of bone is 37.8 g or 27.4 fragments per cu ft. The density of shell is 250.2 g per cu ft. For the Early Miller III subphase the density of bone is 47.2 g per cu ft of feature fill or 28.7 fragments per cu ft. The density of shell is 1,063.4 g per cu ft. For the Late Miller III subphase the density of bone is 33.5 g or 40.0 fragments per cu ft. The density of shell is 2,173.6 g per cu ft.

The only trend noted in the above densities is that the density of mollusk remains increases significantly from the Late Miller II subphase through the Early Miller III subphase and into the Late Miller III subphase. This is the reverse of the trend noted at Sites 1Gr1X1 and 1Gr2, where the density of shell decreased from the Late Miller II to the Middle Miller III subphases. It may be that the Late Miller III occupation at this site was longer or included more individuals, or that the exploitation of shellfish was more frequent at this site. It could also be a seasonality phenomena. The latter is very difficult to demonstrate. Time was not sufficient to identify the invertebrates at this site, so whether or not there are changes in the preference or occurrence of mollusk species through time will have to be determined at a later date.

Teeth of the Cretaceous sand shark (Odontaspis spp.) are contained in the fill from features associated with the Miller II and Miller III subphases. These are not included in Table 33. This animal existed approximately 70 million years ago (Curren 1975: 215) and the teeth were either intentionally brought to the site by the inhabitants or redeposited by natural agents.

The information in Tables 27-33 is based on four features for each of the Late Miller II and Late Miller III subphases, and 11 features from the Early Miller III subphase. The exploitation of mammals is nearly identical for the three subphases, but the percentage of deer decreases through time. Deer comprised 77.8 percent in the Late Miller II subphase pits, 68.0 percent in the Early Miller III subphase features, and 61.1 percent for the Late Miller III subphase. The mammal-other category for the Late Miller II subphase is represented by only two individuals comprising two species. This represents 6.5 percent of the identified bone pieces. In the Early Miller III subphase there are ten species representing 18 individuals which comprise 17.2 percent of the identified animal bone. In the Late Miller III subphase, seven species representing 11 individuals account for 19.7 percent of the animals identified. The percentage of other mammals increases as deer seems to decrease through the Woodland stage.

Birds and turtles are represented by about equal percentages and there is no identifiable trend in the occurrence of these classes of animals. Fish, however, appear to become more frequent through time, as at the other sites. At this site, the percentage of fish based on the bone weight of the animal classes increases from 0.8 percent in the Late Miller II subphase to 0.9 percent in the Early Miller III

subphase, to 1.8 percent in the Late Miller III subphase. The overall increase of fish is demonstrated in Table 27, but there is a slight decrease in the fish in the Early Miller III subphase, then a sharp increase in the Late Miller III subphase. Only two estimates on the length of fish may be included. One Amia calva from the Early Miller III subphase is reconstructed as between 60 and 70 cm. An Atlantic sturgeon bone, a dermal scute, was also found in the Early Miller III subphase. There is no actual reconstruction of its length, but based on the size of the bone, the fish was very large.

One deer mandible from the Early Miller III subphase can be used to estimate the age at death for that individual. The estimation is six to seven months (Severinghaus 1949). From the Late Miller III subphase, a single tooth, a deciduous lower third premolar is slightly worn. Although no actual age estimation at death can be stated, apparently one young deer should be included in the number of deers killed during this phase.

A domesticated dog was uncovered in Feature 69, in a cylindrical pit associated with the Late Miller II subphase. None of the skeletal parts are burned. Some rodent gnawing is noted on the diaphyses of the right radius and the left ulna. Around the left lower canine tooth was some bone resorption in the alveolus. The teeth show extreme wear which could be either due to aging or attrition. All of the epiphyses are completely fused and the epiphyseal line on the long bones is not visible. Not all of the bones can be measured as many have been fragmented. The measurements of this skeleton are provided in Table 34.

CHAPTER VIII

DEER PROCESSING

The procedures utilized to process animals at the four village sites are similar to techniques discussed by various authors for the Eastern United States (Guilday et al. 1962; Parmalee 1965; Parmalee et al. 1972). All mammals, except for perhaps the common mole, apparently were brought back to the village to be butchered, skinned and probably consumed. All parts of the mammal skeletons have been identified, although the elements occur in varying frequencies. Variations in the frequencies of these bones can be seen as a result of the previously discussed biasing, sampling, differential preservation, canid activity and differential treatment by prehistoric peoples.

A crucial question in the discussion of animal processing is whether or not the entire animal was brought back to the village location, or whether the animal was disarticulated in the field, and only selected parts returned to the village. Read (1971:57) has identified those bones that probably would have been taken from the kill site to the base camp. In order of decreasing frequency, they are: (1) antlers or horn cores, (2) lower jaws, (3) metapodials, (4) other long bones and ulnae, (5) ribs, (6) scapula, (7) phalanges, (8) innominates, (9) skull parts other than mandibles, (10) vertebrae, and (11) foot bones other than phalanges.

The difficulty in assessing field dressing is that the most likely bones brought back--antlers, mandibles and long bones--are those elements which are: (1) most easily identified, even in a fractured condition, (2) generally large enough to uncover easily and (3) most likely to be preserved (Olsen 1961).

Despite these difficulties, the relative percentages of elements of the deer have been compared for each subphase to determine whether or not changes can be observed in the presence of one of the 11 groups ranked by Read (1971). The relative percentages varied up to 10 percent, but the variation is sometimes between sites and at other times between phases. No trend whatsoever is observed in the relative decline or increase in any part of deer skeleton found on the sites. If field dressing occurred, which may very well have been the case, it was apparently practiced in all four subphases. Deer were also returned whole to the village sites for processing during all four phases.

Butchering and skinning marks are not common on identified animal bone from the four sites (Table 35). The low number of butchering and/or skinning scores noted probably has been affected to some degree by the fact that bone from Sites 1Gr1X1 and 1Gr2 was not washed, other than in the waterscreen, before the identification

process began. When bone is not washed, dirt can conceal the short, shallow indentations in the bone which are indicative of scoring. However, of the bone from 1P161 which was washed, only 2 percent of the identified deer bone is considered to be scored as a result of either butchering or skinning. Although this is a low figure, it is not unrealistic. According to Guilday et al. (1962: 64), it is very likely that the butchering process can be accomplished without leaving a single mark on any bone. The authors state that "the absence of a standard butchering mark in many cases does not, therefore, necessarily imply that some other butchering technique was used. It may, of course, but more probably it reflects the skill of the operator."

Butchering and skinning cut marks are characterized as short marks, often occurring in a series of three or four. Following Guilday et al. (1962:63), additional criteria for identification include: (1) repetition of a mark in several specimens at exactly the same location, and (2) an anatomically dictated reason why a particular mark should occur at any given spot. In establishing the validity of the first criterion, if a cut mark occurs only once or twice on a particular bone but is a mark which was cited by Guilday et al. (1962) or Parmalee et al. (1972) as a butchering or skinning location, the mark is considered justified as a butchering or skinning score.

Butchering and skinning marks are differentiated by their positioning on the skeleton. Butchering marks are those which are assumed to have aided in the disarticulation of the skeleton, while skinning scores are a result of the process of removing the animal's skin. On the deer's skeleton, seven butchering and four skinning locations are indicated (Table 35). This does not include all the locations where the animal's skeleton could have been disarticulated nor does it include all the locations where the skin was cut away. (See Guilday et al. 1962 for complete description of the process.)

Three of the butchering areas are located on the foreleg. The neck of the scapula just above the glenoid cavity is scored indicating the separation of the foreleg from the shoulder blade. In the disarticulation of the foreleg there are butchering marks along the lateral and anterior surfaces of distal humeri and along the posterior edge and lateral surface of the proximal end of ulnae.

Three other butchering marks are associated with the disarticulation of the hindleg. On the innominate, there are scores around the acetabulum. No markings are noted in the acetabulum or along the anterior portion of the ilium. Marks are not observed on femora. According to Guilday et al. (1962:74), this would indicate that the hindleg was severed at the ilio-sacral joint. Where the lower leg articulates with the tarsal bones there are two butchering areas. Cut marks on the anterior surface of the distal tibia and the lateral surface of the astragalus probably indicate separating the bones from each other.

One mandible is scored on the lateral posterior surface about midway up the ascending ramus. According to Parmalee (1965:26) this

would attest to the standard procedure of severing the masseter muscle in order to remove the lower jaw. Parmalee also notes that the removal of the mandible from the skull would make the procedure of cutting out the tongue much easier.

Two areas on the skull show evidence of skinning. One location is noted on the anterior end of the mandible along the lateral ventral surface. Guilday et al. (1962:67) noted the same position of skinning marks on bear, fox and raccoon. Also, a series of scores are located on the frontal bones of bucks. These marks circled the base of the antlers and resulted when the skin was cut away from connective tissue in this area (Guilday et al. 1962:75).

Another skinning location is the anterior surface of the metatarsal shaft. Guilday et al. (1962:72) describe this area on both metatarsals and metacarpals about two or three inches above the distal end and note that it is easier to cut the skin in this region, just above the dew claws, than to include the hoof area in the skinning process. It is impossible to determine exactly where on the metatarsal diaphysis the marks were located as only shaft fragments have been scored.

Eleven ribs are scored in the following manner. On the lateral surface, a series of marks began below the vertebral articulation area and extended in some examples for two to three inches along the surface. A possible interpretation is that these marks resulted from the removal of the deer skin from the rib cage area.

Other than deer bone, butchering or skinning marks are noted on a rabbit calcaneum and a pleural fragment from a large turtle. The pleural piece is scored on the internal surface along the ventral ridge. This may have resulted from an attempt to remove the inner meat from the turtle's carapace.

It has been well documented in ethnographic accounts that long bones of large mammals were cracked open and the marrow extracted and eaten (Read 1971:68; Bonnicksen 1973). Only one whole long bone, a metacarpal, was found from all of the sites. Long bone fragments from large mammals are the most numerous single category of identified bone elements. Besides fracturing the bone for marrow extraction, ethnographic studies indicate that bone can be further fractured in preparation for extraction of bone grease. Bonnicksen (1973) describes this process for the Calling Lake Cree. He describes the bones used in the production of bone grease: proximal end of humerus, ribs chopped in two to six inches segments, neural spines of thoracic vertebrae chopped like ribs, and chopped portions of the innominates. The broken bones are placed in a pot with water and brought to a slow boil. The fat floats to the top where it is collected with a ladle and put in a storage container. Leechman (1951:355-356) also describes the manufacture of bone grease among the historic Indians.

As only about 30 percent by count of the bone could be identified, the majority of bone was in the category of small pieces of

bone from various animals, primarily mammals. Many of these fragments could be a result of the intentional breaking of bones to the size used in the production of bone grease.

Evidence for butchering, skinning, extraction of marrow and the possible production of bone grease is found on bone from all the sites and from all the subphases. Apparently, there are no changes either in the manner in which the deer was processed or in the parts of the deer which were utilized, at least as can be determined from the bone.

CHAPTER IX

SUMMARY AND CONCLUSIONS

The 1976-1977 archaeological excavations produced a substantial amount of faunal remains from the Gainesville Lake area. Because of the tremendous amount of material recovered, a complete analysis could not be conducted. Consequently, only a sample of the faunal material from each site has been studied. Selected features from each component which yielded fauna were chosen from each site. The features selected for analysis are those without discernible intrusions and which contained ceramics from predominantly one cultural phase or subphase to which the features could be assigned. Analysis also has been conducted on grid units from Sites 1Gr1X1 and 1Gr2. The number of bone fragments analyzed from each site is as follows: Site 1Gr1X1, 15,222 pieces; Site 1Gr2, 13,248 pieces; Site 1Pi61, 11,607 pieces; and Site 1Pi33, 5,220 pieces. As Table 36 indicates, most (95 percent) of the features are associated with the Woodland stage. Only 0.6 percent of the identified bone, by count, is in an Archaic or Mississippian context. More specifically, the main focus of this report has been to describe the subsistence system represented by the zooarchaeological remains from the Late Miller II subphase through the Late Miller III subphase.

The earliest components, associated with the Miller I phase, have only a minimal amount of preserved faunal remains. Early Miller I subphase features from Site 1Gr2 indicate the faunal preference for that time period. By weight deer comprised 95.2 percent of the faunal remains and other mammals comprised only 1.2 percent. Turtle (1.7 percent), bird (0.9 percent), and fish (1.0 percent) comprise less of the faunal remains than in later subphases. Mussels were also procured during the Early Miller I subphase as the density of shell in those features is 55.5 g per cu ft (Table 37).

Evidence from the Late Miller I levels from Unit 54ON460E at Site 1Gr2 indicates that during the Late Miller I subphase, deer and turtle continued to be the most important food items.

The first occupations in the Gainesville Lake area which produced appreciable amounts of faunal remains were in the Late Miller II subphase. By this time, the amount of deer had dropped to 89.0 percent by weight, and other mammals remained constant at 1.1 percent. The amount of turtle bone (6.2 percent), bird remains (2.2 percent), and fish fragments (1.4 percent) increase at the expense of deer (Table 37). Next to deer the most important mammals which comprised the late Miller II subsistence system are turkey, 4.4 percent; rabbit, 2.2 percent; squirrel, 1.7 percent; and raccoon, 2.9 percent. Other animals which occur at a frequency of less than one percent include opossum, beaver, domestic dog, gray fox, black bear, striped skunk and cougar (Table 38). The bone density from the three

late Miller II components is fairly consistent: at Site lGr1Xl the bone density was 35.2 g per cu ft; at site lGr2 it was 39.8 g per cu ft; and at Site lP16l it was 37.8 g per cu ft.

The density of mussel shell on the three sites averaged 105 g per cu ft. However there was significant diversity among the components: at Site lGr1Xl the shell density was 85.4 g per cu ft; at Site lGr2 it was 136 g per cu ft; and at Site lP16l it was 250 g per cu ft. The dominant mollusk species at all three sites are Fusconia ebena and Quadrula pustulosa.

During the Early Miller III subphase the relative percentage of deer bone in the faunal assemblage drops further to 88.0 percent by weight (Table 37). Next to deer, the most important mammals are rabbit, 7.3 percent; opossum, 5.1 percent; turkey, 4.1 percent; grey fox, 1.8 percent; raccoon, 1.7 percent; beaver 1.4 percent; and squirrel, 1.2 percent. Other mammals which comprise less than 1 percent include cougar, striped skunk, black bear, and the common mole (Table 38). The relative amount of turtle remains continues to increase, at the expense of deer, and comprises 6.6 percent by weight. At this time there seems to have been a slight drop in the use of bird, 1.8 percent, and fish, 0.9 percent (Table 37). The bone density in the Early Miller III component at Site lP16l is 47.2 g per cu ft, an increase of approximately 25 percent over Late Miller II.

The shell density in the Early Miller III component increases to 1,063 g per cu ft, an increase of 325 percent from the Late Miller II subphase.

Radiocarbon dates indicate that the complex referred to as Middle Miller III is probably contemporaneous with the Late Miller III complex. The Middle Miller III faunal assemblage at lGr1Xl and lGr2 is very similar to the Late Miller III assemblage at lP16l and lP133 in terms of the species hunted and their relative frequencies of occurrence, but there are drastic differences in the density of bone and shell between the Middle and Late Miller III components.

During the Middle Miller III subphase the relative amount of deer bone declines to 70.9 percent by weight, while the use of other mammals increases to 4.7 percent (Table 37). Other than deer, the most frequently hunted mammals were squirrel, 11.6 percent; rabbit, 8.6 percent; raccoon, 8.3 percent; turkey, 6.0 percent; opossum, 4.7 percent and beaver 1.0 percent. Mammals that occurred at a frequency of less than one percent include muskrat, domestic dog, gray fox, striped skunk, and bobcat (Table 38). Also at this time the exploitation of turtles appears to have increased. Turtle bone increased to 16.1 percent, bird bone increased to 4.2 percent, and fish increased to 4.1 percent of the identified faunal sample (Table 37).

The primary discontinuity of the Middle Miller III faunal assemblage is the paucity of vertebrate and invertebrate remains when compared to the Early and Late Miller III components. The bone density of the Middle Miller III component at Site lGr1Xl is only 15.7 g per cu ft and the shell density is only 41.6 g per cu ft. The bone den-

sity of the Middle Miller III component at Site 1Gr2 is only 6.6 g per cu ft and the shell is only 71.2 g per cu ft. This decrease in the amount of bone and shell during this subphase is not understood. One possible reason for the decrease could be different methods of garbage disposal, i.e., garbage may not have been thrown into features as frequently during the Middle Miller III occupations at 1Gr1X1 and 1Gr2. In an effort to test this hypothesis, the bone density of the midden in the Middle Miller III zone of the control square at Site 1Gr2 was calculated. The density is only 8.3 g per cu ft, very close to the 6.6 per cu ft found in the features, suggesting that the low bone density may be real. However there does seem to have been a distinct area for discarding mollusks at Site 1Gr2. Along the terrace edge, facing the present river, is a very dense deposit of mussels, which contains very few other artifacts. No such deposit was found at Site 1Gr1X1; however, the adjacent site, 1Gr1, has not been adequately explored and could contain such a terrace deposit. A logging road cut through the terrace edge of that site has revealed a tremendous amount of Middle Miller III pottery and mussel shells.

Another possible reason for the paucity of faunal remains in these two components is seasonality. However, the floral analysis of these components (Caddell, this Volume) indicate that were probably occupied at the same time of the year as the Late Miller III components, Spring through Fall.

Perhaps the paucity of faunal remains at these components was the result of different settlement and community organization during the Middle Miller III subphase. This problem will be more fully addressed in Volume V, after all of the data have been presented.

The Late Miller III subphase probably developed directly out of the Early Miller III subphase, since it now seems that the Middle Miller III subphase is contemporaneous with the Late Miller III subphase. During the Late Miller III subphase, the amount of deer represented drops to 76.5 percent by weight while other mammals increase to 5.3 percent, turtle increases to 7.2 percent, bird increases to 9.0 percent and fish increases to 2.1 percent by weight (Table 37). Next to deer, the most important mammals hunted appear to have been squirrel, 11.8 percent; turkey, 10.1 percent; raccoon, 4.1 percent; rabbit, 3.6 percent; beaver 3.3 percent; and opossum, 2.5 percent. Mammals which occurred at a frequency less than one percent were domestic dog, gray fox, black bear and striped skunk (Table 38).

The average shell density of the Late Miller III features from Sites 1Pi33 and 1Pi61 is 1,235.8 per cu ft. Feature 51 from 1Pi33 has a density of 676 g per cu ft and the features from 1Pi61 have a shell density of 2,173.6 g per cu ft. The bone density from the two components seems more comparable; Feature 51 at 1Pi33 has a bone density of 51.8 g per cu ft, and the features from 1Pi61 have a density of 33.5 g per cu ft.

There is little information available on faunal exploitation practices during the Mississippian stage, primarily because the

excavated Mississippian features are primarily burial pits. These pits are generally filled with refuse from earlier components. The best sample of Mississippian faunal data recovered by this project is from Zone A or Level 1 of the Control Square, 540N460E, at Site 1Gr2 (Table 20). It is evident from this stratigraphic unit that although deer probably constituted the primary meat source, the use of this animal declined through time, while other mammals, turtle and fish increased. By Mississippian times deer comprises relatively less of the available meat than in any of the prior Woodland phases.

Clearly, the most significant conclusion which can be drawn from this study is that the inhabitants of the Gainesville Lake area were evolving from a focal pattern of adaption to a diffuse pattern (Cleveland 1976) from the Middle to Late Woodland periods. Starting during the later part of the Middle Woodland period, the exploitation of deer gradually declines while the exploitation of other mammals, fish, turtle, and shellfish increases, to reach a peak by the end of the Late Woodland period. Although this change is gradual, the most pronounced shift seems to have occurred at the beginning of the Late Woodland period, during the Early Miller III subphase, ca. A.D. 700 when the use of shellfish increases by over 300 percent and the bone density of the features increases by 25 percent. Throughout the remainder of the Late Woodland period, the use of other vertebrates and invertebrates becomes substantially more important.

Alone, studies such as this are suggestive rather than conclusive and cannot even begin to answer complex questions of culture change without supporting evidence from other classes of data. Therefore this report will be viewed as part of a comprehensive archaeological investigation. In Volume V this study will be integrated with the studies of the flora, human osteology, lithics, and ceramics to describe and interpret the sequence of culture change in the Gainesville Lake area.

Suggested Cultural and Chronological Nomenclature for the Central Tombigbee Drainage						Contemporary Archaeological Cultures			
Date	Stage	Period	Arch. Culture	Phase	Subphase	Lower Mississippi Valley	Western Tennessee Valley	Mobile Bay-Delta	Date
1735	Historic	Fully Historic	?	?					
		Protolhistoric							
1340		Late			Moundville III	Late			1340
1400 AD					Moundville II				1400 AD
1300	Mississippian	Mature	Moundville	Moundville		Mississippian	Moundville	Moundville Battle Creek	1300
1200		Early			Moundville I		Rogers Island	Late	1200
1100					Moundville I	Early			1100
1000		Terminal Woodland	Terminal Miller	Gainesville	Middle Miller III Late Miller III				1000
900					Late Miller III		Late McKelvey		900
800		Late	Miller-Baytown	Miller III	Early Miller III Early Miller III		Early	Early	800
700									700
600	Woodland								600
500							Baytown		500
400									400
300				Miller II	Late Miller II	Early	Copena		300
200					Early Miller II	Late			200
100	Middle		Miller	Miller I	Late Miller I Middle Miller I	Early		Porter	100
1 AD									1 AD
100 BC					Early Miller I		Colbert		100 BC
	Gulf	Late	Alexander	Henson Springs		Tchoufoucte	Alexander		
500 BC	Formational								
				Broken Pumpkin Creek					
1000 BC		Middle	Wheeler			Poverty Point	Wheeler		1000 BC

Figure 1.

Table 1. Distribution by Site and Subphase of the Analyzed Features from the Gainesville Lake Area Project, Excluding Dog Burials and Structures

Period or Subphase	1Gr1X1	1Gr2	1Pi33	1Pi61	Total
Mississippian	-	1	-	-	1
Late Miller III	-	-	1	11	12
Middle Miller III	8	23	-	-	31
Early Miller III	1	-	-	15	16
Late Miller II - Early Miller III	-	1	-	-	1
Late Miller II	13	9	-	8	30
Middle Miller I	-	1	-	-	1
Early Miller I	-	4	-	-	4
Broken Pumpkin Creek	1	1	-	-	2
Archaic	1	-	-	1	2
Totals	24	41	1	35	101

Table 2. Comparison of the One-Quarter Inch and One-Sixteenth Inch Debris from Site 1Gr1X1

Cultural Period	Feature Number (*)	Pieces Fish		Pieces Rabbit		Pieces Squirrel		Pieces Frog/Toad		Pieces Small Mammal	
		1/4	1/16	1/4	1/16	1/4	1/16	1/4	1/16	1/4	1/16
Middle Miller III	10 (1.0)	232	140	2	-	21	-	6	1	12	3
	25 (15.0)	16	51	1	2	3	1	-	-	-	-
Late Miller II	34 (10.6)	22	65	2	-	-	-	-	-	-	-
	46 (20.0)	83=1 skull	48	-	-	-	2	-	1	-	-
	47 (25.0)	6	79	-	-	1	3	-	-	-	-
Archaic	6 (100)	1	11	-	-	1	5	-	-	-	-
Total		360	394	5	2	26	11	6	2	12	3

* (the percentage of 1/16 inch bone analyzed)

Table 3. Comparison of the One-Quarter Inch and One-Sixteenth Inch Debris from Site 1Gr2

Cultural Period	Feature Number (#)	Pieces Fish		Pieces Rabbit		Pieces Squirrel		Pieces Frog/Toad		Pieces Small Mammal	
		1/4	1/16	1/4	1/16	1/4	1/16	1/4	1/16	1/4	1/16
Mississippian	118 (100.0)	-	1	-	-	-	-	-	-	-	-
Middle Miller III	65 (15.0)	-	-	2	1	1	-	-	-	-	3
	69 (100)	-	-	-	-	-	-	-	-	-	1
	70 (50.0)	5	1	1	-	3	-	-	-	1	-
	77 (25.0)	-	-	-	-	-	-	-	-	-	-
	90 (5.0)	26	22	15	1	3	-	-	-	5	2
	94 (3.3)	10	23	2	2	-	1	-	1	1	3
	96 (10.0)	1	-	-	-	-	-	-	-	-	-
	97 (5.0)	-	-	-	-	-	-	-	-	-	1
	100 (6.7)	4	30	-	1	-	-	-	-	-	-
Late Miller II - Early III	44 (5.0)	-	4	-	-	-	-	-	-	-	-
Miller II	35 (10.0)	-	17	1	-	1	-	-	-	-	1
	40 (6.7)	1	1	1	-	-	-	-	-	-	-
	41 (15.0)	-	1	1	-	-	-	-	-	-	1
	47 (25.0)	-	2	-	1	-	-	-	-	-	-
	54 (2.5)	22	14	1	1	2	1	1	1	-	2
	55 (3.3)	7	14	9	1	-	-	-	-	1	7
	61 (10.0)	9	14	1	-	-	1	-	-	-	2
	80 (5.0)	8	14	2	2	-	-	-	1	-	-
	83 (10.0)	-	-	-	-	-	-	-	-	-	1
Total		93	158	36	10	10	3	1	3	8	24

* (percentage of 1/16 inch bone analyzed)

Table 4. Comparison of the Various Faunal Classes from the One-Quarter and the One-Sixteenth Inch Mesh Screens for Feature 51 at Site 1Pi33

Zone	Mammal Bone		Bird Bone		Fish Bone		Turtle & Snake Bone	
	Weight	Percent	Weight	Percent	Weight	Percent	Weight	Percent
Zone A 1/4"	298.9 g	41.0	34.0 g	4.7	13.7 g	1.9	20.5 g	2.8
	43.3 g	16.3	1.6 g	0.6	26.7 g	10.0	6.7 g	2.5
Zone B 1/4"	555.3 g	48.8	122.0 g	10.7	20.0 g	1.8	28.0 g	2.5
	52.0 g	16.8	2.0 g	0.6	44.0 g	14.2	6.0 g	1.9
Zone C 1/4"	316.8 g	61.2	35.2 g	6.8	3.3 g	0.6	14.7 g	2.8
	30.0 g	17.4	2.0 g	1.2	30.0 g	17.4	2.0 g	1.2
Zone D 1/4"	37.8 g	8.9	2.0 g	3.1	2.1 g	3.3	0.9 g	1.4
	4.0 g	12.9	-	-	6.0 g	19.4	1.0 g	3.2

Table 5 . Distribution by Site and Elements of
Canidae Gnawed Bone

Element	lGr1X1	lGr2	lP133	lP161	Total
<u>Odocoileus virginianus</u>					
Long Bones	30	9	14	14	67
Innominate	3	1	6	5	15
Scapula	2	-	2	1	5
Mandible	3	-	-	1	4
Tarsal/Carpal	6	3	2	4	15
Rib	2	-	-	3	5
Phalanx	4	1	-	1	6
Vertebrae	7	-	4	6	17
<u>Procyon lotor</u>					
Mandible	1	-	1	-	2
<u>Castor canadensis</u>					
Calcaneus	-	-	1	-	1
Vertebra	-	-	-	1	1
<u>Didelphis marsupialis</u>					
Mandible	-	1	-	-	1
Long Bone	-	-	1	-	1
Indeterminate Mammal	-	1	-	3	4
Total	59	16	31	39	144

Table 6 . Breakdown of Features into
Primary and Secondary Classification

Site	Number of Primary Features	Number of Secondary Features	Total Features
lGr1X1	19	5	24
lGr2	15	26	41
lP133	1	-	1
lP161	22	14	36
Total	57	45	102

Table 7. Vertebrates Identified from Primary Features
at Site 1GrlX1
One-Quarter Inch Mesh

Species	Middle Miller III			Early Miller III			Late Miller II		
	Pieces	Percent	MNI	Pieces	Percent	MNI	Pieces	Percent	MNI
Mammals									
<u>Didelphis marsupialis</u>									
opossum	3	1.1	1	-	-	-	3	0.4	1
<u>Sylvilagus</u> spp.									
rabbit	7	2.5	2	1	11.1	1	12	1.7	2
<u>Sciurus</u> spp.									
squirrel	26	9.3	5	-	-	-	10	1.4	4
<u>Castor canadensis</u>									
beaver	3	1.1	1	-	-	-	8	1.1	1
<u>Ondatra zibethicus</u>									
muskkrat	1	0.4	1	-	-	-	-	-	-
<u>Canis</u> cf. <u>familiaris</u>									
domestic dog	1	0.4	1	-	-	-	-	-	-
<u>Procyon lotor</u>									
raccoon	20	7.1	3	-	-	-	2	0.3	1
<u>Mephitis mephitis</u>									
striped skunk	2	0.7	1	-	-	-	1	0.1	1
<u>Odocoileus virginianus</u>									
white-tailed deer	140	49.8	2	7	77.8	1	584	83.5	8
Subtotal	203	72.4	17	8	88.9	2	620	88.5	18
Birds									
<u>Meleagris gallopavo</u>									
turkey	12	4.3	2	1	11.1	1	29	4.1	4
Subtotal	12	4.3	2	1	11.1	1	29	4.1	4
Turtles									
<u>Trionyx</u> spp.									
soft-shelled turtle	17	6.0	*	-	-	-	-	-	-
<u>Chelydra serpentina</u>									
snapping turtle	2	0.7	*	-	-	-	-	-	-
<u>Terrapene carolina</u>									
box turtle	3	1.1	*	-	-	-	7	1.0	*
<u>Pseudemys</u> or <u>Chrysemys</u>	10	3.6	*	-	-	-	3	0.4	*
Subtotal	32	11.4	*	-	-	-	10	1.4	*
Fish									
<u>Amia calva</u>									
bowfin	6	2.1	2	-	-	-	6	0.9	1
<u>Lepisosteus</u> spp.									
gar	3	1.1	1	-	-	-	3	0.4	1
Catostomidae	4	1.4	-	-	-	-	-	-	-
<u>Ictalurus nebulosus</u>									
small mouth buffalo	-	-	-	-	-	-	3	0.4	2
Ictaluridae	13	4.6	-	-	-	-	18	2.6	-
<u>Ictalurus punctatus</u>									
channel catfish	-	-	-	-	-	-	2	0.3	2
<u>Ictalurus furcatus</u>									
blue catfish	-	-	-	-	-	-	1	0.1	1
Centrarchidae	1	0.4	-	-	-	-	-	-	-
<u>Micropterus</u> cf. <u>salmoides</u>									
large mouth bass	-	-	-	-	-	-	2	0.3	1
<u>Aplodinotus grunniens</u>									
freshwater drum	6	2.1	3	-	-	-	5	0.7	3
Subtotal	33	11.7	6	-	-	-	40	5.7	11
Total	281	99.8	25	9	100.0	3	699	99.7	33

* Minimum Number of Individuals not estimated as comparative collection specimens lacking.

Table 8. Mammalian Fauna from Site 1GrlX1 Features
One-Quarter Inch Mesh

Species	Cranial fragments	Mandible	Teeth	Humerus	Ulna	Radius	Femur	Tibia	Long Bone fragments	Metacarpal	Metatarsal	Metapodial	Phalanx	Calcaneus	Acirapagus	Tarsal/Carpal	Innominate	Scapula	C. verte	T. verte	L. verte	Vertebrae	Sternum	Ribs	Sacrum	Total
<u>Odocoileus virginianus</u> white-tailed deer	105	18	90	22	12	20	16	21	-	8	19	35	88	18	13	67	26	15	19	25	32	16	1	-	2	688
<u>Didelphis marsupialis</u> opossum	-	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	6
<u>Procyon lotor</u> raccoon	1	7	3	-	5	1	-	-	-	-	-	-	-	-	2	1	-	1	-	-	-	-	-	-	-	21
<u>Sciurus app.</u> squirrel	5	4	-	8	2	1	7	3	-	-	-	-	-	1	-	-	-	4	-	-	-	-	-	-	1	36
<u>Sylvilagus app.</u> rabbit	-	1	-	3	2	-	3	6	-	-	-	-	-	2	-	-	2	1	1	-	-	-	-	-	-	21
<u>Castor canadensis</u> beaver	-	-	8	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	11
<u>Mephitis mephitis</u> skunk	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
<u>Canis cf. familiaris</u> domestic dog	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Ondatra zibethicus</u> muskrat	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Small Mammal (squirrel size)	1	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	10
Medium Mammal (raccoon to dog size)	-	2	3	-	-	-	-	-	3	-	-	2	-	-	-	-	-	-	-	-	-	3	-	-	-	13
Large Mammal	1	4	-	-	-	-	-	-	2149	-	-	-	-	-	-	-	-	-	-	-	-	11	-	85	-	2250
Total																										3061

Table 9. Avian Fauna from Site 1GrlXl Features
One-Quarter Inch Mesh

Species	Skull	Fibiotarsus	Humerus	Ulna	Radius	Corsoid	Tersometa-	Innominate	Phalanx	Sacrum	Femur	Long Bone	Fragment	Carpomet-	Carpus	Tarsal/Carpal	Spur	Vertebrae	Unidentified	Total
<u>Meleagris gallopavo</u> turkey	-	1	6	1	-	-	13	-	-	1	1	-	1	4	7	1	-	-	-	35
Large Bird (turkey or goose size)	1	-	-	-	-	-	-	-	15	-	-	142	-	-	-	-	-	3	11	172
Medium Bird (duck size)	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	2
Bird	-	-	-	-	-	-	-	-	3	-	-	16	-	-	-	-	-	-	20	19
Total																				248

Table 10. Fish Fauna from Site 1GrlXl Features
One-Quarter Inch Mesh

Species	Vertebrae	Scales	Cranial other	Rays, spines	Pharyngeal element	Sensory	Articular	Diadrate	Hyomandibular	Ectopterygoid	Maxilla	Premaxilla	Frontal	Urohyal	Epithal	Ceratahyal	Neurothoid	Parasphenoid	Basoscapula	Neurial	Supracleithrum	Cleithrum	Operculum	Entire Skull	Unidentifiable	Total
<u>Amia calva</u> bowfin	4	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	12
<u>Lepisosteus</u> spp. gar	1	1	-	-	2	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Ictaluridae	-	-	13	1	-	2	3	-	-	-	-	-	-	1	2	1	1	-	1	-	-	-	-	-	3	28
<u>Ictalurus punctatus</u> / <u>furcatus</u>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	3
<u>Ictalurus punctatus</u> channel catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	2
<u>Ictalurus furcatus</u> blue catfish	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Catostomidae	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	4
<u>Ictiobus bubalus</u> small-mouth buffalo	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	3
Centrarchidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
<u>Micropterus</u> cf. <u>salmoides</u> large-mouth bass	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<u>Aplodinotus grunniens</u> freshwater drum	-	-	1	-	9	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Fish	16	13	2	34	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	233	302
Total																										375

Table 11. Amphibian and Reptilian Fauna from Site 1GrlX1 Features
One-Quarter Inch Mesh

Species	Long Bone fragments	Humerus/Femur	Innominate	Ribs	Vertebrae	Plastron	Xiphiplastron	Hyo-plastron	Carapace/Plastron	Carapace	Pleurals	Neurals	Peripherals	Nuchal Bone	Pygal	Suprapygial	Total
Amphibian																	
Toad/Frog	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Subtotal																	2
Reptiles																	
Snake	-	-	-	2	61	-	-	-	-	-	-	-	-	-	-	-	63
Trionyx spp. soft-shelled turtle	-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	17
cf. <u>Chelydra serpentina</u> snapper	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Kinosterninae	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1	-	5
<u>Pseudemys/Chrysemys</u>	-	-	-	-	-	-	-	1	-	-	-	1	9	2	-	-	13
<u>Terrapene carolina</u> box turtle	-	1	-	-	-	-	1	-	-	2	-	1	3	-	2	-	10
Turtle	4	1	-	-	-	24	-	-	822	-	109	31	118	-	2	1	1,112
Subtotal																	1,159
Total																	1,161

Table 12. Minimum Number and Estimated Length of Fish from
Site 1Gr1X1
Late Miller II and Middle Miller III Primary Features

Species	Estimated Length of Fish in Cm													MNI	
	0-12 cm	12-15 cm	15-18 cm	18-21 cm	21-24 cm	24-27 cm	27-30 cm	30-36 cm	36-42 cm	42-48 cm	48-54 cm	54-60 cm	60-72 cm		72-greater cm
Middle Miller III															
<u>Amia calva</u> bowfin	-	-	-	-	-	-	-	-	1	-	-	1	-	-	2
<u>Lepisosteus</u> spp. gar	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
<u>Aplodinotus grunniens</u> freshwater drum	-	-	-	-	-	-	1	1	1	-	-	-	-	-	3
Subtotal															6
Late Miller II															
<u>Amia calva</u> bowfin	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
<u>Lepisosteus</u> spp. gar	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
<u>Ictalurus punctatus</u> channel catfish	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
<u>Ictalurus furcatus</u> blue catfish	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
<u>Ictiobus bubalus</u> small mouth buffalo	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2
<u>Micropterus</u> cf. <u>salmoides</u> large mouth bass	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Aplodinotus grunniens</u> freshwater drum	-	-	-	-	1	-	-	-	1	1	-	-	-	-	3
Subtotal															11
Total															17

Table 13. Faunal Remains from the Combined
Grid Squares at Site 1Gr1X1
One-Quarter Inch Mesh

Cultural Affiliation	Square Level Depth Below Surface	Pieces Deer	Pieces Turtle	Pieces Bird	Pieces Mammal-Other	Pieces Fish	Total Pieces
Middle Miller III & Late Miller II (mixed)	Level 1 0.0 - 0.5 ft	-	1	-	-	-	41
Middle Miller III & Late Miller II (mixed)	Level 2 0.5 - 1.0 ft	1	10	1	-	-	131
Middle Miller III & Late Miller II (mixed)	Level 3 1.0 - 1.5 ft	-	-	-	-	-	11
Middle Miller III & Late Miller II (mixed)	Level 4 1.5 - 2.0 ft	-	-	-	-	-	1
Archaic	Level 5 2.0 - 2.5 ft	-	-	-	-	-	3
Archaic	Level 6 2.5 - 3.0 ft	-	-	-	-	-	-
Archaic	Level 7 3.0 - 3.5 ft	-	-	-	-	-	1
Total		1	11	1	-	-	188

Table 14. Freshwater Mussel Shells from the One-Quarter
Inch Mesh at Site 1GrlX1

Species	Middle Miller III			Late Miller II		
	Total Valves	Percent	MNI	Total Valves	Percent	MNI
<u>Fusconala ebena</u> niggerhead	132	24.8	73	508	31.1	284
<u>Quadrula pustulosa</u> pimple-back	163	29.6	87	321	19.7	180
<u>Elliptio crassidens</u> elephants ear	10	2.7	8	51	3.0	27
<u>Elliptio dilatatus</u> spike	14	3.4	10	41	2.4	22
<u>Quadrula metanevra</u> monkey-face	8	1.4	4	42	2.4	22
<u>Plagiola lineolata</u> butterfly	8	1.4	4	41	2.7	25
<u>Obovaria unicolor</u>	10	1.7	5	22	1.3	12
<u>Obliquaria reflexa</u> three-horned warty back	6	1.4	4	24	1.5	14
<u>Amblema plicata</u> three-ridge	4	1.0	3	19	1.1	10
<u>Pleurobema decisum</u>	1	0.3	1	14	0.8	7
<u>Ligumia recta</u> black sand shell	-	-	-	2	0.2	2
<u>Potamilus purpuratus</u>	3	1.0	3	2	0.2	2
<u>Lampsilis fasciola</u> slough sand shell	-	-	-	3	0.2	2
<u>Lampsilis radiata</u>	16	3.1	9	1	0.1	1
<u>Lampsilis teres</u> yellow sand shell	7	1.7	5	1	0.1	1
<u>Lampsilis ovata</u> pocketbook	-	-	-	2	0.1	1
<u>Fusconala undata</u> pig-toe	-	-	-	4	0.3	3
<u>Truncilla truncata</u> deer-toe	1	0.3	1	1	0.1	1
<u>Tritogonia verrucosa</u> buckhorn	-	-	-	1	0.1	1
<u>Quadrula cf. aspera</u>	3	0.7	2	3	0.2	2
<u>Pleurobema spp.</u>	10	2.7	7	26	1.4	13
<u>Quadrula spp.</u>	3	0.7	2	21	1.2	11
Unidentified valves	118	22.4	66	538	29.5	269
Total	517	100.3	294	1688	99.7	912

Table 15. Vertebrates Identified from Primary Features at Site 1Gr2
One-Quarter Inch Mesh

Species	Middle Miller III			Late Miller II			Early Miller I		
	Pieces	Percent	MNI	Pieces	Percent	MNI	Pieces	Percent	MNI
<u>Lepus sylvaticus</u> opossum	11	10.2	1	6	1.5	2	1	11.1	1
<u>Sciurus spp.</u> squirrel	19	17.6	2	15	2.7	2	-	-	-
<u>Peromyscus spp.</u> mouse	9	8.3	1	5	1.0	1	1	11.1	1
<u>Thomomys talpae</u> vole	-	-	-	2	0.4	1	-	-	-
<u>Microtus pennsylvanicus</u> vole	1	0.9	1	1	0.2	1	-	-	-
<u>Procyon lotor</u> raccoon	5	4.6	1	33	6.3	4	-	-	-
<u>Mephitis mephitis</u> striped skunk	-	-	-	5	1.0	2	-	-	-
<u>Ursus americanus</u> black bear	-	-	-	1	0.2	1	-	-	-
<u>Ursus concolor</u> brown bear	-	-	-	1	0.2	1	-	-	-
<u>Lynx rufus</u> bobcat	1	0.9	1	-	-	-	-	-	-
<u>Odocoileus virginianus</u> white-tailed deer	34	31.5	1	389	74.4	5	6	66.7	1
Subtotal	80	74.0	8	458	87.9	20	8	88.9	3
Birds									
<u>Meleagris gallopavo</u> turkey	6	5.6	1	21	4.0	2	-	-	-
Subtotal	6	5.6	1	21	4.0	2	-	-	-
Turtles									
<u>Trionyx spp.</u> soft-shelled turtle	4	3.7	*	15	2.9	*	-	-	-
Emydoidea	1	0.9	*	8	1.5	*	-	-	-
<u>Testudo carolina</u> box turtle	1	0.9	*	2	0.4	*	-	-	-
Subtotal	6	5.5	*	25	4.8	*	-	-	-
Fish									
<u>Amia calva</u> bowfin	-	-	*	-	-	*	1	11.1	*
<u>Lepisosteus spp.</u> gar	-	-	-	16	3.1	*	-	-	-
<u>Ictaluridae</u> catfish family	4	3.7	*	-	-	-	-	-	-
<u>Ictalurus spp.</u>	2	1.9	*	-	-	-	-	-	-
<u>Ichthyosoma</u> small mouth buffalo	-	-	*	1	0.2	*	-	-	-
<u>Moxostoma cf. carinatum</u> river herring	3	2.8	*	-	-	-	-	-	-
<u>Aplodinotus grunniens</u> freshwater drum	7	6.5	*	2	0.4	*	-	-	-
Subtotal	17	14.9	*	19	3.7	*	1	11.1	*
Total	108	100.0	15	523	100.4	22	9	100.0	3

* Minimum Number of Individuals not estimated as comparative collection specimens are lacking.

Table 16. Mammalian Fauna from Site 1Gr2 Features
One-Quarter Inch Mesh

Species	Cranial Fragments	Mandible	Teeth	Humerus	Ulna	Radius	Femur	Tibia	Long Bone Fragments	Metacarpal	Metatarsal	Metatarsal	Phalanx	Patella	Scapula	Ischium	Vertebrae	Sternum	Total							
<u>Odocoileus virginianus</u> white-tailed deer	97	9	78	7	2	10	10	17	-	6	14	19	83	1	12	13	42	14	2	6	15	24	5	-	27	514
<u>Didelphis marsupialis</u> opossum	4	5	2	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	-	-	17
<u>Sciurus</u> spp. squirrel	2	-	-	9	1	-	2	3	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	19
<u>Sylvilagus</u> spp. rabbit	3	2	-	5	3	4	4	3	-	-	1	-	-	3	2	-	2	4	-	-	-	-	-	-	-	36
<u>Procyon lotor</u> raccoon	8	10	4	2	3	6	2	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-	43
<u>Mephitis mephitis</u> striped skunk	1	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
<u>Urocyon cinereoargenteus</u> gray fox	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3
<u>Canis cf. familiaris</u> domestic dog	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<u>Ursus americanus</u> black bear	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Felis concolor</u> cougar	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Lynx rufus</u> bobcat	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Large Mammal	-	-	-	-	-	-	-	-	545	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	18	544
Medium Mammal	12	1	2	-	-	-	1	-	1	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	21
Small Mammal	-	-	-	-	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	7	-	-	13
Total																										1218

Table 17. Avian Fauna from Site 1Gr2 Features
One-Quarter Inch Mesh

Species	Metatarsal I	Tibiotarsus	Humerus	Ulna	Radius	Coracoid	Tarsometatarsus	Phalanx	Femur	Long Bone Fragments	Carpometacarpus	Tarsal or Carpal	Spur	Vertebrae	Unidentifiable	Total
<u>Meleagris gallopavo</u> turkey	1	3	3	1	1	3	9	-	1	-	3	3	1	-	-	31
Anatidae	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Large Bird (turkey or goose size)	-	-	-	-	-	-	6	-	1	-	-	-	-	-	-	7
Bird	-	-	1	-	-	-	1	1	-	69	-	-	-	7	20	99
Total																138

Table 18. Fish Bone Identified from Site 1Gr2 Features
One-Quarter Inch Mesh

Species	Cranial element	Otolith	Pharyngeal elements	Basioccipital	Operculum	Articular	Cleithrum	Dentary	Spines, Rays Ribs	Vertebrae	Unidentifiable	Total
<u>Amia calva</u> bowfin	-	-	-	-	-	-	1	-	-	-	-	1
<u>Lepisosteus</u> spp. gar	-	-	-	-	-	-	-	3	-	13	-	16
Ictaluridae catfish family	-	-	-	-	-	-	-	-	-	-	4	4
<u>Ictalurus</u> spp.	1	-	-	-	-	-	1	-	-	-	-	2
<u>Ichthyobus bubalus</u> small mouth buffalo	-	-	-	-	-	1	-	-	-	-	-	1
<u>Moxostoma</u> cf. <u>carinatum</u> river redhorse	-	-	-	1	2	-	-	-	-	-	-	3
<u>Aplodinotus grunniens</u> freshwater drum	-	4	5	-	-	-	-	-	-	-	-	9
Fish	-	-	-	-	-	-	-	-	2	10	27	39
Total												75

Table 19. Amphibian and Reptilian Fauna from Site 1Gr2 Features
One-Quarter Inch Mesh

Species	Cranial fragments	Vertebrae	Innominate	Long Bone fragments	Plastron or caparace	Pleural	Neurals	Peripherals	Nuchal Bone	Pygal	Plastron	Hypoplastron	Total
Amphibian													
Toad/Frog	-	-	1	-	-	-	-	-	-	-	-	-	1
Subtotal													1
Reptilian													
Snake	-	16	-	-	-	-	-	-	-	-	-	-	16
Turtle	2	-	-	3	592	3	1	10	-	1	5	-	617
<u>Trionyx</u> spp. soft-shelled turtle	-	-	-	-	16	-	2	-	-	-	2	-	20
Kinosterninae	-	-	-	-	-	-	-	6	1	-	-	1	8
<u>Terrapene carolina</u> box turtle	-	-	-	-	1	-	1	-	-	-	1	1	4
Subtotal													665
Total													666

Table 20. Vertebrate Fauna Identified from
Control Block 540N460E at Site 1Gr2
One-Quarter Inch Mesh

Cultural Period Assignment	Square Level Depth Below Surface	Pieces Deer	Pieces Mammal-Other	Pieces Turtle	Pieces Bird	Pieces Fish	Total Pieces
Historic & Mississippian	Level 1 0.0 - 0.5 ft	8	21	173	11	18	1016
Mississippian & Miller III (mixed)	Level 2 0.5 - 0.8 ft	9	7	36	4	8	429
Middle Miller III & Late Miller I (mixed)	Level 3 0.8 - 1.0 ft	22	-	14	-	2	429
Middle Miller III & Late Miller I (mixed)	Level 4 1.0 - 1.2 ft	50	3	46	3	1	977
Late Miller I	Level 5 1.2 - 1.4 ft	18	-	15	6	-	446
Late Miller I	Level 6 1.4 - 1.6 ft	11	1	12	3	-	247
Late Miller I	Level 7 1.6 - 1.8 ft	2	-	13	1	-	119
Late Miller I	Level 8 1.8 - 2.0 ft	3	-	5	-	-	42
Archaic	Level 9 2.0 - 2.2 ft	2	-	3	1	-	26
Archaic	Level 10 2.2 - 2.4 ft	3	-	3	1	-	26
Archaic	Level 11 2.4 - 2.6 ft	-	-	2	-	-	10
Archaic	Level 12 2.6 - 2.8 ft	1	-	1	1	-	13
Archaic	Level 13 2.8 - 3.0 ft	-	1	4	1	-	6
Archaic	Level 14 3.0 - 3.2 ft	-	-	-	-	-	-
Archaic	Level 15 3.2 - 3.4 ft	-	-	-	-	-	-
Total		129	31	327	32	29	3786

Table 21. Freshwater Mussels from Site 1Gr2 Features
One-Quarter Inch Mesh

Species	Middle Miller I-I			Late Miller II			Early Miller I		
	Pieces	Percent	MNI	Pieces	Percent	MNI	Pieces	Percent	MNI
<u>Esconata ebena</u> niggerhead	174	15.9	93	378	29.7	190	7	4.9	4
<u>Quadrula pustulosa</u> purple-back	95	19.4	61	83	7.8	50	22	19.5	16
<u>Elliptio crassilens</u> elephant's ear	20	1.9	11	34	3.0	19	-	-	-
<u>Elliptio dilatatus</u> spike	-	-	-	12	1.1	7	-	-	-
<u>Quadrula metanoeva</u> monkey face	13	1.4	8	5	0.5	3	-	-	-
<u>Plagiola lineolata</u> butterfly	9	1.0	6	10	0.8	5	-	-	-
<u>Obovaria unicolor</u>	19	2.4	14	8	0.8	5	2	2.4	2
<u>Obliquaria reflexa</u> horned warty back	23	2.6	15	18	1.6	10	1	1.2	1
<u>Anodonta plicata</u> three ridge	2	0.3	2	6	0.8	5	-	-	-
<u>Pleurobema decisum</u>	52	4.6	27	32	2.8	18	14	9.8	8
<u>Potamilus purpuratus</u>	-	-	-	4	0.6	4	-	-	-
<u>Lampsilis radiata</u>	2	0.3	2	-	-	-	3	3.7	3
<u>Lampsilis excavata</u>	6	0.7	4	-	-	-	-	-	-
<u>Lampsilis teres</u> yellow sand shell	2	0.2	1	-	-	-	-	-	-
<u>Pleurobema cordatum</u>	2	0.2	1	-	-	-	1	1.2	1
<u>Quadrula quadrula</u>	-	-	-	4	0.6	4	-	-	-
<u>Esconata flava</u>	3	0.3	2	-	-	-	-	-	-
<u>Tritogonia verrucosa</u> buckhorn	1	0.2	1	-	-	-	-	-	-
<u>Pleurobema</u> spp.	77	9.1	53	46	3.6	23	-	-	-
<u>Quadrula</u> spp.	51	4.4	36	32	2.5	16	-	-	-
<u>Lampsilis</u> spp.	7	0.7	4	4	0.3	2	-	-	-
Unidentified	471	43.4	254	539	43.8	280	87	57.3	47
Total	1030	100.0	585	1213	100.0	639	137	100.0	82

Table 22. Vertebrates Identified from Feature 51
at Site 1P133
One-Quarter Inch Mesh

Species	Late Miller III		
	Pieces	Percent	MNI
Mammals			
<u>Didelphis marsupialis</u> opossum	8	2.0	3
<u>Sylvilagus</u> spp. rabbit	15	3.7	2
<u>Sciurus</u> spp. squirrel	57	13.9	5
<u>Castor canadensis</u> beaver	19	4.6	2
<u>Canis</u> cf. <u>familiaris</u> domestic dog	1	0.2	1
<u>Urocyon cinereoargenteus</u> gray fox	1	0.2	1
<u>Procyon lotor</u> raccoon	11	2.7	4
<u>Ursus americanus</u> black bear	4	1.0	1
<u>Mephitis mephitis</u> striped skunk	2	0.5	1
<u>Odocoileus virginianus</u> white-tailed deer	232	56.6	6
Subtotal	350	85.4	25
Birds			
<u>Meleagris gallopavo</u> turkey	53	12.9	5
Subtotal	53	12.9	5
Turtles			
<u>Trionyx</u> spp. soft-shelled turtle	3	0.7	*
<u>Terrapene carolina</u> box turtle	1	0.2	*
Subtotal	4	1.0	*
Fish			
<u>Amia calva</u> bowfin	1	0.2	*
<u>Aplodinotus grunniens</u> freshwater drum	2	0.5	*
Subtotal	3	0.7	*
Total	410	100.0	30

* Minimum Number of Individuals not estimated as comparative collection specimens are lacking.

Table 23. Mammalian Fauna from Site lPi33 Features
One-Quarter Inch Mesh

Species	Cranial Fragments	Mandible	Teeth	Humerus	Ulna	Radius	Ptibia	Femur	Tibia	Long Bone Fragments	Metacarpal	Metatarsal	Metapodial	Phalanges	Patella	Calcaneus	Astragalus	Tarsals or Carpals	Innominate	Scapula	C. verte	T. verte	L. verte	Vertebrae	Sternum	Ribs	Total
<u>Odocoileus virginianus</u>	28	17	28	7	4	9	-	8	12	-	9	13	6	9	1	2	1	19	12	5	4	16	10	7	1	9	232
<u>Didelphis marsupialis</u>	1	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
<u>Procyon lotor</u>	1	4	2	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
<u>Sciurus app.</u>	21	6	3	5	2	2	1	6	4	-	-	-	-	-	-	2	1	-	2	2	-	-	-	-	-	-	57
<u>Sylvilagus app.</u>	3	2	3	-	-	-	-	2	-	-	-	-	-	-	-	2	1	-	1	1	-	-	-	-	-	-	15
<u>Ursus americanus</u>	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
<u>Castor canadensis</u>	3	1	1	-	-	-	-	1	-	-	-	-	1	-	-	3	1	-	1	1	-	-	-	-	-	6	19
<u>Urocyon cinereoargenteus</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
<u>Canis cf. familiaris</u>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>cf. Mephitis mephitis</u>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Large Mammal	3	-	-	-	-	-	-	-	-	126	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	130
Medium Mammal	1	1	6	-	-	-	-	-	1	-	-	-	6	1	-	-	-	-	-	-	-	-	1	2	-	3	23
Small Mammal	13	-	-	-	-	-	-	2	-	4	-	-	2	1	-	-	-	-	-	-	1	-	-	7	-	2	32
Total																											535

Table 24. Avian Fauna from Site 1P133 Features
One-Quarter Inch Mesh

Species	Tibiotarsus	Fibula	Humerus	Ulna	Radius	Coracoid	Tarsometatarsus	Unnominate	Phalanx	Sternum	Femur	Scapula Bone Fragment	Carpometacarpus	Tarsal or Carpal	Spur	Vertebra	Unidentified Site	Unidentified	Total
<u>Meleagris gallopavo</u>	9	-	10	1	2	10	7	6	-	2	1	-	1	1	1	2	-	-	53
Large Bird (turkey or goose size)	-	-	-	1	-	-	-	-	5	-	-	119	-	1	-	1	-	-	127
Medium Bird (duck size)	-	1	-	1	-	1	-	1	-	-	-	-	1	-	-	1	-	-	6
Bird	1	-	7	5	-	4	-	-	-	-	-	-	2	1	-	-	102	8	130
Total																			316

Table 25. Fish, Reptilian, and Amphibian Fauna from
Site 1P133 Features
One-Quarter Inch Mesh

Species	Ribs	Nuchal Bone	Peripherals	Neurals	Pleurals	Hypoplastron	Hyoplastron	Isur Bone Fragments	Epipiastron	Wriston/Carapace	Vertebrae	Scales	Spines, Rays, Fins	Cranial	Unidentified	Unidentified Site	Total
Fish																	
<u>Aria calva</u>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
<u>Aplodinotus grunniens</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Fish	-	-	-	-	-	-	-	-	-	-	26	54	9	-	100	114	303
Subtotal																	306
Reptilian																	
Snake	1	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-	43
<u>Terrapene carolina</u>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
<u>Trionyx</u> spp.	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	3
Turtle	-	1	3	2	3	2	-	1	1	230	1	-	-	-	-	-	244
Subtotal																	248
Amphibian																	
Toad/Frog	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Subtotal																	1
Total																	557

Table 26. Skeletal Measurements of the Domesticated Dog
Burial from Feature 4, Site 1P133

Measured element	Left (mm)	Right (mm)
Ulna length	155.0	--
Radius length	133.0	--
Humerus length	127.5	--
Width of distal end, humerus	20.0	23.5
Femur length	136.0	--
Width of femur head	13.0	13.5
Width of femur, proximal end	30.0	--
Tibia length	141.0	141.5

Table 27. Vertebrates Identified from Primary Features at Site 1Pi61
One-Quarter Inch Mesh

Species	Late Miller III			Early Miller III			Late Miller II		
	Pieces	Percent	MNI	Pieces	Percent	MNI	Pieces	Percent	MNI
Mammals									
<u>Didelphis marsupialis</u> opossum	7	2.9	2	37	4.6	4	-	-	-
<u>Scalopus aquaticus</u> common mole	-	-	-	1	0.1	1	-	-	-
<u>Sylvilagus</u> spp. rabbit	7	2.9	2	52	6.5	3	-	-	-
<u>Sciurus</u> spp. squirrel	14	5.9	2	9	1.1	2	6	5.6	1
<u>Castor canadensis</u> beaver	1	0.4	1	10	1.2	2	-	-	-
<u>Urocyon cinereoargenteus</u> gray fox	3	1.3	1	13	1.6	1	-	-	-
<u>Ursus americanus</u> black bear	-	-	-	1	0.1	1	-	-	-
<u>Procyon lotor</u> raccoon	14	5.9	2	12	1.5	2	1	0.9	1
<u>Mephitis mephitis</u> striped skunk	1	0.4	1	3	0.4	1	-	-	-
<u>Felis concolor</u> cougar	-	-	-	1	0.1	1	-	-	-
<u>Odocoileus virginianus</u> white-tailed deer	146	61.1	5	546	68.0	12	84	77.8	2
Subtotal	193	80.8	16	685	85.2	30	91	83.4	16
Birds									
<u>Meleagris gallopavo</u> turkey	8	3.3	2	30	3.7	3	4	3.7	1
Subtotal	8	3.3	2	30	3.7	3	4	3.7	1
Turtles									
<u>Trionyx</u> spp. soft-shelled turtle	14	5.9	*	6	0.7	*	3	2.8	*
Kinosterninae	-	-	-	14	1.7	*	1	0.9	*
<u>Terrapene carolina</u> box turtle	6	2.5	*	35	4.4	*	4	3.7	*
Subtotal	20	8.4	*	55	6.8	*	8	7.4	*
Fish									
<u>Ambloplites caeruleus</u> bowfin	1	0.4	*	2	0.2	*	1	0.9	*
<u>Lepisosteus</u> spp. gar	3	1.3	*	3	0.4	*	-	-	-
Catostomidae	2	0.8	*	-	-	-	1	0.9	*
Ictaluridae	6	2.5	*	14	1.7	*	-	-	-
<u>Ictalurus</u> spp.	2	0.8	*	10	1.2	*	-	-	-
Centrarchidae	2	0.8	*	1	0.1	*	-	-	-
<u>Aplodinotus grunniens</u> freshwater drum	2	0.8	*	2	0.2	*	4	3.7	*
<u>Acipenser</u> cf. <u>oxyrinchus</u> Atlantic sturgeon	-	-	-	1	0.1	*	-	-	-
Subtotal	18	7.4	*	33	3.9	*	5	5.5	*
Total	239	99.9	18	803	99.6	33	108	100.9	5

* Minimum Number of Individuals not estimated as comparative collection specimens lacking.

Table 28. Mammalian Fauna from Site 1Pi61 Features
One-Quarter Inch Mesh

Species	Cranial Fragments	Mandible	Teeth	Humerus	Ulna	Radius	Femur	Tibia	Long Bone Fragments	Metacarpal	Metatarsal	Metapodial	Phalanx	Calcaneus	Astragalus	Tarsal/Carpal	Innominate	Scapula	C. verte	T. verte	L. verte	Vertebrae	Sternum	Ribs	Sacrum	Pelvis	Total
<u>Odocoileus virginianus</u> white-tailed deer	41	23	53	28	11	44	17	64	-	12	26	32	74	15	15	40	34	66	33	28	29	19	-	70	1	1	776
<u>Didelphis marsupialis</u> opossum	12	14	7	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	2	7	-	-	-	-	48
<u>Procyon lotor</u> raccoon	7	6	7	1	3	1	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	27
<u>Urocyon cinereoargenteus</u> gray fox	1	1	2	2	1	1	-	-	-	-	-	-	-	1	1	3	-	1	-	-	2	-	-	-	-	-	16
<u>Castor canadensis</u> beaver	2	2	4	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	12
<u>Sciurus</u> spp. squirrel	3	5	4	6	2	2	8	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	33
<u>Sylvilagus</u> spp. rabbit	7	6	10	3	-	3	3	5	-	-	-	1	-	2	1	-	4	5	2	-	5	1	-	-	-	-	58
cf. <u>Mephitis mephitis</u> striped skunk	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
<u>Scalopus aquaticus</u> common mole	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Felis concolor</u> cougar	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<u>Ursus americanus</u> black bear	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Large Mammal	12	-	-	1	-	-	-	-	784	-	-	-	-	-	-	-	-	-	-	-	-	24	-	8	-	-	929
Medium Mammal	4	7	9	1	-	-	2	-	4	-	-	9	2	1	-	1	-	1	-	-	-	4	-	1	-	-	46
Small Mammal	1	-	-	-	1	-	-	-	5	-	-	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-	14
Total																											1866

Table 29. Primary and Secondary Features at Site 1P161
One-Quarter Inch Mesh

	Feature Type	
	Primary	Secondary
Weight of bone per cu ft of fill. Feature volume equals 0.0 - 5.0 cu ft.	72.7 g / cu ft	18.6 g / cu ft
Weight of bone per cu ft of fill. Feature volume equals 5.1 - 10.0 cu ft.	47.3 g / cu ft	8.4 g / cu ft
Weight of bone per cu ft of fill. Feature volume equals 15.0 - 60.0 cu ft.	41.7 g / cu ft	0.3 g / cu ft
Count of bone per cu ft of fill. Feature volume equals 0.0 - 5.0 cu ft.	67 bones / cu ft	13 bones / cu ft
Count of bone per cu ft of fill. Feature volume equals 5.1 - 10.0 cu ft.	37 bones / cu ft	0.9 bone / cu ft
Count of bone per cu ft of fill. Feature volume equals 15.0 - 60.0 cu ft.	27 bones / cu ft	0.5 bone / cu ft

Table 30. Fauna from Structures 1-4 at Site 1P161
One-Quarter Inch Mesh

Structure (Feature Number)	Pieces Deer	Pieces Large Mammal	Pieces Mammal- Other	Pieces Turtle	Pieces Bird	Pieces Fish	Pieces Snake	Pieces Not Identifiable	Total Pieces
Structure 1 (Feature 17)	8	30	3	59	-	7	1	205	313
Structure 2 (Feature 28)	3	5	2	5	11	7	4	66	103
Structure 3 (Feature 29)	26	16	13	60	12	9	3	308	447
Structure 4 (Feature 92)	11	20	9	38	3	5	-	123	260
Total	48	71	27	162	26	28	8	702	1133
Percentage of Total Identified to Class Category	13.0	19.2	7.3	43.8	7.0	7.6	2.2	-	100.1

Table 31. Avian Fauna from Site 1P161 Features
One-Quarter Inch Mesh

Species	Innominate	Scapula	Coracoid	Sternum	Phalanx	Vertebrae	Sacrum	Long Bone fragments	Spur	Tibiotarsus	Humerus	Ulna	Radius	Tarsometatarsus	Femur	Carpometatarsus	Fibula	Indeterminate	Total
<u>Meleagris gallopavo</u> turkey	1	2	6	4	1	1	3	-	1	6	2	2	1	9	2	-	1	-	42
Large Bird (turkey to goose size)	-	-	-	-	9	-	-	38	-	-	1	-	-	1	-	-	-	29	78
Medium Bird (duck size)	-	-	-	-	1	-	-	-	-	1	-	17	1	5	1	-	-	-	26
Bird	-	-	-	-	2	-	-	24	-	1	-	1	-	-	-	-	-	12	40
Total																			186

Table 32. Reptilian Fauna from Site 1P161 Features
One-Quarter Inch Mesh

Species	Vertebrae	Ribs	Innominate Plastron/ Carapace	Plastron	Hypoplastron	Carapace	Neural	Pleural	Peripheral	Nuchal Bone	Pygal	Suprasygal	Long Bone fragments	Total
Snake	94	1	-	-	-	-	-	-	-	-	-	-	-	95
<u>Trionyx</u> spp. soft-shelled turtle	-	-	-	18	1	-	-	3	4	-	-	-	-	26
Kinosterninae	-	-	-	-	-	1	-	1	-	6	-	-	-	8
<u>Terrapene carolina</u> box turtle	-	-	-	16	-	-	3	2	1	17	1	2	1	43
Turtle	-	-	2	686	24	2	12	6	12	31	3	1	-	786
Total														958

Table 33. Fish Fauna from Site 1P161 Features
One-Quarter Inch Mesh

Species	Identifiable Cranial fragments	Dentary	Pharyngeal elements	Cleithrum	Dermal Scute	Scales	Vertebrae	Pectoral spine	Spines, Rays, Ribs	Unidentifiable	Total
<u>Amia calva</u> bowfin	1	-	-	-	-	-	3	-	-	-	4
<u>Lepisosteus</u> spp. gar	1	3	-	-	-	1	1	-	-	-	6
Catostomidae	1	-	1	1	-	-	-	-	-	-	3
Ictaluridae	12	4	-	-	-	-	-	-	-	-	16
<u>Ictalurus</u> spp.	2	2	-	1	-	-	-	11	-	-	16
Centrarchidae	1	2	-	1	-	-	-	-	-	-	4
<u>Aplodinotus grunniens</u> freshwater drum	-	-	9	-	-	-	-	-	-	-	9
<u>Acipenser cf. oxyrinchus</u> Atlantic sturgeon	-	-	-	-	1	-	-	-	-	-	1
Total											263

Table 34. Skeletal Measurements of Dog Burial at Site 1P161

Measured Element	Left (mm)	Right (mm)
Humerus length	110.0	110.0
Humerus width, distal end	24.0	24.0
Radius length	114.0	115.0
Ulna length	---	136.5
M ₁ length	---	19.0
M ₁ width	---	8.6
M ₂ length	---	8.0
M ₂ width	---	6.5
PM ₄ length	--	11.9
PM ₄ width	--	6.5

Table 35. Butchering and Skinning Marks on Deer Elements from Sites 1Gr1X1, 1Gr2, 1Pi61, and 1Pi33

Element	Number of Bones Scored
Humerus	7
Radius	1
Ulna	2
Tibia	4
Metatarsal	2
Diaphysis of Long Bone	3
Tarsals/Carpals	2
Astragalus	1
Mandible	2
Ribs	11
Scapula	4
Innominate	4
Frontal	3
Total	46

Table 36. Breakdown of Features into Primary and Secondary Groups for the Subphases

Stage or Subphase	Primary Features		Secondary Features	
	Number	Percent	Number	Percent
Mississippian	-	~	1	100.0
Late Miller III	5	41.7	7	58.3
Middle Miller III	12	38.7	19	61.3
Early Miller III	14	87.5	2	12.5
Late Miller II	22	73.3	8	26.7
Late Miller I	-	~	1	100.0
Middle Miller I	-	~	1	100.0
Early Miller I	2	50.0	2	50.0
Broken Pumpkin Creek	-	~	2	100.0
Archaic	-	~	2	100.0
Total	55		45	

Table 37. Summary and Comparisons of the Various Identified Vertebrate Categories by Cultural Phase

Cultural Affiliation	Deer		Mammal-Other		Turtle		Bird		Fish		Mussel Shell	
	Weight	Percent	Weight	Percent	Weight	Percent	Weight	Percent	Weight	Percent	Weight	Density*
Late Miller III (5 features)	2804.9 g	76.5	192.6 g	5.3	263.2 g	7.2	329.9 g	9.0	76.2 g	2.1	163006.3 g	1235.8 g
Middle Miller III (13 features)	1411.6 g	70.9	93.3 g	4.7	320.7 g	16.1	84.5 g	4.2	81.8 g	4.1	15720.9 g	58.2 g
Early Miller III (16 features)	2082.9 g	88.0	206.1 g	2.6	526.9 g	6.6	140.5 g	1.8	70.4 g	0.9	228945.0 g	1049.8 g
Late Miller II (22 features)	2075.3 g	89.0	91.1 g	1.1	496.0 g	6.2	177.3 g	2.2	11.6 g	1.4	36598.0 g	105.8 g
Early Miller I	115.3 g	95.2	1.4 g	1.2	2.1 g	1.7	1.1	0.9	1.2	1.0		

* Density measured in grams/cu ft fill

Table 38. Summary of the Identified Mammal and Bird Bone from Primary Features at Sites 1Gr1X1, 1Gr2, 1P133, and 1P161

Species	Late Miller III		Middle Miller III		Early Miller III		Late Miller II	
	Pieces	Percent	Pieces	Percent	Pieces	Percent	Pieces	Percent
<u>Didelphis marsupialis</u> opossum	15	2.5	14	4.7	37	5.1	9	0.7
<u>Scalopus aquaticus</u> common mole	-	-	-	-	1	0.1	-	-
<u>Sylvilagus</u> sp. rabbit	22	3.6	26	8.6	53	7.3	27	2.2
<u>Sciurus</u> spp. squirrel	71	11.8	35	11.6	9	1.2	21	1.7
<u>Castor canadensis</u> beaver	20	3.3	3	1.0	10	1.4	8	0.7
<u>Ondatra zibethicus</u> muskrat	-	-	1	0.3	-	-	-	-
<u>Canis</u> cf. <u>familiaris</u> domestic dog	1	0.2	1	0.3	-	-	2	0.2
<u>Urocyon cinereoargenteus</u> gray fox	4	0.7	1	0.3	13	1.8	1	0.1
<u>Ursus americanus</u> black bear	4	0.7	-	-	1	0.1	1	0.1
<u>Procyon lotor</u> raccoon	25	4.1	25	8.3	12	1.7	36	2.9
<u>Mephitis mephitis</u> striped skunk	3	0.5	2	0.7	3	0.4	6	0.5
<u>Felis concolor</u> cougar	-	-	-	-	1	0.1	1	0.1
<u>Lynx rufus</u> bobcat	-	-	1	0.3	-	-	-	-
<u>Odocoileus virginianus</u> white-tailed deer	378	62.6	174	57.8	553	76.3	1057	86.4
<u>Meleagris gallopavo</u>	61	10.1	18	6.0	30	4.1	54	4.4
Total	604	100.1	301	99.9	723	99.8	1223	100.0

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APPENDIX

A ZOOARCHAEOLOGICAL ANALYSIS OF 4,991 BONE AND SHELL
ARTIFACTS FROM THE GAINESVILLE LAKE AREA

by
Cailup B. Curren, Jr.

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INTRODUCTION

During the 1976-1977 archaeological excavations within the Gainesville Lake area in west Alabama, 4,991 bone and shell artifacts (Tables 1-2) were excavated from four prehistoric sites (1Pi61, 1Pi33, 1Gr2, and 1Gr1X1). The following zooarchaeological analysis is based upon these artifacts. These sites were occupied primarily during the Late Woodland period and Mississippian stage of that region's prehistory (A.D. 600-1500). A large number of bone and shell artifacts was recovered from these sites thus providing an excellent opportunity for an evaluation of prehistoric uses of such raw materials. Although the preservation of bone and shell remains is usually poor due to destructive elements of nature, these sites were an exception because of the presence of numerous river mussels deposited within the site limits. The calcium in mussels greatly reduces the effects of the acid soil enhancing the preservation of bone and shell.

The majority of the artifacts (4,332) were recovered from Site 1Pi61; most of the artifacts recovered were beads (4,861). Bone and shell artifacts were classified into 16 categories plus one group of problematical objects. These categories will now be defined and discussed. Detailed descriptions of the artifacts and their proveniences are given in Tables 3 through 10.

BONE AND SHELL ARTIFACTS

BEADS AND PENDANTS

A total of 4,861 bone and shell beads was recovered from Sites 1Pi61, 1Pi33, 1Gr2 and 1Gr1X1. All but two of these beads were shell (gastropods). Only two bone beads were recovered. The shell beads were placed into seven categories. Three categories were based on genera (Goniobasis, Anculosa and Marginella); four were based on shape and/or portion of the shell (cylindrical, disk, rectangular, and pearl) (Table 2). The beads appear to have been used in two ways; they were strung upon the body or sewn on clothing or objects. A more detailed discussion of the uses of these objects is presented later in this paper.

A small freshwater gastropod or aquatic snail (Goniobasis cf. pupaeformis) (Fig. 1A-C) was by far the most abundant animal used for beads on these sites. A total of 182 of the 3,405 specimens was unground. The remaining 3,223 were ground flat across their apertures. This procedure provided a channel through the longitudinal axis of the shell for the presumed purpose of sewing to clothing or stringing as necklaces. The shells ranged from 7-16 mm in length with a mean length of 13 mm. This genus of freshwater snail is found

predominantly along the bottom of small, shallow streams where water is flowing over stones. Limestone bedrock regions are excellent locations as the animal absorbs the calcium carbonate in the formation of its exoskeleton. An abundance of algae and other plants is characteristic of the snail's habitation area as they provide much of the animal's food supply (Webb 1942; Goodrich 1930). The streams that flow into the Tombigbee River in the area of these archaeological sites still support these animals; they have been observed along the main river on the numerous gravel bars of the region. It can be concluded that Goniobasis was probably easily available to the prehistoric inhabitants of these regions.

Another freshwater snail (Anculosa cf. brevispira) (Fig. 1D) was also used as raw material for beads, though in much smaller numbers (103 Anculosa as opposed to 3,405 Goniobasis). These specimens were all ground flat across their apertures as was Goniobasis. The size range of the shells was 7-11 mm in length with a mean length of 10 mm. The habitat of Anculosa is similar to that described for Goniobasis.

A total of 673 small marine gastropods (Marginella apicina) (Fig. 1E-F) was found at the four sites. All specimens exhibited a small hole in the inferior surface of the whorl near the apex. The shells ranged from 10-14 mm in length with a 1-4 mm diameter drilled or cut hole. The mean length was 12 mm. Little if any grinding or polishing was noted on the shells. Marginella apicina are small, porcelaineous, highly polished shells found on sandy bottoms and in warm seas. Their color is ivory or creamy white, sometimes with two or three pale brownish bands. The shell is solid and highly polished, with the spire rather flattened and body whorl greatly enlarged. The aperture is long and narrow, almost as long as the whole shell, and the outer lip is somewhat thickened. There are four distinct plaits on the inner lip. This is a common species in the northern Gulf of Mexico and may be found as far north as the Carolinas in the Atlantic Ocean (Morris 1951:212-213).

Both cylindrical and disk beads were found at the four sites. For the purpose of analysis a cylindrical bead is defined as having a length greater than its diameter while a disk bead has a diameter greater than its length. A total of 505 cylindrical beads was identified. The cylindrical shells ranged from 2-20 mm in length with a mean length of 5 mm. The diameter of the beads ranged from 5-20 mm. The diameter of the drilled holes ranged from 2-8 mm (Figs. 2A-C, F). A total of 204 disk beads was identified. The size range of these shells is 1-2 mm in length, exterior bead diameter from 2-25 mm, and diameter of drilled hole from 1-6 mm (Fig. 2D, G, H).

The manufacturing technique of both bead categories was similar. The raw material for bead manufacture was generally the columella of a large marine conch or welk. The columella is a length of solid shell, present in gastropods, which runs along the longitudinal axis of the shell. This central columella was ground, cut into sections, and drilled through the center to form the cylindrical or disk beads. The purpose of the two bead categories was probably collateral. A

necklace was made by stringing the beads in a sequence; they were thus worn around the neck, bicep, wrist, ankle, or calf.

A total of two rectangular beads was examined from the sites. A technique similar for that described for the cylindrical and disk beads was probably employed to manufacture the rectangular beads. Both of these beads were found in one burial and may indicate the individual's preference for that particular shape. Drilled holes in both beads indicate a likelihood that they had been strung on a necklace (Fig. 2I).

Two pearls were identified from Site lPi33. The pearls were drilled through their centers with a resultant 2 mm diameter hole in each. Both pearls were round with maximum diameters of 4 and 8 mm and both still retained a lustre.

Two objects of similar manufacture were identified from Sites lGr2 and lPi6l. These objects were made of either bone or antler and both had been cut and ground. The object from Site lGr2 was drilled with a hole diameter of 1 mm, a length of 7 mm, and a diameter or thickness of 6 mm. The object from Site lPi6l was not drilled but possesses a length of 16 mm and a thickness of 9 mm. The object from Site lPi6l differed from the Site lGr2 specimen in that one end had been ground to a smoothly blunted end. The similarity of both objects includes evidence of cutting or scoring through half the diameter of the object at one or two points. Considerable effort and workmanship had been exercised to obtain these results. Both objects were broken and probably represent only a portion of the original object. These objects have been categorized as beads based in part on the drilled hole, shape, and ethnographic references such as "necklaces of pearls, beads of copper, smooth bones, or shell worn by the coast Indians of Carolina . . . (Swanton 1946:516)." Secotan girls of good parentage wore necklaces of "rownde pearls, with little beades of copper, or polished bones between them (Hariot in Swanton 1946:516)." These bone objects found at the sites on the Tombigbee may represent portions of bone beads.

Four types of pendants were also recovered from the sites: triangular, teardrop, disk, and canine (Figs. 2E, 3A-E, 4). Of the nine canine pendants, eight were black bear (Euarctos americanus) and one was possibly dog (Canis familiaris). The five triangular-shaped pendants, three teardrop-shaped pendants, and one disk-shaped pendant were all made from shell of marine gastropods.

When archaeologists analyze bone and shell artifacts from archaeological sites, two errors are commonly made: (1) it is generally assumed that all beads were worn around the neck of their prehistoric owner, and (2) the value of these objects in prehistoric economy is underestimated.

The position of the beads about the body as ornamentation is inferred both from their placement within the burials at these Tombigbee sites and from ethnographic accounts. Table 11 includes: the human burials containing bone/shell artifacts from three of the

four Tombigbee River sites (Site 1Gr1X1 had no bone or shell artifacts with burials), age and sex of the burials, prehistoric cultural assignments of the burials, the presumed function of bone and/or shell artifacts based on the associative position with the body, and the category and number of artifacts present within each burial. Several points are thus apparent: the bone/shell artifacts are not restricted to any age or sex group, the bone/shell artifacts here considered came from a Late Woodland and Mississippian period population, and a variety of ornamental and utilitarian uses were made of the bone/shell objects in question. The shell artifacts are discussed below.

The beads and pendants found in these burials were more than trinkets. They were the mode of exchange for a prehistoric economy. When the first Europeans arrived in North America, they saw and wrote about the exchange network established with these beads. Like any other exchange system of the present or past, a person could buy almost anything with the agreed upon currency, in this case, beads. The Indians purchased skins, slaves, furs, and food with it, "... it being the mammon . . . that entices and persuades them to do anything, and part with every thing they possess . . ." (Lawson 1866 in Swanton 1946:483). Rates of exchange were established such as one gorget as the equivalent of three deerskins or the one unit measure of beads consisting of the length from a person's elbow to a tip of the little finger of the hand (Swanton 1946:482). This barter system was in fact so convenient that it was adopted as legal tender by special enactments in several of the New England colonies for use in the liquidation of debts not exceeding specified amounts. But inferior, poorly finished kinds, made not only of shell but bone, stone, and antler, were introduced by Europeans. In spite of attempts to regulate it, shell beads ceased to be an accepted currency in the colonies by 1693 (Brame 1921:27). Not only were the northeastern areas affected by this but exchange systems based on bead currency from the Atlantic to the Mississippi River were virtually ended (Swanton 1946:483). When the English first arrived in eastern North America, they noted differences in the types of beads and the names and values placed upon them by the Indians. Wampum and Roanoke were two of the more common names applied to the bead types. Wampum differed from Roanoke as "in the beads of the first type (Wampum) the length exceeded the diameter while the opposite was true of Roanoke . . . the name (Roanoke) was applied equally to the Marginella shells (Swanton 1946:484)." The beads found at the sites on the Tombigbee River may not have been called Wampum and Roanoke by the prehistoric inhabitants of the sites, but it does seem likely that there was a distinction between measurements of this size and value of the beads in question. Wampum could be equated to the cylindrical beads from the Tombigbee sites and Roanoke equated with the disk and Marginella beads.

The techniques employed in the manufacture of the shell beads and pendants were apparently difficult and time consuming. For many years the English smithies tried, with little success to reproduce the quality of the aboriginal bead or pendant. Some were shaped by

rubbing on a hard stone and pierced near the edge by means of fire. According to Lawson, the Indians drilled shell:

. . . with a nail stuck in a cane or reed. Thus they roll it continually on their thighs, with their right hand holding the bit of shell with their left, so in time they drill a hole quite through it, which is very tedious work . . . (Lawson 1860 in Swanton 1946:482).

Also used as beads by the Indians in the southeastern United States were freshwater pearls. Two such pearls were found at one of the archaeological sites on the Tombigbee River (Site 1Pi33). The pearl itself is formed by a bit of foreign matter taken into the internal parts of the filter feeding mussel. As a reaction to this foreign irritant the mussel forms a nacreous coating over the object which smoothes it over and it eventually becomes a pearl. The Indians were aware of at least the final product of this event and collected pearls from mussels.

An interesting situation exists in the southeastern United States concerning the presence of pearls on archaeological sites. After a literature search, it was found that one of the areas more prolific in archaeological pearls is along the Tennessee River in middle Tennessee. Other archaeological sites throughout the Southeast certainly have produced pearls but usually not as prolific as this Tennessee River area. References are generally made of less than a dozen pearls and frequently only one or two as in the case of the Tombigbee River Site 1Pi33. But in the Tennessee area, hundreds of pearls are occasionally reported from archaeological sites:

Fresh water pearls, skillfully perforated with very small drills, were another source of beads. One necklace contained a thousand pearls, and individual examples of half inch in diameter have been found in Dallas sites in eastern Tennessee (Lewis and Kneberg 1958:112).

These types of reference are rare and most of the pearls which have been found on archaeological sites are fewer in number even in this Tennessee region. The vast quantities indicated by early travelers such as DeSoto in the northern Georgia-southern Tennessee region, LaSalle in the lower Mississippi, and among the Natchez and Taensa have not been found archaeologically. A few authors have suggested that the reason for this discrepancy may be that many of the shell beads made by the Indians had a lustre equal to that of the pearls and were mistaken for them by the early explorers (Lewis and Kneberg 1946:130). Many early writers mentioned the high lustre of the shell beads:

All the early narratives described the [shell beads] as being polished until they were like ivory . . . (Brame 1921:28).

They [the shell beads] are wrought as smooth as glass . . . (Beverley 1705 in Swanton 1946:481).

This [shell beads] is what many writers call porcelain . . . Four or five of these make an inch, and every one is to be drilled through, and made as smooth as glass . . . (Lawson 1860 in Swanton 1946:482).

It may be both unfair and incorrect to assume that the early explorers were misidentifying the pearls for in at least one reference in the DeSoto chronicles a distinction is made between small ocean snails and pearls. If it is true that what the early explorers were seeing were actually pearls in the tremendous quantities they noted, where are they in archaeological context? Whether pearls or shell beads, the DeSoto accounts of the use of pearls in the province of Cofatachiqui in northwestern Georgia or southern Tennessee is impressive and worthy of noting here.

When the Spaniards entered the province of Cofatachiqui they were received by the queen, a very regal individual as described by the conquistadores. All of the chroniclers made note of the event and the presence of pearls:

She was a young girl of fine bearing; and she took off a string of pearls which she wore on her neck, and put it on the Governor as a necklace to show her favour and to gain his good will (Ranjel from Bourne 1904:99).

The Cacica presented much clothing of the country, . . . drawing from over her head a large string of pearls, she threw them about his neck, exchanging with him many gracious words of friendship and courtesy (Elvas from Bourne 1904:65).

While the mistress of Cofatachiqui was speaking with the Governor . . . she was disengaging little by little a large strand of pearls as thick as hazelnuts which encircled her neck three times and fell to her thighs . . . Then the lady . . . arose to deliver the pearls to the Governor (de la Vega from Varner 1951:302).

As the young female cacique saw that the Europeans were interested in the pearls (I imagine she judged this by the wide eyes and dropped jaws of the treasure hunting adventurers standing before her), she volunteered that the pearls were abundant in her country and even mentioned a nearby area where they were gathered. She directed them to the charnel house in her village and another in the principal village of her province. Within these burial places DeSoto could find as many pearls as he so desired. It is anybody's guess as to why she would helpfully invite him to pillage her ancestral burial area but one possibility is her attempt to turn over the pearls and get the Spanish out of the country as quickly as possible. DeSoto returned her generosity by kidnapping her to assure his safe passage. She took with her on the journey a cane box full of undrilled pearls with which she later escaped. The description of the interior of the charnel house seen by the Spanish is not only very impressive but

informative to the use of shell and pearl beads as decoration of the body, interior structures, tools, weapons, and clothing:

Now this temple was large, being more than a hundred feet in length and forty in width The roof of the temple revealed that it was constructed of reeds and very thin canes split in half Over the roof of the temple many large and small shells of different marine animals had been arranged. The Spaniards did not learn how they had been brought inland, but it may be that they too are produced in the rivers of that land which are so numerous and so full of water. These shells had been placed with the inside out so as to show their greatest luster, and they included many conch shells of strange magnificence. Between them, spaces had been left, for each had been placed in its particular order and in these spaces there were large strands, some of pearls and some of seed pearls, half a fathom in length (approx. 3 ft.) which hung from the roof and descended in a graduated manner so that where some left off others began. The temple was covered on the outside with all these things, and made a splending sight in the brilliance of the sun.

The ceiling of the temple, from the inside was adorned like the roof outside with designs of shells interspersed with strands of pearls and seed pearls which were stretched so as to adhere to and follow the contour of the roof. Among these decorations were great headdresses of different colors of feathers such as those made for wear, and in addition to the pearls stretched along the ceiling and the feathers nailed to it, there were many others which had been suspended by some thin, soft-colored strings that could not be seen distinctly. Thus both pearls and feathers seemed to have been placed in the air at different levels so that they would appear to be falling from the roof. In this manner the ceiling of the temple was adorned from the walls upward, and it was an agreeable sight to behold (de la Vega in Varner 1951:315-316, 318).

Remains of shell artifacts in archaeological sites are white, chalky and flaking. It is easy to consider these remains as actual examples of the finished product of aboriginal shell work. This is not the case. "The . . . beads, when recovered after ages of inhumation in the soil, are but crumbling, chalky masses, a pitiful mockery of their former beauty described in the early narratives (Brame 1921:29)." So it is with the shell artifacts from the four sites on the Tombigbee River. The two pearls, some of the mussel shell hoes, and less than a dozen of the thousands of shell objects retained any of their original lustre. Recent specimens of Anculosa, Marginella, and Goniobasis are glossy and sometimes banded with color, much different than the specimens recovered from the Tombigbee sites. Many of the cylindrical and disk beads were probably highly polished by the inhabitants of the sites and the natural nacre of the

shells exhibited a mother-of-pearl effect in contemporary jewelry. Some of the cut shell by-products of this effect were found on these sites (Fig. 3G-H).

There must have been a considerable trade network established along the Tombigbee in the Late Woodland and Mississippian periods. Much of the shell used for artifacts at these sites was marine in origin, primarily gastropods such as the scotch bonnet (Phalium grandulatum), the welk (Busycon sp.), and the marginellas (Marginella apicina) (Tables 3-6). In Formative Mesoamerica can be found excellent examples of this marine and inland trade.

In the case of Formative Mesoamerica, it is interesting that the final conversion of this shell into ornaments (presumably further increasing their value) was not always done by the coastal villagers who had the easiest access to the shell; for example, unmodified Spondylus shells were traded intact to the Valley of Oaxaca where local part-time craftsmen cut, ground, and drilled them into pendants (Flannery 1976:312).

The methods of procuring these raw materials from the sea must have been numerous. Perhaps the gastropods were found along the beach, sought by diving, or netted. One rather ingenious technique for obtaining Marginella was recorded by Lawson:

At the time when they are on the salts, and sea coasts, they have another fishery, that is for a little shell fish, which those in England call Blackmoors teeth. These they catch by tying bits of oysters to a long string, which they lay in such places, as they know, those shell fish haunt. These fish get hold of the oysters, and suck them in, so that they pull up those long strings, and take great quantities of them, which they carry a great way into the main land, to trade with the Indians, where they are of great value; but never near the sea, by reason they are common, therefore not esteemed (Lawson in Swanton 1946: 485).

In an attempt to demonstrate the extent that the Indians, including those at the villages along the Tombigbee River, used shell ornaments a table has been devised (Table 12). Included in this table are shell artifact positions in burials (Sites 1P161, 1P133, 1Gr2) and literature references demonstrating observed use of shell objects.

The use of shell to ornament objects and people was apparently multiplistic in meaning--personal adornment, superstition, economic, and a reflection of belief systems. Unfortunately, we can only guess at the specifics of these meanings. Often, ethnographic accounts are

somewhat vague as to meaning: "Yuchi women were found with strings of large round blue beads about their necks which were said to have something to do with their fertility (Speck from Swanton 1946:517)." Natchez children of nobles wore several pearls taken from the temple until they were around ten years old at which time the pearls were returned to the temple indicating some mystique attached to the pearls. Not only did the DeSoto narratives give the impression that shell beads were considered sacred to the Indians, but specifics such as the observation of designs of babies and birds made from them is fascinating as probably icons from myth and legend.

SHELL HOES

The so-called shell hoes known from other archaeological sites were not abundant at the four Tombigbee River sites (Fig. 5). A total of 16 was identified from two sites (1Pi61, 1Pi33). The majority of the shell hoes (13) were found in one pit (Feature 51, Site 1Pi33) (Table 4). Eight species of river mussels were identified from the sample. All of these can still be found in the unimpounded Tombigbee River today. The size of the mussel valves ranged from 60-90 mm in length and the size of the man-made holes in the center from 9-23 mm in diameter. The drilled, cut, and punched holes in the valves were located between the lateral and pseudocardinal teeth, just posterior to the beak cavity. On most of the valves definite wear patterns are observable but on at least two no wear patterns were apparent. The assumption that all these objects were used as hoes is incorrect. It is possible that the hoes found at the Tombigbee sites were used for not only cultivation but also for shaving or grating, scraping sinew from the interior of hides, or wood carving. Other authors have also suggested alternative uses for these shell hoes.

The pointed ends of these shells show no evidence of use, but the perforations are worn slightly elliptical as though something was rubbed back and forth through them. This raises the question as to whether all of these artifacts were used for cultivation (Faulkner and Graham 1965: 75-76).

Ethnographic accounts also indicate a more varied use of bivalves than merely shell hoes:

The shells of bivalves were employed as knives, in such occupations as the hollowing out of a canoe or scraping a bow into shape. With two such shells, the Virginians shaved off, or rather grated off, the hair of one side of the head (Swanton 1946:253).

DIPPER

One well shell dipper was found with Burial 31 at Site 1Pi33 (Fig. 6C). The specimen is a marine gastropod (Busycon sp.) 99 mm in

length which had been ground about the whorl and apex. The columella and a portion of the whorl had been cut and removed as is typical for dippers (Gilliland 1975:169-73). The shell cup was found at the cranium of the child burial in one lobe of a twin globular jar of a Mississippian manufacture. Why the cup was placed with a child burial is unknown. Usually the welk shell dippers were used by only the adult males in the black drink ceremony. It is entirely possible that the child never used it and it was placed with the burial as a cherished object of the family. Although it is unknown if the shell dippers were used solely in the black drink ceremony, it is noteworthy to excerpt a portion of the description of this ceremony:

The ceremony of drinking took place in the town square where all men, according to their rank, had special seats around the edge. There was always a special black drink cook, and two or three young warriors were on hand to serve it. Many gallons had to be brewed because each man was expected to drink four or five quarts.

In ancient times it was served in large conch shells. A young man would present one to a prominent warrior, thereafter backing up for a short distance and giving the black drink cry. As he began to sound the cry, the warrior would begin drinking and continue to do so as long as the cry lasted. A man's merits at this ceremony were judged by his capacity for imbibing the drink (Lewis and Kneberg 1954: 68).

AMULETS

A total of 4 shell and bone objects was found at the Tombigbee River sites (all from Site 1Pi33, from 3 burials, Tables 4, 8) which are designated amulets. An amulet is an object kept as a protection against misfortune or more simply--a power object.

Three of the amulets were marine gastropods (Figs. 3F, 6A-B) and one was a left humerus from a cougar (Felis concolor) (Fig. 7). The humerus (19.5 cm length) was unaltered except that the extreme proximal portion was not present. One of the marine gastropods, a welk (Busycon sp., 66 mm in length), was drilled at the base of its aperture. The other two marine gastropods, scotch bonnets (Phalium granulatum, 52 mm and 55 mm in length), were unaltered.

One of the scotch bonnets and the welk were found at the left of the pelvis of Burial 26. Both could have been in a pouch or purse that hung from the waist or shoulder. The other scotch bonnet was found at the left hand of Burial 11 and could have actually been placed in the hand. The cougar legbone was found at the left of the pelvis of Burial 19 and may also have been within a pouch or purse.

FISH HOOKS

A total of six fish hooks was identified from the sites (Tables 1, 2). All but one were made from bone, probably mammal. The remaining fish hook was made from shell. All were single pronged except for one rather unusual specimen that was double pronged (Fig. 8A-B).

CHISELS

A total of three beaver (Castor canadensis) incisor chisels was identified from these sites. Other beaver incisors were found at the sites but none were artificially ground along the cutting edges as were the three in question. The chisels were probably used primarily as wood carving tools.

AWLS AND NEEDLES

A total of 32 awls and 4 needles was found on these sites (Tables 1, 2, Fig. 9). The basic difference here between awls and needles is size and refinement of workmanship. The needles are generally smaller and more finely worked. The awls are made from both mammal and bird (Meleagris gallopavo) bone. All of the needles and awls were sharpened to a point on at least one end. Functions of these objects were probably varied and included: putting holes in garments to lace with cordage or leather strips, sewing, pressure flaking stone tools (3 awls and 3 triangular projectile points were found at the right shoulder of Burial 18, Site 1Pi33), and weaving netting (C.E. Smith Jr., personal communication).

PUNCHES/FLAKERS

The three punches and flakers and the antler hammer found on these sites were probably used in the preparation of stone tools (Tables 1, 2).

RATTLES/CUPS

Two turtle shells (carapaces; "cooter"; Pseudemys sp.) were found with Burial 48 at Site 1Pi61. The turtle shells were found to the left of the pelvis and were upside down and overlapping each other. They may have been rattles but no objects such as small stones or ceramic marbles or other noise producing percussion objects were found within the shell. The size of the shells (23 cm by 18 cm; 19 cm by 17.5 cm) is somewhat large for tying to the body as rattles but could have been hafted on handles with skins stretched over the open ends for handle held rattles. The lack of interior noise makers makes this unlikely, however. A more likely function of the shells was as containers for perishable burial offerings such as food for the journey to the land of the dead.

BEAMER

One fragment of a possible bone beamer was found at the sites (Tables 1, 2). The bone was a midsection of a deer metatarsal which was ground and polished on one edge after having been cut in half along the longitudinal axis. The beamer was used to scrape sinew from the inside surface of animal skins.

PROJECTILE POINTS

One antler projectile point was found with Burial 27 at Site 1Pi33. The antler was cored through the centrum and may have been hafted as a tool.

PROBLEMATICAL OBJECTS

One group of objects listed as problematical objects may be portions of blanks of finished products such as awls. The shafts of the metatarsals were cut longitudinally and ground flat in possible preparation of the finished tool. A number of these objects were found at the Key Marco site in Florida (Gilliland 1975: 219, Plate 131).

SUMMARY

An attempt has been made to call attention to a much neglected aspect of archaeological analysis, that of bone and shell artifacts. The interpretation of these categories of artifacts involved both morphological and functional identifications. Not only was it necessary to delineate utilitarian and ornamental groups but also to scientifically identify the animals which were used as raw materials. Of the 4,990 bone and shell artifacts examined, 17 categories were established including one known as problematical objects. Of the 18 species identified from these categories, 12 were invertebrate species and 6 were vertebrate species. Of the species identified, 3 were marine and were probably taken from the Gulf of Mexico some 175 miles to the south. All of the bone and shell from this sample represents animals still found in the region today. Although it was not possible to denote specific changes through time in this sample, it was an excellent opportunity to delve into bone and shell technologies of Late Woodland and Mississippian groups. Efforts were made to personalize these technologies by incorporating ethnographies of Southeastern United States Indians. Our concepts of bone and shell artifacts should be modified to include more sophisticated analyses; something more than simply beads or shell hoes.

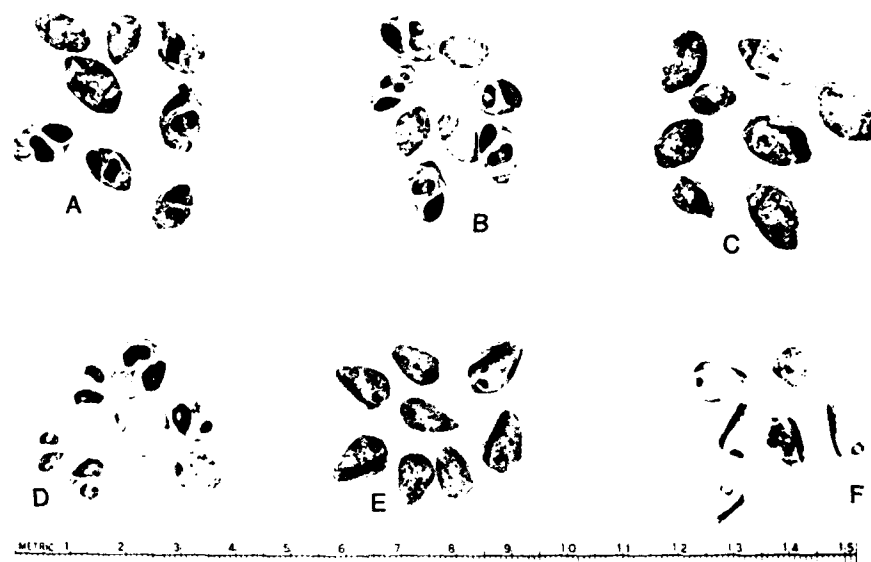


Figure 1. Shell beads. Freshwater snail (*Goniobasis* cf. *pupaeformis*), A-C; freshwater snail (*Anculosa* cf. *brevispira*), D; marine gastropod (*Marginella apicina*), E-F.

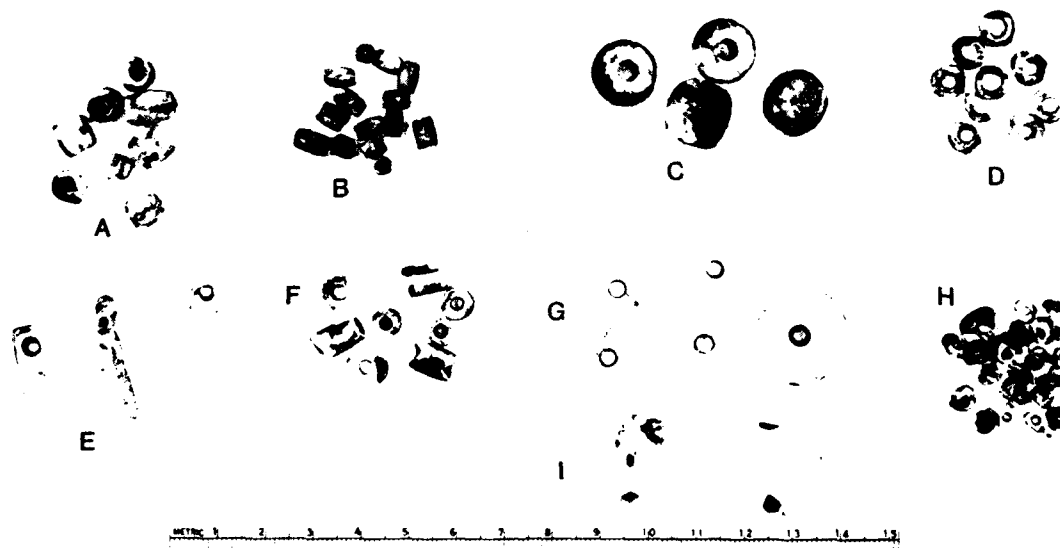


Figure 2. Shell beads and pendants. Cylindrical beads, A-C, F; disk beads, D, G, H; rectangular beads, I; pendants, E.



Figure 3. Shell pendants, amulet, and cut shell by-products. Pendants, A-E; marine whelk (*Busycon* sp.) amulet, F; cut shell by-products, G-H.



Figure 4. Canine pendants.



Figure 5. Shell hoes.

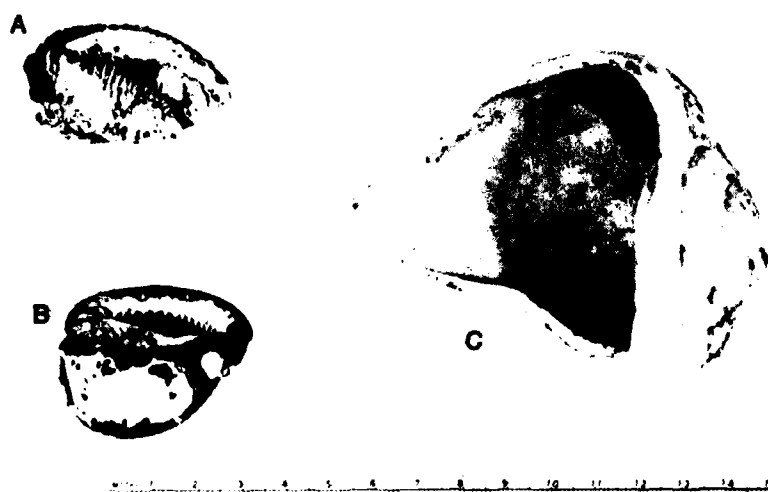


Figure 6. Shell dipper and amulets. Marine gastropod (*Phalium granulatum*) amulets, A-B; whelk (*Busycon* sp.) shell dipper, C.



Figure 7. Bone amulet. Left humerus from a cougar (Felis con-
color).

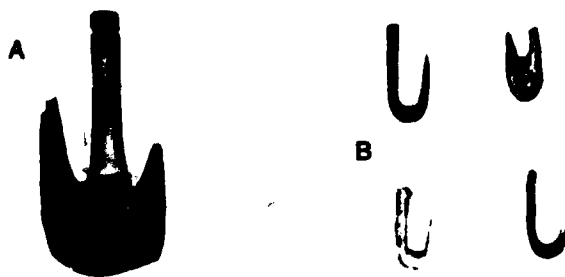


Figure 8. Fish hooks. Double pronged fish hook, A; single
pronged fish hooks, B.

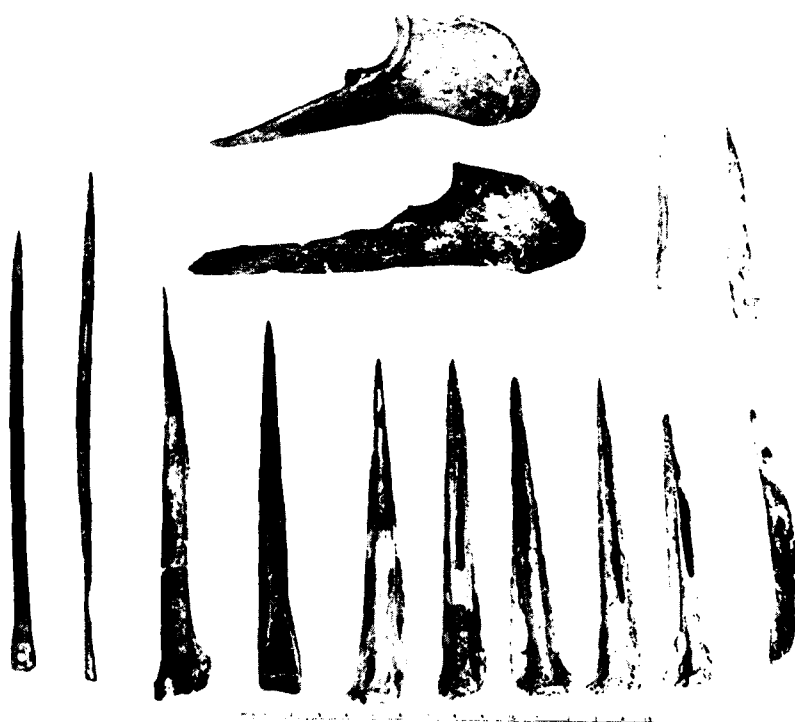


Figure 9. Bone awls and needles.

Table 1. Bone and Shell Artifact Totals: Gainesville
Lake Area

Artifact	Total
Beads	4,861
Cut Shell By-products	16
Shell Hoes	16
Dipper	2
Pendants	18
Amulets	4
Awls	32
Fishhooks	6
Chisels	3
Game Objects	2
Punches or Flakes	3
Needles	4
Antler Hammer	1
Rattles or Cups	2
Beamer	1
Antler Projectile Point	1
Problematical Objects	19
Total	4,991

Table 2. Bone and Shell Artifact Categories by Site:
Gainesville Lake Area

Artifact	1Pi61	1Pi33	1Gr2	1Gr1x1	Total
Beads					
Goniobasis	3,347	57	1	-	3,405
Anculosa	103	-	-	-	103
Marginella	618	19	-	-	637
cylindrical	19	473	12	1	505
disk	204	-	-	-	204
rectangular	2	-	-	-	2
pearl	-	2	-	-	2
bone	-	-	1	-	1
blank	1	-	1	-	2
Cut Shell By-products	-	16	-	-	16
Shell Hoes	3	13	-	-	16
Dipper	-	1	-	-	1
Pendants					
triangular	5	-	-	-	5
teardrop	3	-	-	-	3
disk	-	1	-	-	1
canines	3	2	3	1	9
Amulets					
marine gastropod	-	3	-	1	4
cougar legbone (humerus)	-	1	-	-	1
Awls	7	15	6	4	32
Fishhooks					
bone	4	1	-	-	5
shell	-	-	1	-	1
Chisels	1	2	-	-	3
Game Objects	1	-	-	1	2
Punches or Flakers	1	-	1	1	3
Needles	-	1	3	-	4
Hammer	1	-	-	-	1
Cups or Rattles	2	-	-	-	2
Beamer	-	-	-	1	1
Projectile Point	-	1	-	-	1
Problematical Objects					
bone	7	-	-	1	18
shell	-	-	1	-	1
Total	4,332	616	39	13	4,991

Table 3. Shell Artifacts from Site 1Pi61

Artifact	Species	Number	Provenience
Beads	small freshwater gastropod, aquatic snail (<i>Contobasis</i> cf. <i>pupaeformis</i>)	2 ground	Burial 66-A Late Miller III
"	"	47 ground	Burial 1 Late Miller III
"	"	76 ground	Burial 69 Early Miller III
"	"	52 ground	Burial 8 Late Miller III
"	"	9 ground	Burial 4 Late Miller III
"	"	17 ground	Burial 66-B Late Miller III
"	"	7 ground	Burial 58 Late Miller III
"	"	1 ground	Burial 78-B Late Miller III
"	"	2 ground	Burial 23 Late Miller III
"	"	226 ground	Burial 54 Late Miller III
"	"	3 ground	Burial 66-A Late Miller III
"	"	2 ground	Burial 73 Late Miller III
"	"	1 ground	Feature 93 Middle to Late Miller III
"	"	1,117 ground	Burial 28 Late Miller III
"	"	178 ground	Burial 28 Late Miller III
"	"	425 ground	Burial 27 Late Miller III
"	"	1,142 ground	Burial 59 Late Miller III
		Subtotal 3,307 ground	
Beads	small marine gastropod, aquatic snail (<i>Marginella apicina</i>)	26 ground	Burial 80 Late Miller III
"	"	67 ground	Burial 27 Late Miller III
"	"	11 ground	Burial 56 Late Miller III

Table 3. (Continued)

Artifact	Species	Number	Provenience
Beads	small marine gastropod, aquatic snail (<i>Marginella apicina</i>) (continued)	45 drilled	Burial 66 Late Miller III
"	"	395 drilled	Burial 19 Late Miller III
"	"	2 drilled	Burial 16 Late Miller III
"	"	38 drilled	Burial 4 Late Miller III
"	"	34 drilled	Burial 23 Late Miller III
Subtotal		618	
Beads	disk-shaped, probably from columella of marine gastropod	6 drilled	Burial 55 Late Miller III
"	"	8 drilled	Burial 60 Late Miller III
"	"	1 drilled	Burial 27 Late Miller III
"	"	47 drilled	Burial 49 Late Miller III
"	"	17 drilled	Burial 56 Late Miller III
"	"	62 drilled	Burial 1 Late Miller III
"	"	19 drilled	Burial 4 Late Miller III
"	"	26 drilled	Burial 58 Late Miller III
"	"	1 drilled	Feature 93 Mid-Late Miller III
"	"	1 drilled	Burial 28 Late Miller III
"	"	16 drilled	Burial 23 Late Miller III
Subtotal		204	
Beads	small freshwater gastropod, aquatic snail (<i>Anculosa</i> cf. <i>brevispira</i>)	103 drilled	Burial 28 Late Miller III
Subtotal		103	
Beads	cylindrical-shaped, probably from columella of marine gastropod	5 drilled	Burial 49 Late Miller III
"	"	4 drilled	Burial 56 Late Miller III
"	"	3 drilled	Burial 1

Table 3. (Continued)

Artifacts	Species	Number	Provenience
Beads	cylindrical-shaped, probably from columella of marine gastropod (continued)	1 drilled	Burial 4 Late Miller III
"	"	2 drilled	Burial 23 Late Miller III
"	"	2 drilled	Burial 28 Late Miller III
"	"	2 drilled	Burial 4 Late Miller III
	Subtotal	14	
Beads	rectangular-shaped	2 drilled	Burial 1 Late Miller III
	Subtotal	2	
Pendant	triangular-shaped	1 drilled	Burial 60-A Late Miller III
"	"	1 drilled	Burial 4 Late Miller III
"	"	1 drilled	Burial 69 Early Miller III
"	"	1 drilled	Burial 28 Late Miller III
"	"	1 drilled	Burial 27 Late Miller III
	Subtotal	5	
Pendant	teardrop-shaped	1 drilled	Burial 85 Late Miller III
"	"	2 drilled	Burial 23 Late Miller III
	Subtotal	3	
Shell Hoe	freshwater mussel (species indeterminant)	1	Feature 26 Late Miller III
"	"	1 drilled	Feature 266 Late Miller III
	Subtotal	2	
	Total	4,263	

Table 4. Shell Artifacts from Site 1P133

Artifact	Species	Number	Provenience
Beads	small freshwater gastropod, aquatic snail (<i>Goniobasis</i> cf. <i>pupaeformis</i>)	37 ground	Burial 2 Mississippian
"	"	2 unground	Burial 2 Mississippian
"	"	1 unground	Burial 24 Mississippian
"	"	8 ground	Burial 21 Late Miller III or Early Mississippian
"	"	6 ground	Feature 11, Zone B Late Miller III
"	"	1 ground	Feature 11 Late Miller III
"	"	1 ground	Stratigraphic Zone Late Mississippian
Subtotal		56	
Beads	small marine gastropod, aquatic snail (<i>Marginella apicina</i>)	19 drilled	Burial 2 Mississippian
Subtotal		19	
Beads	cylindrical shaped, probable marine gastropod columella, whelk or conch	67 cut, drilled, ground	Burial 2 Mississippian
"	"	207 cut, drilled, ground	Burial 2 Mississippian
"	"	24 cut, drilled, ground	Burial 2 Mississippian
"	"	128 cut, drilled, ground	Burial 2 Mississippian
"	"	2 cut, drilled, ground	Burial 20-A Mississippian
"	"	1 cut, drilled, ground	Unit 55S 11-0 Level 3
"	"	35 cut, drilled, ground	Burial 20-B Mississippian
"	"	14 cut, drilled, ground	Burial 20 Mississippian
Subtotal		473	
Pearl	probable freshwater mussel source	1 drilled	Burial 2 Mississippian
"	"	1 drilled	Burial 20-A Mississippian
Subtotal		2	

Table 4. (Continued)

Artifact	Species	Number	Provenience
Pendant	Disk-shaped, probable small marine gastropod	1 drilled, ground	Feature 25-B Mississippian
	Subtotal	1	
Dipper	marine gastropod (weik) (<i>Busycon</i> sp.)	1 ground	Feature 31 Mississippian
	Subtotal	1	
Shell Hoes	freshwater mussels (<i>Elliptio crassidens</i>)	2	Feature 31, Zone A Late Miller III
"	freshwater mussel (<i>Pleurobema</i> sp.)	1	"
"	freshwater mussel, species indeterminate	1	"
"	freshwater mussel (<i>Ambelga plicata</i>)	1	Feature 31, Zone B Late Miller III
"	freshwater mussel (<i>Largillia excavata</i>)	1	"
"	freshwater mussel (<i>Pleurobema</i> sp.)	1	"
"	freshwater mussel (<i>Plectonerus dombeiana</i>)	1	"
"	freshwater mussel (<i>Petamillus purpuratus</i>)	1	"
"	freshwater mussel (<i>Plagiola lineolata</i>)	1	"
"	freshwater mussel, species indeterminate	1	"
	Subtotal	10	
Cut Shell by-Product	freshwater mussel, species indeterminate	1	Feature 31, Zone A Late Miller III
"	"	15	Feature 31, Zone B Late Miller III
	Subtotal	16	
Amulet	marine gastropod (weik) (<i>Busycon</i> sp.)	1 drilled, ground	Feature 26 Mississippian
"	marine gastropod (scotch bonnet) (<i>Phalium granulosum</i>)	1 unground	Feature 31 Mississippian
"	"	1 unground	Feature 26 Mississippian
	Subtotal	3	
	Total	584	

Table 5. Shell Artifacts from Site 1Gr2

Artifact	Species	Number	Provenience
Bead	small freshwater gastropod, aquatic snail (<i>Goniobasis</i> cf. <i>pupaeformis</i>)	1 unground	Surface
		Subtotal	1
Beads	cylindrical shaped, probable marine gastropod columella, whelk or conch	5 cut, drilled, ground	Surface
"	"	1 cut, drilled, ground	5508/460F, Zone C ₃ Late Miller I
"	"	1 cut, drilled, ground	Feature 112 Mississippian or Historic
"	"	2 cut, drilled, ground	5508/460H, Level 2 Late Mississippian
"	"	3 cut, drilled, ground	5508/460I, Level 3 Middle Miller III
		Subtotal	12
Bead	cylindrical shaped, probable marine gastropod columella, whelk or conch	1 cut, ground	5508/460H, Level 2 Middle Miller III
Blank?		Subtotal	1
Fish hook	Indeterminant	1 cut, ground	5508/460I, Zone A Historic or Mississippian
		Subtotal	1
Problematic Object	Indeterminant	1 cut, ground	5508/460I, Level 3 Middle Miller III
		Subtotal	1
		Total	16

Table 6. Shell Artifacts from Site 1Gr1X1

Artifact	Species	Number	Provenience
Bead	cylindrical shaped, probable marine gastropod columella, conch or whelk	1 cut, drilled, ground	Feature 10 Middle Miller III
		Subtotal	1
Dipper	whelk?	1 ?	2
		Subtotal	1
		Total	2

Table 7. Bone Artifacts from Site 1Pi61

Artifact	Species / Element	Number	Provenance
Awl	mammalian bone	1	Feature 10 Early Miller III
"	"	1	Feature 10 Late Miller III
"	"	1	Feature 10 Early Miller III
"	"	1	Feature 10 Early Miller III
"	mammalian longbone	1	Feature 10 Early Miller III
"	probable white-tailed deer, antler (<i>Odocoileus virginianus</i>)	1	Feature 10 Early Miller III
Fish hook	bone	1	Surface
"	"	1	Feature 10 Early Miller III
"	"	1	Feature 10 Early Miller III
"	"	1	Feature 10 Early Miller III
		Subtotal	5
Chisel	beaver incisor (<i>Caster canadensis</i>)	1	Feature 10 Early Miller III
Pendant	black bear canines (drilled) (<i>Euarctos americanus</i>)	1	Feature 10 Early Miller III
"	" (scored)	1	Feature 10 Early Miller III
Star	white-tailed deer footbone (pedal), (drilled) (<i>Odocoileus virginianus</i>)	1	Feature 10 Early Miller III
Flaker	mammalian bone	1	Feature 10 Early Miller III
"	mammalian bone (scored, cut, ground)	1	Feature 10 Early Miller III
Hammer	probable white-tailed deer, antler (<i>Odocoileus virginianus</i>)	1	Feature 10 Early Miller III
Rattle?	cooter turtle shell (carapace) (<i>Pseudemys</i> sp.)	1	Feature 10 Early Miller III
Cup	"	1	Feature 10 Early Miller III
Problematical object	mammalian bone	1	Feature 10 Early Miller III
"	" (burned)	1	Feature 10 Early Miller III
"	"	1	Feature 10 Early Miller III
"	"	1	Feature 10 Early Miller III
"	white-tailed deer footbone (metatarsal) (<i>Odocoileus virginianus</i>)	1	Feature 10 Early Miller III
		Subtotal	7
		Total	28

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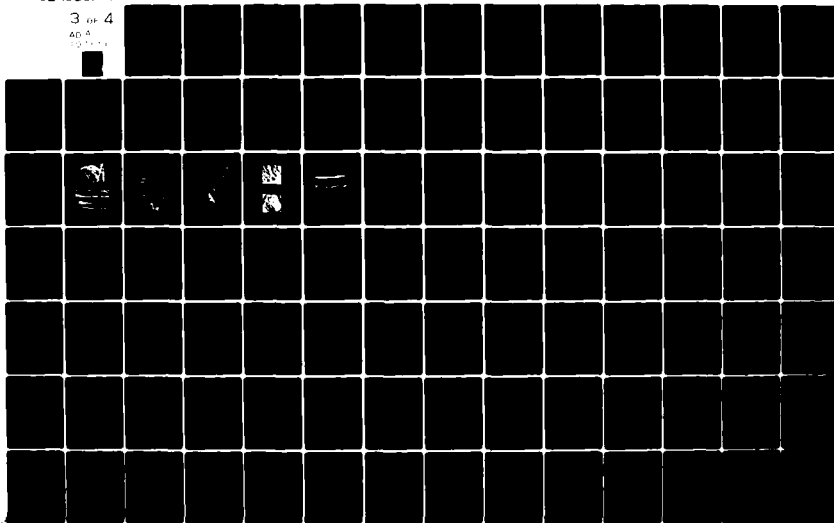
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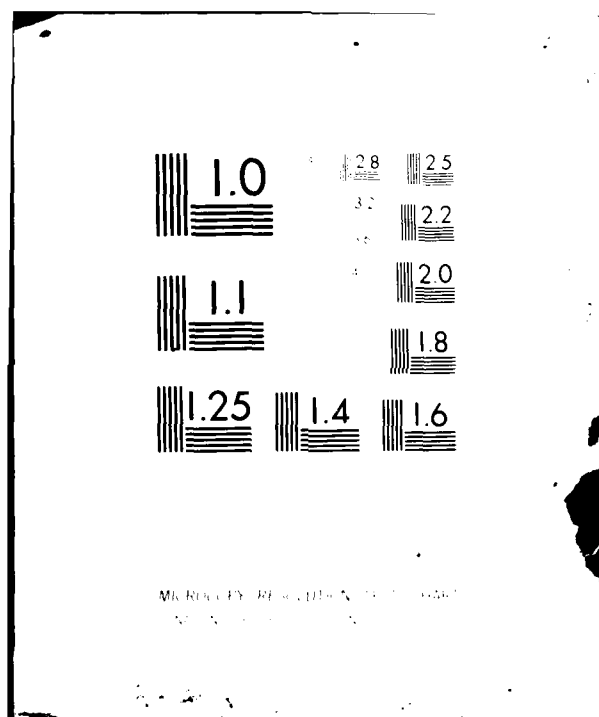


Table 8. Bone Artifacts from Site 1P133

Artifact	Species/Element	Number	Provenience
Needle	mammalian longbone	1	Burial 21 Late Miller III or Early Mississippian
	Subtotal	1	
Awl	wild turkey footbone (tarsometatarsus) (<u>Meleagris gallopavo</u>)	3	Burial 18 Mississippian
"	"	1	Burial 27 Mississippian
"	"	2	Burial 29 Mississippian
"	mammalian longbone	1	Burial 2 Mississippian
"	white-tailed deer, legbone (rt. ulna) (<u>Odocoileus virginianus</u>)	1	Feature 32 Mature Mississippian
"	white-tailed deer, legbone (lf. ulna) (<u>Odocoileus virginianus</u>)	1	Burial 27 Mississippian
"	wild turkey footbone (tarsometatarsus) (<u>Meleagris gallopavo</u>)	1	Feature 51, Zone A Late Miller III
"	mammalian bone	2	Feature 51, Zone B Late Miller III
"	"	2	Feature 51, Zone A Late Miller III
	Subtotal	15	
Amulet	cougar legbone (lf. humerus) (<u>Felis concolor</u>)	1	Burial 19 Mississippian
	Subtotal	1	
Fish hook	mammalian bone	1	Burial 19 Mississippian
	Subtotal	1	
Projectile Point	antler	1	Burial 27 Mississippian
	Subtotal	1	
Chisel	beaver incisor (<u>Castor canadensis</u>)	2	Burial 27 Mississippian
	Subtotal	2	
Pendant	blac. bear canines (drilled) (<u>Euarctos americanus</u>)	2	Burial 21 Late Miller or Early Mississippian
	Subtotal	2	
Problematical Object	mammalian longbone	1	Burial 27 Mississippian
"	white-tailed deer legbone (left tibia), (cut, ground) (<u>Odocoileus virginianus</u>)	1	Burial 27 Mississippian
"	mammalian longbone (cut)	1	Burial 31 Mississippian
"	polished bone	1	Burial 25 Mississippian
"	"	1	Feature 51, Zone C Late Miller III
"	"	1	Structure 2, Zone A Late Mississippian
"	"	2	Feature 51, Zone B Late Miller III
	Subtotal	8	
	Total	31	

Table 9. Bone Artifacts from Site 1Gr2

Artifact	Species/Element	Number	Provenience
Needles	mammalian bone	3	550N/460E Level 2 Late Mississippian
	Subtotal	3	
Awls	wild turkey footbone (tarsometatarsus) (<i>Meleagris gallopavo</i>)	2	Burial 20 Late Mississippian
"	white-tailed deer legbone (left femur) (<i>Odocoileus virginianus</i>)	1	Burial 20 Late Mississippian
"	mammalian bone	1	Feature 98 (Middle Miller III)
"	burned antler, probable white-tail deer	1	Surface
"	mammalian bone	1	Feature 54 Late Miller II
	Subtotal	6	
Punch/ Flaker	white-tailed deer legbone (left ulna) (<i>Odocoileus virginianus</i>)	1	Feature 115 Early Miller III
	Subtotal	1	
Pendants	black bear canines (drilled) (<i>Euarctos americanus</i>)	3	Burial 10 Late Mississippian
	Subtotal	3	
Bead	mammalian bone	1	Surface
	Subtotal	1	
	Total	14	

Table 10. Bone Artifacts from Site 1Gr1X1

Artifact	Site/Element	Number	Provenience
Awl	probable dog legbone (lf. ulna) (<i>Canis</i> cf. <i>familiaris</i>)	1	Feature 10 Middle Miller III
"	mammalian longbone	1	Feature 48 Late Miller II
"	"	1	Feature 10 Middle Miller III
"	" (burned)	1	Feature 13 Late Miller II
	Subtotal	4	
Punch/ Flaker	antler, probable white-tailed deer (<i>Odocoileus virginianus</i>)	1	Feature 10 Middle Miller III
	Subtotal	1	
Pendant	canine (drilled), probable dog (cf. <i>Canis familiaris</i>)	1	Feature 10 Middle Miller III
	Subtotal	1	
Game Object	white-tailed deer footbone (podial), (drilled) (<i>Odocoileus virginianus</i>)	1	Feature 42 Late Miller II
	Subtotal	1	
Beamer ?	white-tailed deer footbone (metatarsal) (<i>Odocoileus virginianus</i>)	1	Feature 10 Middle Miller III
	Subtotal	1	
Problematic Objects	mammalian bone	3	Feature 10 Middle Miller III
	Subtotal	3	
	Total	11	

Table 11. Burials with Bone and/or Shell Artifacts

Site	Burial No., Age and Sex	Cultural Affiliation	Probable Artifact Use	Category and No. Artifacts	Field Notes
1Pi61	Burial 1 (child) (1.5-2.0 yrs.) (Sex indeter- minable)	Late Miller III (Late Woodland)	Necklace or Headband or Hair Ornament	<u>Goniobasis</u> shell beads (47) Disk shell beads (62) Cylindrical Shell beads (3) Rectangular shell beads (2)	Bead necklace placed around neck of individual, larger beads below mandible, smaller ones around sides of neck . . . cut gastropods generally encompassed the cranium in a circle. Approximately 8 were found in a circular arrangement, many more around skull area.
1Pi61	Burial 4 (child) (approx. 6-10 yrs.) (sex indeter- minable)	Late Miller III (Late Woodland)	Beads Pendant	<u>Goniobasis</u> shell beads (9) disk shell beads (19) <u>Marginella</u> shell beads (38) cylindrical shell beads (1) triangular shell (1)	One drilled shell gorget, triangular in shape. Cut shell beads. Burial badly dis- turbed.
1Pi61	Burial 8 (adult) (25+ years) (female)	Late Miller III (Late Woodland)	Beads	<u>Goniobasis</u> shell beads (52)	
1Pi61	Burial 16 (adult) (20-28 yrs.) (female)	Late Miller III (Late Woodland)	Beads	<u>Marginella</u> shell beads (2)	
1Pi61	Burial 19 (Adult) (30+5 yrs.) (female)	Late Miller III (Late Woodland)	Necklace and Bracelets	<u>Goniobasis</u> shell beads (2) Disk shell beads (16) <u>Marginella</u> shell beads (34) Cylindrical shell beads (2) Teardrop shell pendants (2)	Beads were located in area of head, below mandible.
1Pi61	Burial 23 (Adult) (30+5 yrs.) (female)	Late Miller III (Late Woodland)	Necklace and Bracelets	<u>Goniobasis</u> shell beads (2) Disk shell beads (16) <u>Marginella</u> shell beads (34) Cylindrical shell beads (2) Teardrop shell pendants (2)	Shell beads were located around wrist area of hands.
1Pi61	Burial 27 (Young adult) (Approx. 16 years) (female)	Late Miller III (Late Woodland)	Necklace and clothing ornaments	<u>Goniobasis</u> shell beads (425) Disk shell bead (1) <u>Marginella</u> shell beads (67) Triangular shell pendant (1) Black Bear canine pendants (2)	Numerous cut gastropods had been placed in the cephalic region, probably as ornaments on clothing. Also they were found in quantity on the left arm located in the neck region was a triangular shell gorget with two holes drilled in the wide end. Bear canines have a hole drilled in one end and were found near the gorget.
1Pi61	Burial 28 (Adult) (25-30 yrs.) (male)	Late Miller III (Late Woodland)	Necklace and clothing ornaments and cache	<u>Goniobasis</u> shell beads (1,117) Disk shell bead (1) <u>Marginella</u> shell beads (67) Triangular shell pendant (1) Black Bear canine pendants (2)	One cut shell gorget, numerous cut shell gastropods in cephalic region as well as over rest of body. Three post holes in a linear arrangement were discovered at the western edge of the burial. The center post (#2) was tightly packed with cut gastropods.
1Pi61	Burial 48 (adult) (30+ yrs.) (male)	Late Miller III (Late Woodland)	Cups or rattles	Turtle shells (2)	Two turtle shells, placed up- side-down and overlapping each other (at left pelvis).
1Pi61	Burial 49 (Infant) (Approx. 1 year) (Sex indeter- mined)	Late Miller III (Late Woodland)	Necklace	Disk shell beads (47) Cylindrical shell beads (5)	Shell bead necklace (disk beads and cylinder shaped beads in largest strand) looped.

Table 11. (Continued)

Site	Burial No., Age and Sex	Cultural Affiliation	Probable Artifact Use	Category and No. Artifacts	Field Notes
IP161	Burial 55 (Adult) (35+ yrs.) (female)	Late Miller III (Late Woodland)	Loin cloth or waist band (sash)	Disk shell beads (6) Teardrop shell pendant	Cylindrical shell beads. Disk beads. Small shell pendant, under right anterior region of sacrum.
IP161	Burial 56 (young adult) (19+2 yrs.) (male?)	Late Miller III (Late Woodland)	Necklace	Disk shell beads (17) <u>Marginella</u> shell beads (11) Cylindrical shell beads (4)	
IP161	Burial 58 (Adolescent) (Approx 10 yrs.) (Sex indeter- minable)	Late Miller III (Late Woodland)	Necklace and bracelet and clothing orna- ments	<u>Goniobasis</u> shell beads (266) Disk shell beads (26) Cylindrical shell beads (2)	Beads arranged near the feet and neck in a necklace fashion.
IP161	Burial 60 (Adult) (30+ years) (Female)	Late Miller III (Late Woodland)	Bracelet	Disk shell beads (8)	Beads found in the groin area, under and over the pelvis, and under and over the forearms.
IP161	Burial 66-A (Infant) (Approx. 2-3 yrs.) (Sex indeter- minable)	Late Miller III (Late Woodland)	Necklace	<u>Goniobasis</u> shell beads (3) Triangular shell pendant (1)	Pendant under right lower ribs.
IP161	Burial 66-B (Adolescent) (Approx. 10- 15 yrs.) (Male ?)	Late Miller III (Late Woodland)	Necklace	<u>Goniobasis</u> shell beads (17) <u>Marginella</u> shell beads (45)	
IP161	Burial 69 (Infant) (Approx 9 mo.) (Sex indeter- minable)	Early Miller III (Late Woodland)	Necklace	<u>Goniobasis</u> shell beads (17) <u>Marginella</u> shell beads (45)	Disk beads were found in the right side rib cluster and under left side of the skull.
IP161	Burial 73 (Adult) (Approx. 4- 5 yrs.) (Male)	Late Miller III (Late Woodland)	Clothing ornaments	<u>Goniobasis</u> shell beads (2)	
IP161	Burial 78-B (Adult) (Approx 25- 30 yrs.) (female)	Late Miller III (Late Woodland)	Clothing ornament	<u>Goniobasis</u> shell bead (1)	Antler tine on top of right wrist. Shell beads under right pelvis.
IP161	Burial 80 (Young adult) (Approx. 19 yrs.) (male)	Late Miller III (Late Woodland)	Necklace	<u>Marginella</u> shell beads (26)	Necklace slightly above collar bones.
IP133	Burial 2 (Adolescent) (Approx. 15 yrs.) (Male ?)	Late Miller III or Early Mississippian	Necklace or clothes orna- ments and awl	<u>Goniobasis</u> shell beads (79) <u>Marginella</u> shell beads (15) Pearl (1) Bone awl	Bone awl near head.
IP133	Burial 11 (child) (2-3 yrs) (Sex indeter- minate)	Mississippian	Amulet	Phallium shell amulet (1)	Marine shell near left hand.
IP133	Burial 13 (Adult) (35+5 yrs.) (Male ?)	Mississippian	Awls	Wild turkey bone awl (3)	Three turkey awls with three triangular projectile points next to right shoulder.
IP133	Burial 19 (Adult) (45+5 yrs.) (male)	Mississippian	Fish hook Amulet	Two prong bone fish hook (1) Amulet	Large mussel shell with a large mam- mal bone next to left pelvic bone. Under the larger mammal bone is a spatula-shaped worked bone, and a double pronged fish hook was dis- covered .9 feet to left of the left femur.
IP133	Burial 20-A (Adult) (No data) (Male ?)	Mississippian	Necklace	Pearl (1) Cylindrical shell head (2)	

Table 11. (Continued)

Site	Burial No., Age and Sex	Cultural Affiliation	Probable Artifact Use	Category and No. Artifacts	Field Notes
1Pi33	Burial 20-B (Adult) (Approx. 35 yrs.) (male)	Mississippian	Necklace	Cylindrical shell beads (35) Disk shell pendant (1)	
1Pi33	Burial 20-C (Adult) (35+5 yrs.) (male)	Mississippian	Bracelets	Cylindrical shell beads (128)	Strands of barrel shaped shell beads around proximal and distal ends of left tibia (total of 2 separate strands).
1Pi33	Burial 21 (Child) (Approx. 9 yrs.) (Sex indeter- minable)	Late Miller III or Early Mississippian	Necklace Needle	Coniobasis shell beads (8) Black Bear canine pendants (2) Mammal bone needle (1)	
1Pi33	Burial 24 (Child) (9.5-11 yrs.) (Sex indeter- minable)	Mississippian	Necklace	Cylindrical shell beads (202)	Assortment of cut shell beads around the individual's neck.
1Pi33	Burial 25 (Sub-adult) (Approx. 12 yrs.) (Sex indeter- minable)	Mississippian	Necklace	Cylindrical shell beads (14)	Shell bead necklace (barrel-shaped beads).
1Pi33	Burial 26 (Infant) (Approx. 0.5 yrs.) (Sex indeter- minable)	Mississippian	Amulets	Marine gastropods (2)	Two marine gastropod shells adjacent to left pelvic bone.
1Pi33	Burial 27 (Adult) (35-40 yrs.) (male)	Mississippian	Awls Chisel Projectile point	Wild turkey bone awl (1) Deer bone awl (1) Beaver incisor chisels (2) Antler projectile point (1)	
1Pi33	Burial 28-B (Young Adult) (Approx. 21-23 yrs.) (male)	Mississippian	Pendant	Disk shell pendant (1)	Small perforated shell gorget under mandible.
1Pi33	Burial 29 (Adult) (45+5 yrs.) (male)	Mississippian	Unknown Awls	Coniobasis shell (1) Wild turkey bone awls (2)	Two awls right of right shoulder, bird bone awl .8 feet right of skull.
1Pi33	Burial 30 (Adult) (21-23 yrs.) (female)	Mississippian	Necklace	Cylindrical shell beads (67)	Necklace of disk shell beads.
1Pi33	Burial 31 (Child) (1.5-2.5 yrs.) (Sex indeter- minate)	Mississippian	Necklace Dipper	Cylindrical shell beads (24) Marine gastropod (1)	With the right lobe of the twin, vessel is a conch shell cup. Around the neck region are barrel-shaped shell beads. Within the clusters is a small marine shell, presumably attached to the strand.
1Gr2	Burial 10 (Sub-adult) (7-8 years) (Sex indeter- minate)	Late Mississip- pian	Pendants	Black bear canines (3)	Drilled bear canines. Lying in general area of cranium near bottom of burial pit.
1Gr2	Burial 20 (Adult) (45-50 years) (male)	Late Mississip- pian	Awls	Wild turkey bone awls (2)	The cranium, scapula, clavicle, some vertebrae, and ribs with two bone awls and chert perforators in apparent association at the upper northeast end of pit.

Table 12. Shell Ornament Categories, Burial Occurrences, and Literature References

Shell Ornament Category	Gainesville Reservoir Burial Occurrences	Literature References
necklace/pendant	IP161 Bu. 1	Numerous shell necklaces and pendants; Alabama (Webb 1939). Archaic and Mississippian periods.
	Bu. 4	
	Bu. 19	
	Bu. 23	"Cut shell beads were used in a variety of shapes and sizes. . . . Various sizes and shapes were combined in necklaces. . . . Infants of only a few months of age were decked with heavy necklaces. . . . one 6-year-old child had a necklace of 75 <i>Marginella</i> shells around the neck. . . ." (Lewis and Kneberg 1946: 129, 147). Drawings of adult females and males and children found in Hamilton mounds (Lewis and Kneberg 1946: Plates 99-100). Tennessee. Middle Woodland and Mississippian periods.
	Bu. 49	
	Bu. 56	
	Bu. 58	
	Bu. 66A	
	Bu. 66B	
	Bu. 69	
	Bu. 80	"There were twenty-one instances of shell beads found with burials, in thirteen of which appeared <i>Anculosa</i> shells. In five instances, necklaces of <i>Anculosa</i> beads were found around the neck, the number of beads ranging from forty-three to two hundred fifty. An attempt was made to determine the original stringing of the beads, and on several occasions from ten to fifteen of them were seen to lie with the flat surfaces facing each other in such a manner that the upper half of one bead overlapped the lower half of the bead opposite" (Titterton 1935:22). Illinois. Middle Woodland period.
	IP133 Bu. 2	
	Bu. 20	
	Bu. 208	
	Bu. 21	
	Bu. 24	
	Bu. 25	
	Bu. 28B	
	Bu. 30	Sixteenth century engravings and paintings reproduced figuring native Southeastern U. S. "kings, queens, and noblemen" attired in shell necklaces. (Fundaburk 1969: Plates 16, 34, 37-9, 44, 47, 59-9, 63).
	Bu. 31	
	IGr2 Bu. 10	
		"The military men especially, wear at their breasts a concave shell. . . . this is a universal decoration with all the Indians of the northern continent; and as all their mechanism, for want of good tools, is performed with great labour, so these gorgets bear a great price in proportion to their largeness and carving" (Gatsesy from Swanton 1946:19).
clothing ornaments	IP161 Bu. 27	"Approximately 165 gar scales (<i>Lenisosteus</i> sp.) were under the left arm of the individual (Burial #1). Some of the scales had been altered by a slight notching at one end although none showed further modification. These artifacts were probably tied to clothing as strong as part of an ornament. . . . The only worked shells from the site were 35 <i>Anculosa</i> beads found with Burial #1. One side of the beads was flat. These beads were in a line with the gar scales and were also probably attached to an article of clothing or an ornament" (Faulkner and Graham 1965: 34-35). Tennessee. Mississippian period.
	Bu. 28	
	Bu. 58	
	Bu. 73	
	Bu. 78B	
	IP133 Bu. 2	
		"Tlavah use of shell beads characterized the Dallas Indians' costumes. . . . Small freshwater and marine shells, unaltered except for perforations, formed necklaces or were sewn onto garments and headbands" (Lewis and Kneberg 1958:110-11). Tennessee. Mississippian period.
bracelet (bicep, forearm, wrist, thigh, calf, ankle)	IP161 Bu. 23	Drawings, engravings, and paintings of 14th, 15th, and 16 century native Americans. (Fundaburk 1969: Plates 13, 14, 32, 34-5, 37, 38, 63) (Lewis and Kneberg 1958:92, 93, 155).
	Bu. 58	
	Bu. 60	
	IP133 Bu. 20C	Mississippian period burial with traclets on arms and legs. (Fundaburk 1958:Plate 155).
		"Most Southeastern Indians wore leggings at times, and beaded garters, made of bluish hair, opossum hair, or other material. . . . Beaded strings were worn by Chickasaw women in the same place, though their functions were ornamental and magical. Strings of beads seem sometimes to have been worn by men even without their leggings. Le Moyne shows strings of beads and strings of copper disks worn in this place by Floridians of both sexes without leggings or other clothing under them. In one case he shows a string of beads worn just above the knee, and in two or three cases men and women appear wearing true anklets. . . . In the latitude of Florida, where much of the clothing could be dispensed with, there were correspondingly more opportunities for ornamentation of both arms and legs. The Calusa chief (came) to meet his party with his body adorned with strings of beads of four or six fingers in breadth hung about his neck, his biceps, his wrists, under his knees, above his ankle bones, and on his ankles" (Swanton 1946:523).
headband	IP161 Bu. 1	Illustration of woman with headband of shell beads. (Lewis and Kneberg 1958:92).
		On the east coast of North America the historic Powhatan: "Headbands of 'coral', i.e., beads, seem to have been peculiar to this region. Barlowe notes that the wife of Granganimeo 'had a bande of white Corall' about her forehead, 'and so had her husband many times'" (Swanton 1946:509).
hair ornament	IP161 Bu. 1	"In six instances, <i>Anculosa</i> beads were found on the front or at the side of the skull. . . . the number ranging from seven to two hundred eight. . . . The beads in this location were more widely scattered than when found around the neck, and no definite pattern of their stringing could be worked out. Their use here is thought to have been as hair ornaments" (Titterton 1935:22).
		"Alabama women divided their hair in the middle, carried the two parts back and tied them there by means of a string, tape, or ribbon, sometimes beaded" (Swanton 1946:500).
		"The old Alabama men are said to have had their hair divided into four braids, two of which were allowed to fall down behind and two in front, and the end of each braid was fastened with a head. . . . used, however, only on special occasions" (Swanton 1946:506).
belt or sash and joincloth or breech clout	IP161 Bu. 55	A drawing of Dallas adolescent female with bead belt (Lewis and Kneberg 1946:Plate 105).
		The Chickasaw women of Adair's time had leather belts covered with brass runners or buckles and he mentions beaded sashes" (Swanton 1946:524).
		"The breechclout was the one article of dress worn constantly by all males other than infants and young children. It was the first to be put on and the last to be laid aside. . . . (and later in the 16th century) . . . It is usually plaited and indented at the ends, and ornamented with beads, tinseil lace, etc." (Swanton 1946: 456-7). Speaking of the S.E.U.S. Indians.

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ANALYSIS, SYNTHESIS, AND INTERPRETATION OF THE SKELETAL
MATERIAL EXCAVATED FOR THE GAINESVILLE SECTION OF THE
TENNESSEE-TOMBIGBEE WATERWAY

by
Mary Cassandra Hill

Part III
of
Biocultural Studies
in the Gainesville Lake Area

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CHAPTER I

INTRODUCTION

The transition from one cultural phase to another is always of interest to archaeologists, but the transition from Woodland to Mississippian in the eastern United States has become particularly intriguing during the past few years. The recent redefinition of the goals of archaeological field excavations recognizes that inclusion of physical analyses and cultural theory are of necessity in the ultimate understanding and solution of the problems represented by prehistoric data. Numerous multidisciplinary efforts similar to that of Blakely (1977) have resulted as anthropologists attempt to evaluate archaeological data.

Unfortunately, very little published data from skeletal series representative of the Woodland/Mississippian transition are available. Although exploratory in nature, it is hoped that the data from the skeletal series from these four sites in Alabama will contribute to the eventual elucidation of some of the questions posed by anthropologists concerning the Woodland/Mississippian cultural transition.

CHAPTER II

MATERIALS AND METHODS

MATERIALS

The skeletal material analyzed for this study was from four sites, Sites 1Gr1X1, 1Gr2, 1Pi61 and 1Pi33, excavated by the University of Alabama Office of Archaeological Research. A total of 190 individuals was analyzed. Site 1Gr1X1 is represented by two individuals, Site 1Gr2 is represented by 52 individuals, Site 1Pi61 is represented by 96 individuals, and Site 1Pi33 is represented by 40 individuals.

The burials excavated from these four sites are now stored at Mound State Monument, Moundville, Alabama.

METHODS

Before the skeletal material could be completely analyzed, it was necessary to do the basic cleaning, cataloguing and reconstruction prerequisite to the curation of any archaeological material. Once this was completed, the basic analyses of skeletal material were applied to the burials. These basic analyses included the determinations of age at death, sex, stature, pathologies and anomalies of each individual. These determinations were often difficult, and occasionally impossible, because of the fragmented nature of the skeletal material.

Knowledge of those methods and criteria which result in the most accurate assessments of individuals' age at death, sex, stature and pathologies and anomalies is required of each skeletal biologist. These methods and criteria are of critical importance in the analysis of prehistoric skeletal material.

Determination of Age. There are two primary problems associated with the determination of age at death. The standards used are based on data obtained from American Caucasians. Consequently, the validity of the application of these standards to prehistoric American Indians is often questioned. This is, unfortunately, unavoidable. The second criticism comes from the fact that chronological age often varies from biological (skeletal) age for any given population. Because the actual chronological age cannot be known for mortuary samples, however, there really is no problem. All the individuals are compared on the basis of skeletal development and maturation.

Aging can generally be divided into two processes: maturation and degeneration. Included among those criteria used in the assessment of maturation are the appearance and union of primary centers of ossification, dental eruption sequences, diaphyseal length of long bones, and the stages of epiphyseal union.

Dental eruption sequences have been shown to be among the most accurate of the aging criteria for subadult skeletal material. The dental maturation charts prepared by Schour and Massler (1941, 1944) and Ubelaker (1978) were found to be the most useful in this particular study. If teeth were not available, the diaphyseal length standards published by Johnston (1962) and Ubelaker (1978) were used. Diaphyseal length was also used as a reinforcement for age determined by dental maturation. Occasionally it was possible to refer to the developmental sequences observed by Greulich and Pyle (1959) for the bones of the hand and wrist. The summaries of various researches concerning the appearance and union of ossification centers and epiphyseal union provided by Bass (1971), Krogman (1973), and Stewart (1968) were often referenced, as was the extensive research on epiphyseal union by McKern and Stewart (1957).

Those criteria included under the process of degeneration in the assessment of age at death are cranial suture closure, changes in texture and density of bones, accentuation of muscle attachments, changes in the symphyseal face of the os pubis, dental attrition, and degenerative pathologies. Todd and Lyon (1924, 1925) first described the sequences of endocranial suture closure as being indicative of the age of an individual. However, Krogman (1973) cautions, in his summary on cranial suture closure, that this method of age assessment is quite variable and should not be relied upon too heavily. In the absence of other more accurate age criteria, endocranial suture closure was referenced.

Changes in the texture and density of bones is usually indicative of senile osteoporosis. These changes are also seen as a consequence of prolonged illness and should only be used as age determining criteria in conjunction with other age indicators.

Bone remodeling occurs in response to stress or tension due to the required locomotion or movement of everyday life and activities. Consequently, as one ages, the "lines" of muscle attachments, particularly on the long bones, become more pronounced.

Probably the most accurate means of visual assessment in the determination of the age of adults is the observation of the changes which occur on the symphyseal face of the os pubis. Todd (1920, 1921) initially defined ten phases of age related changes from 18 to 50± years. Because this system tends to overestimate age, McKern and Stewart (1957) redefined the phases which are considered to be accurate for males up to age 40. For females, however, the changes in the symphyseal face occur at different times (ages) than for males, because of distortion occurring during parturition. Gilbert

and McKern (1973), after completing a study similar to that of McKern and Stewart, proposed standards for the assessment of age of the female os pubis. Because of the fragmented, poorly preserved nature of most of the skeletal material excavated from these four sites, the assessment of age from changes in the pubic symphysis was virtually impossible.

Certain pathologies and anomalies which occur as a normal consequence of degeneration can often be indicative of general adult age assessments (i.e., young adult, mature adult, senile adult). Included in these degenerative pathologies are osteophytosis, osteoarthritis, ossification of costal cartilage, pacchionian pits, etc.

Dental attrition results as a consequence of normal mastication. It generally proceeds at a constant rate, and has been used as an indicator of age (Hrdlicka 1939). However, dental attrition is quite variable, depending on the type of diet, food processing techniques, or even habitual activities not related to eating (such as processing hides), and should not be used as a single determining factor in the estimation of age.

All of the above aging criteria are macroscopic methods. More accurate methods of determining the age of an individual have been developed which utilize microscopic techniques and equipment. Because of the lack of such equipment and skills in the use thereof, no attempts were made to determine the age of an individual by microscopic techniques.

Determination of Sex. Those standardized means of visual and statistical determination of the sex of a particular individual which have produced the most accurate results are based on developmental changes in the bone which occur after the individual has reached puberty. Numerous attempts have been made in determining the sex of prepubescent individuals with only moderate success (Boucher 1955, 1957). Hunt and Gleiser (1955) proposed a method for determining the sex of subadult skeletal material which compares the development of the postcranial skeleton to the dental development of the individual. This method is based on the fact that females mature more rapidly than males, and consequently, a discrepancy in the two assessments of age (dental vs. post-cranial) would be indicative of a female, although an agreement between the two would be indicative of a male. However, it is generally known to the medical community that prolonged illness almost always results in stunted post-cranial growth of the individual, while the dental development appears to remain unaffected, except for enamel hypoplasia. This might tend to overestimate the number of subadult females in one's population. Consequently, no attempt was made to estimate the sex of prepubescent skeletons represented in this particular study.

The determination of sex and its related problems has been discussed at length by numerous authors. Summaries of these studies

appear in Stewart(1968), Bass (1971), Krogman (1973), and Ubelaker (1978).

The overall morphology of the pelvis is recognized by skeletal biologists as being the most distinctive criterion upon which to base an assessment of the sex of a particular individual. Generally, the female pelvis is broader than that of a male, and is characterized specifically by a wide sciatic notch, smaller acetabulum, presence of a preauricular sulcus, long pubis, wide subpubic angle, small triangular obturator foramen, and gracile overall appearance (Stewart 1968; Bass 1971; Krogman 1973; Ubelaker 1978). Stewart (1957, 1970) and Houghton (1974) have shown that the presence of parturition pits along the pubic symphysis and sacro-iliac articular surfaces are also indicative of female pelvises.

The gross morphologies of the cranium and mandible are the second best criteria for the determination of sex. Sexual dimorphism is usually evidenced by a more robust cranium in males. Specifically, the male cranium usually has a more prominent supra-orbital torus, blunt orbital borders, larger teeth, larger palate, more pronounced muscle attachments, larger mastoid processes, and larger frontal sinuses. The male mandible is characterized by larger teeth and a squared mental eminence (chin).

Cranial measurements have been proven to be quite accurate in the discrimination between males and females (Giles and Elliot 1963; Giles 1964, 1970). When the cranial material was complete enough, these discriminant functions were used to check the visual assessment of sex.

Other general post-cranial morphology which might be indicative of sex includes a tendency toward robusticity and rugosity in males, with the muscle attachments being more pronounced and the diameters of the heads of the femora and humeri being larger in males. Also, the presence of septal apertures (supra-condyloid foramen) may be indicative of females (Hrdlicka 1932; Bass 1971).

Because of the often fragmented and poorly preserved nature of most of the skeletal material analyzed in this study, visual assessment of gross morphological features was the principal means of determining the sex of the individuals.

Determination of Stature. Although stature varies greatly within a particular population, as well as among different populations, regression equations have been computed for estimating stature of individuals in the major racial groups. Probably the most reliable formulae for prehistoric American Indians are those of Genoves (1967:76) and Trotter and Gleser (1958:120) which are reproduced in Ubelaker (1978).

Bone Pathology. The determination of a differential diagnosis of pathology for each individual is of major importance to any study

of prehistoric populations. The adaptive success (ability to adapt to a particular environment which is mutually beneficial to the people, as well as the environment) of any population can often be determined through the analysis of those biological remodelings which occur in response to certain pathologies and anomalies. Often inferences concerning cultural behavior can be made by examining each individual and then constructing a descriptive model for the entire population in terms of adaptive behavior. For instance, the physical disability of an individual could result in an altering of behavior by his fellow inhabitants in order to compensate for that person's non-productivity. Food getting or processing behavior may also be indicated through pathological response.

Because bone is limited in its ability to respond to external and internal stimuli, unlike soft tissues which show change in color, etc., a differential diagnosis is necessary. A differential diagnosis is defined as "the determination of which of two or more diseases with similar symptoms is the one which the patient is suffering from (Stedman's Medical Dictionary 1972: 345)."

In the diagnosis of paleopathology, several general categories are considered: trauma, arthritis, inflammation of bone, neoplasms, anomalies, dental pathology, and specific diseases such as tuberculosis or treponema. (Morse 1969; Brothwell 1972; Brothwell and Sandison 1967; Steinbock 1976; and Ubelaker 1978.)

A differential diagnosis was made for each skeleton from these four sites whenever possible by visual and roentgenographic examination. These diagnoses of pathologies will perhaps aid in the elucidation of questions and hypotheses proposed for these particular time periods.

Mortality Curve, Survivorship, and Life Tables. Because of the vagaries of the adult age groups, the often fragmented and poorly preserved condition of some of the skeletal material, and the fact that numerous individuals have not as yet been assigned to particular time periods, no attempts were made to construct mortality curves, survivorship, or life tables for the populations from these four sites.

CHAPTER III

DISCUSSION

SITE 1Gr1X1

Two burials were excavated from Site 1Gr1X1, an adult male and adult female, which have been assigned to the Middle Miller II phase, A.D. 900. Both were interred in primary, flexed positions in refuse areas.

The male evidenced pathologies indicative of hematogeneous osteomyelitis, a systemic infection. The computed stature for this individual is 172.816 ± 4.05 cm (approximately $68\frac{1}{2}$ in, or 5 ft 8 in).

The female evidenced degenerative pathologies, and the computed stature is 156.709 ± 3.816 cm (approximately 61 $\frac{6}{8}$ in, or 5 ft 2 in). (See Table 1.)

SITE 1P161

The excavations at this site revealed a total of 96 individuals, six of which are considered to belong to the Early Miller III phase, 77 assigned to the Late Miller III phase, and 13 which are as yet undetermined for a particular time period (Table 2).

Although the burials appear to form distinct clusters (see Vol. 1) dating to the Catfish Bend and Gainesville subphases, these temporal distinctions among these clusters had not been made when this study was conducted. Primary, flexed positions (usually on the right side) appear to have been the preferred mode of interment.

Of the six individuals representative of the Early Miller III phase, there are two infants in the 0.0 to 2.9 year category, one in the 10.0 to 14.9 year category, an adult male and an adult female in the 25 to 35 year category, and an adult male in the 40+ year category (Table 3).

The average computed height for adult males from the Early Miller III phase is 165.48 cm, or approximately 65 in (5 ft 5 in). The computed stature for the one adult female from this time period is 157.227 ± 3.816 cm, or approximately 62 in (5 ft 2 in).

Table 4 is a condensation of the descriptive data in the Appendix of this report. The pathologies have been assigned to general categories discussed in more detail later in this section.

For the Early Miller III phase, two individuals evidenced anemia or other dietary deficiencies, three evidenced trauma, and four evidenced systemic infections (individuals often exhibit multiple pathological responses). Dental pathologies ranged from slight to extreme. Malnutrition and systemic infections were the common pathologies for the younger individuals, and degenerative pathologies, trauma and infection were the common pathologies for the older individuals.

Of the 77 individuals assigned to the Late Miller III phase, 12 (15.58 percent) are in the 0.0 to 2.9 year category, 4 (5.20 percent) are in the 3.0 to 4.9 year category, 5 (6.49 percent) are in the 5.0 to 9.9 year category, 6 (7.79 percent) are in the 10.0 to 14.9 year category, 4 (5.20 percent) are in the 15.0 to 19.9 year category, 7 (9.09 percent) are in the 20.0 to 24.9 year category, 10 adult males (12.99 percent), 13 adult females (16.88 percent) and 2 adults of undetermined sex are in the 25 to 35 year category (32.47 percent in total), 8 adult males (10.39 percent) and 4 adult females (5.20 percent) are in the 35 to 45 year category (15.58 percent in total), and two adult males (2.60 percent) are in the 50+ year category (Table 3). A total of 31 individuals (40.26 percent) died before the age of 20 years.

The average computed stature for adult males from the Late Miller III phase is 167.48 cm, or approximately 66 in (5 ft 6 in). The average computed stature for adult females during this time period is 160.069 cm, or approximately 63 in (5 ft 3 in).

For the Late Miller III phase, 22 individuals (28.57 percent) evidenced anemia or other dietary deficiency, 28 individuals (36.36 percent) evidenced trauma, and 35 individuals (45.45 percent) evidenced systemic infections. Dental pathologies ranged from moderate to extreme, with extreme attrition, plaque formation, caries, abscessing, and staining of the teeth being prevalent. Impacted and peg-shaped third molars also appear to have been common anomalies. Another pathology which appears during this time period is osteopetrosis, which is evidenced by seven individuals (Burials 23, 42, 44, 46, 58, 70A, and 71). Malnutrition and systemic infections appear to have been the common pathologies for the younger individuals, while malnutrition, trauma, systemic infections and degenerative pathologies appear to have been common among the older individuals.

Of the thirteen individuals which could not be assigned to a particular time period, 4 are in the 0.0 to 2.9 year category, 2 are in the 3.0 to 4.9 year category, 4 are in the 10.0 to 14.9 year category, 1 female is in the 20.0 to 24.9 year category, and one male and one female are in the 25 to 35 year category.

The same general pathologies were noted for these individuals, with 1 evidencing anemia, 3 evidencing trauma, 5 evidencing systemic infections, and 2 evidencing extreme dental pathologies. Three of these individuals also evidenced osteopetrosis (Burials 9, 10, and 19).

SITE 1Pi3?

The excavations at this site revealed a total of 40 individuals, 5 are considered to have been interred during the Late Woodland period, 31 assigned to the Mississippian period, and 4 are as yet not assigned to a particular time period (Table 5).

The most intriguing feature for this particular site is that there appears to have been a formal cemetery during the Mississippian period which contained several high status individuals. (See Fig. 1 and Appendix discussion of Burial 20.)

Of the 5 individuals representative of the Late Woodland period, 4 were younger than 15 years of age at the time of death (Table 6). There was one female in the 25 to 35 year category, whose computed stature is 163.584 ± 4.24 cm, or approximately 65 in (5 ft 5 in).

Table 7 is a condensation of the descriptive data in the Appendix for the individuals from this site. The same general categories for pathologies have been applied. For the Late Woodland period, 3 individuals evidenced anemia or malnutrition, 3 individuals evidenced systemic infections, one evidenced trauma, and 2 evidenced dental pathologies ranging from slight to extreme.

Of the 31 individuals assigned to the Mississippian component, 4 (12.9 percent) are in the 0.0 to 2.9 year category, 2 (6.45 percent) are in the 3.0 to 4.9 year category, 2 (6.45 percent) are in the 10.0 to 14.9 year category, 4 (12.9 percent) are in the 15.0 to 19.9 year category, a male and a female (6.45 percent) are in the 20.0 to 24.9 year category, 5 males, 3 females and 2 individuals of indeterminate sex (32.26 percent) are in the 25 to 35 year category, 3 males and 2 females (16.13 percent) are in the 35 to 45 year category, and one male and one female are in the 50+ year category (Table 6).

All of the individuals, except one (Burial 9), which could be measured for the computation of stature, were interred in the cemetery. Therefore, the average computed stature for males is 168.621 cm, approximately 66 in (or 5 ft 6 in). However, 2 of these individuals are from the interment designated 20A, B, C, D, considered to be that of high status individuals. These 2 individuals, 20A and 20B, were taller than the other males. The computed stature for 20A is 172.54 ± 2.81 cm, approximately 68 in (or 5 ft 8 in), and the computed stature for 20B is 176.56 ± 4.04 cm, approximately 70 in (or 5 ft 10 in). Individuals 27 and 29 had computed statures of 170.791 ± 3.417 cm (approximately 67 in) and 170.113 ± 3.417 (approximately 67 in), respectively. The average computed stature for females interred in the cemetery is 160.07 cm, approximately 63 in, (or 5 ft 3 in). The computed stature for the female not considered to be interred in the cemetery (Burial 9) is 159.29 ± 4.05 cm (approximately 63 in).

There are also some rather unusual physical distinctions among the individuals interred in the cemetery. Individuals 16, 17, 18, and 23 show a combination of male and female physical characteristics (see Appendix for more detailed information), and several of the males (Burials 19, 20A, 20B, 20C, 23, 27, 29) evidence very large shoulder structures, in terms of humeral head diameters, clavicle development, and development of the sternum. The robusticity of the long bones of these individuals is also quite pronounced.

With reference to pathologies and anomalies (Table 7 and Appendix), 3 (9.70 percent) individuals evidenced anemia or other dietary deficiency, 6 (19.36 percent) evidenced trauma, 12 (38.71 percent) evidenced systemic infections, and 23 (74.19 percent) evidenced dental pathologies ranging from slight to extreme. Impacted and peg-shaped third molars also appear to have been common anomalies, along with stained teeth. Malnutrition and systemic infections were the common pathologies for the younger individuals, while trauma, systemic infections, malnutrition, and degenerative pathologies were the common pathologies for the older individuals.

SITE 1Gr2

The excavations at this site from 1974 to 1978 have revealed a total of 52 individuals. All of these interments, except one (Burial 26), have been attributed to the Late Mississippian period, or Late Moundville phase, A.D. 1400 to 1550. Burial 26 is assigned to the Middle Woodland period, A.D. 100 to 600.

One of the more noteworthy aspects of interment at this site is the presence of secondary interments, which usually contain more than one individual (Burials 1, 5, 7, 8), and primary interments which have had bones removed (Burials 3, 4, 10, 11, 12, 13, 14, 17, 19, 20, 25). Burial 1, for instance, contained the crania of at least 18 individuals (Hill and Smith 1975).

The skeletal material is extremely fragmented and poorly preserved, and, consequently, the determinations of age, sex, and pathology were virtually impossible in most instances. Table 8 is a condensation of data presented in Hill and Smith (1975) and the Appendix of this report. Because of the vagaries in age, sex, and pathological determinations, no percentages were computed for specific age categories or pathologies. Also, no computation of stature was made because of the fragmentary, poorly preserved condition of the skeletal material.

Dental pathologies ranged from slight to extreme, and the teeth were heavily stained by a reddish-black vegetable dye.

From the descriptive data recorded for the mortuary remains from these four sites general statements can be made for each time period.

In terms of mortuary preparation, there appears to have been a preference for primary flexed depositions during the Late Woodland period which gradually changed to primary semi-flexed and extended depositions during the Mississippian period. In an earlier report, Hill and Smith (1975) offered an explanation for the secondary mass interments and primary interments which have specific bones missing (i.e., long bones and crania) at Site 1Gr2. It was postulated that the primary interments which had specific bones removed were not necessarily primary interments, but primary processing areas in which the bodies were deposited for decomposition. After decomposition, portions of the skeletons were removed and secondarily interred. This idea seems to be supported by the fact that the primary interments often had no definite pit outlines. This form of mortuary preparation has been recorded in the Lower Illinois Valley (Perino 1968, Buikstra 1972) and southern Maryland (Ubelaker 1974).

An egalitarian form of interment is evidenced during the Late Woodland period which changes to a non-egalitarian form of interment during the Middle Mississippian period, and then returns to an egalitarian form of interment during the Late Mississippian period. An example of the non-egalitarian mortuary treatment can be seen in Figure 1.

Another inference of non-egalitarian social structure which could be made for the Middle Mississippian period would be that of notable height and nutritional differences between the high status individuals and those of lower class distinction. In her dissertation, Buikstra (1972) infers a non-egalitarian society in which males hold the higher social positions, on the basis of burial distribution, energy expended in burial preparation, and burial accoutrements. There are two very interesting discussions brought forth in this work. One is devoted to the development of the idea of social status being indicated by the amount of energy expended in the preparation and burial of an individual. Buikstra points out that elaborate burial preparation and accompanying accoutrements require more energy than does a more simple interment. The second idea brought forth by Buikstra involves a discussion of stature as a possible status correlate. In this discussion she proposes three hypotheses as possible explanations for the fact that those individuals found in special grave positions were taller than the rest of the population: (1) The migration or foreign power hypothesis - taller individuals represent a group from outside the valley who maintain the power to require special burial treatment for their dead, (2) Internal differentiation - those groups maintaining positions of power (higher social status) could have been small inbreeding units resulting in a significant increase in stature, (3) The dietary hypothesis - higher status individuals could have privileged access to food resources and, therefore, be under less dietary stress than others in the same social unit. In other words, a better diet could result in an increase in stature (Buikstra 1972: 76-83). Buikstra seems to favor this dietary hypothesis, and the data from Site 1P133 appear to support it as well.

Certain aspects of cultural behavior can often be inferred from pathologies. The pathologies recorded for the individuals from these sites are extensively described in the Appendix, and are generally categorized as anemia or nutritional stress, systemic infections, trauma, and dental pathologies.

The pathologies indicative of anemia or nutritional stress are collectively known as porotic hyperostosis. Porotic hyperostosis is a descriptive term for abnormal bone changes in the skull which appear as spongy or sieve-like porosity (Angel 1967; El-Najjar and Robertson 1976; El-Najjar 1976; El-Najjar, et al. 1976; Steinbock 1976; Mensforth, et al. 1978). Because bone is limited in its ability to respond to external and internal stimuli (unlike soft tissues which show change in color, etc.), porotic hyperostosis has been used to describe the physiological changes resultant from congenital hemolytic anemia such as thalassemia or sickle-cell anemia (Angel 1966, 1967), rickets (Williams 1929), calcium deficiency (Todd, cited by Williams 1929), and iron deficiency anemia (El-Najjar 1976; El-Najjar and Robertson 1976; El-Najjar, et al. 1976; Steinbock 1976; Mensforth, et al. 1978). Porotic hyperostosis is characterized by the thinning and often complete destruction of the outer table of the cranial vault, caused by pressure atrophy produced by hypertrophy of the hematopoietic diploe between the inner and outer tables (Steinbock 1976:214). Steinbock goes on to say that the sieve-like or coral appearance of the affected area is due to the complete destruction of the outer table and exposure of the hypertrophied cancellous bone or diploe, and that the skull vault in the affected area is thicker than normal due to the hypertrophied bone which protudes to a slight or moderate degree over the normal external contour of the skull (Steinbock 1976:214-215).

Because the congenital hemolytic anemias were not present in prehistoric New World populations, the most probable cause of porotic hyperostosis seen in these individuals is iron deficiency anemia, which is caused by inadequate dietary iron content, inability to absorb iron from the intestine, excessive losses of iron from the body, disturbances of iron metabolism by infection or other mechanisms, or dietary factors such as chronic deficiencies of amino acids and minerals necessary for bone formation (Steinbock 1976:231). Investigations of the relationship between iron deficiency anemia and diet have noted an association between anemia and artificial or prolonged milk feeding (Fullerton 1937; McKay 1931, cited in Mensforth, et al. 1978), prolonged milk feeding and weaning diets of maize or corn gruels (Ashworth 1973; Grantham-McGregor, et al. 1974; Jelliffe and Blackman 1962, cited in Mensforth, et al. 1978), and maize-dependent diet (El-Najjar 1976; El-Najjar and Robertson 1976; El-Najjar, et al. 1976).

Nutritional stress is usually the result of multiple stimuli. The presence of numerous systemic infections, most commonly attributed to microorganism infection, probably further complicated the nutritional stress evidenced by these individuals. Microorganism infection is one of the most common consequences of a more

sedentary subsistence and settlement pattern. The accumulation of wastes and garbage coupled with common use of cooking vessels, particularly unglazed pottery, resulted in high microorganism infection rates of prehistoric groups (Brothwell 1967:63). Mensforth et al. (1978) have noted a definite relationship between iron deficiency anemia and infectious disease among the infants and children from the Libben Site, a Late Woodland ossuary and occupation site from Ottawa County, Ohio. An example of infection is seen in Figs. 2-3.

The presence of osteopetrosis among the individuals at Site lPi6l further complicates the diagnoses of anemia and systemic infections. Osteopetrosis is a relatively rare inborn disorder which is inheritable and seems to be transmitted mainly as an autosomal recessive trait (Jaffe 1972; Edeiken and Hodes 1967), and the subjects who exhibit the disease are frequently the offspring of consanguineous marriages (Jaffe 1972:187). It is characterized by increased density of the bones, persistence of calcified cartilage, and encroachment of the marrow spaces, which often results in severe anemia and pathological fractures of the bones (Edeiken and Hodes 1967; Jaffe 1972), though there is no correlation between the severity of the bone diseases and anemia (Edeiken and Hodes 1967). Massive hemorrhage and intercurrent infection are the usual cause of death (Edeiken and Hodes 1967). The disease may be discovered in fetal bones in utero or in any age group (Edeiken and Hodes 1967), and the bone appears structureless, with the individual components (cortex, medullary cavity, epiphyseal plates, and trabecular pattern) completely obliterated (Edeiken and Hodes 1967). The tubular bones lack modeling which causes a flaring of the ends, the bone shafts may be widened, and the tubular bones may appear to have a miniature bone inset within the host bone, which is evidence of cessation of the sclerosing process near birth (Edeiken and Hodes 1967). The disease can be inherited from either parent, though males seem to predominate (Jaffe 1972).

Trauma may be either accidental or deliberate, and it is often impossible to distinguish between the two. However, in many instances one can distinguish between deliberate and accidental trauma by the presence of specific injuries associated with one or the other. For example, the fractures seen in Fig. 4 are those commonly seen as a result of an accidental fall, while those fractures, known as parry fractures, seen in Fig. 5 are more commonly seen as a result of a deliberate injury. When one sees examples of trauma such as those in Figs. 5, 6, and 7, one can postulate conflict among individuals during that particular time period. Mass interments such as those seen at Site lPi6l (Fig. 8), which contained individuals who evidenced deliberate trauma, are also indicative of conflict. Fig. 9 shows other examples of trauma.

The dental pathologies seen among the individuals from these sites range from slight to extreme, with "extreme" including extensive attrition, caries, plaque formation, and abscessing. These pathologies cannot only be attributed to the ingestion of particular foods (large amounts of carbohydrates), but to food

processing techniques as well (such as grinding with a mano and metate). Another notable pathology of the dentition is heavy staining of the teeth by a reddish-black or reddish-brown vegetable dye. This staining was observed among the individuals of each time period, with increasing frequency from Late Woodland to Late Mississippian. This staining was also observed among individuals from a Mississippian site in Georgia (Hill 1979). Blackened teeth were noted among the Tunica and Natchez (Thwaites 1900), and it appears that this practice may have begun much earlier. Whether these individuals deliberately blackened their teeth, or simply chewed and/or ingested some particular plant is not known.

In his dissertation, Lallo (1973) observed increasing incidences of developmental, infectious, degenerative and traumatic pathologies from Late Woodland through Mississippian time periods in individuals from the Dickson Mounds. However, the individuals from these sites in Alabama do not support this observation. It appears that the highest incidences of these pathologies occur during the Late Woodland period, specifically the Late Miller III phase. One other observation which Lallo recorded for his skeletal series is that of decreased sexual dimorphism from Late Woodland through Mississippian. This observation appears to be supported by the skeletal data obtained from these four sites in Alabama.

CHAPTER IV

SUMMARY

The cultural transition from Woodland to Mississippian in the eastern United States has always been of interest to archaeologists but the increase in excavations in the Southeast has resulted in an increased interest in the Woodland/Mississippian transition.

In order to more completely explain and/or understand the reasons for the transition from one subsistence and settlement pattern to another, it is necessary to examine every possible source of information. One such source of information would be the mortuary remains of the prehistoric groups representative of those time periods which are being compared. Through the analysis of those biological remodelings, which appear in response to environmental influences, the physical anthropologist is often able to determine the adaptive success of a population. Unfortunately, very little published data are available at this time from skeletal series representative of the Woodland/Mississippian transition.

Though excavations are still being conducted in these areas, the initial examination of the skeletal material from these four sites in Alabama has revealed some interesting phenomena. Lallo (1973) observed an increase in developmental, infectious, degenerative and traumatic pathologies from the Late Woodland through Mississippian time periods in individuals from the Dickson Mounds in the Lower Illinois Valley. The individuals from these four sites in Alabama indicate, however, that the highest frequencies of occurrence of these pathologies took place during the Late Woodland period, specifically the Late Miller III phase. Other observations include a decrease in sexual dimorphism from Late Woodland through Late Mississippian, and a change from egalitarian to non-egalitarian, and a return to egalitarian forms of interment of individuals at the time of death, which is probably indicative of social status.

Though exploratory in nature, this initial survey should contribute to the eventual elucidation of some of the questions posed by anthropologists concerning the Woodland/Mississippian cultural transition.



Figure 1. Field Photograph of Burials 20 and 28 at Site 1Pi33.

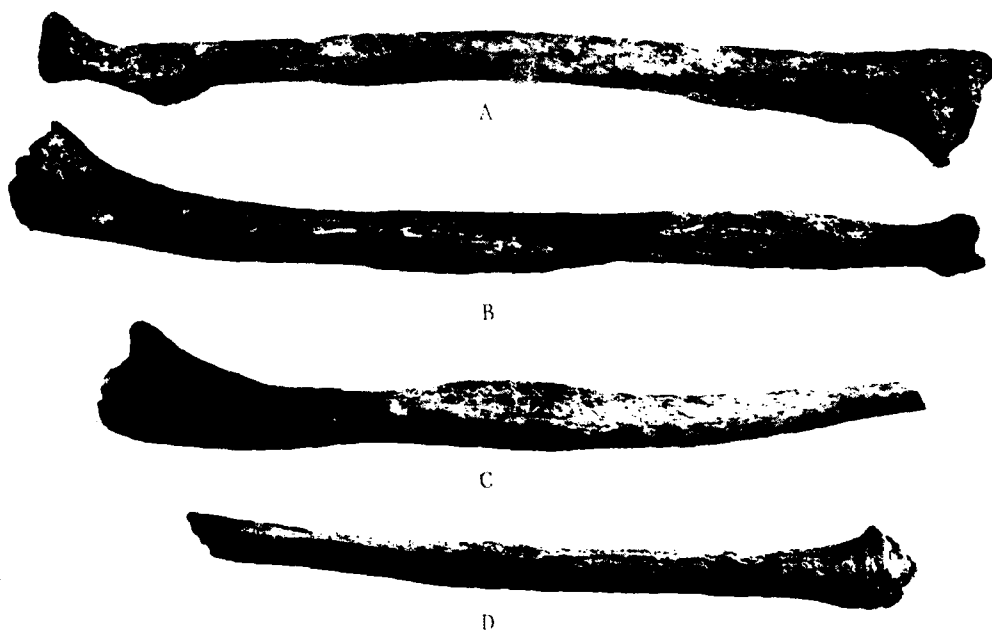


Figure 2. Site 1Pi61, Burial 51. Chronic pyogenic osteomyelitis of the right radius and ulna, A, B; and left radius and ulna, C, D.



Figure 3. Site lPi61, Burial 51. Chronic pyogenic osteomyelitis of the tibiae, A, C; and left fibula, B.



Figure 4. Site lGr2, Burial 25. Colle's fracture of distal right radius, A; and fracture of right patella, showing formation of pseudo-arthritis of right lateral aspect, B.

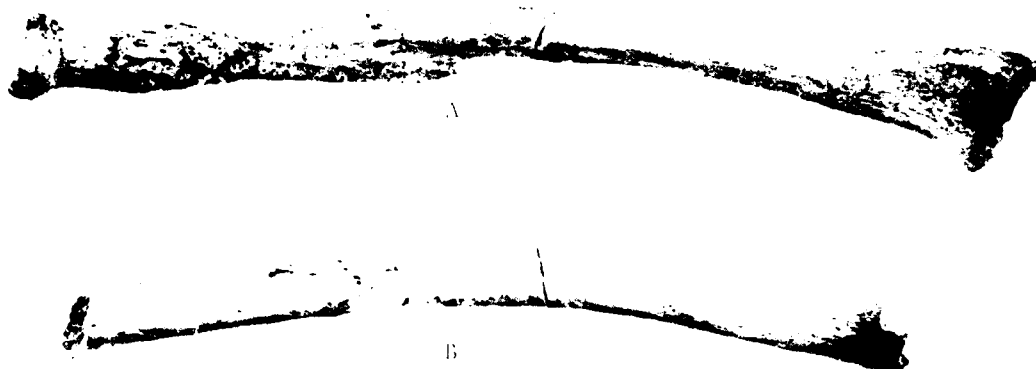


Figure 5. Site 1Pi33, Burial 12. Healed, dislocated fractures of left radius, A; and ulna, B.

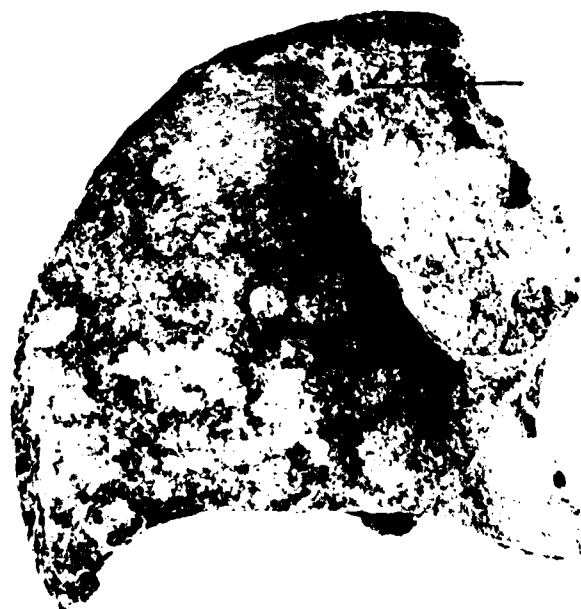


Figure 6. Site 1Pi61, Burial 55. Projectile point completely penetrating the right ilium, just superior to the sacro-iliac articular surface.



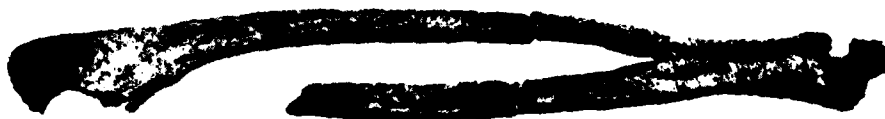
Figure 7. Field Photograph of Burial 13B at Site 1P161, showing projectile point in ribs.



Figure 8. Field Photograph of Burials 42, 43, 44 at Site 1P161, showing mass interment.



A



B

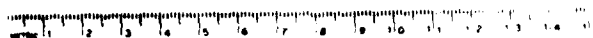


Figure 9. Site 1Pi61, Burial 85. Infected fracture callus of the distal diaphysis of the right ulna, A; Site 1Pi61, Burial 60. Possible crushing injury or synostosis of distal ends of the right radius and ulna, with pronounced atrophy, B.

TABLE 1. Burial Data From Site 1Gr1X1

Burial	Burial Type	Age	Sex	Pathology
1	single, primary, semi-flexed	40±5 years	F	degenerative pathologies
2	single, primary, fully flexed	35 years	M	hematogenous osteomyelitis

Table 2. Cultural Affiliations of Site 1Pi61 Burials

Burial	Cultural Affiliation	Burial	Cultural Affiliation
1	Late Miller III	* 44	Late Miller III
* 2	Late Miller III	* 45	Late Miller III
3	Late Miller III	46	Late Miller III
* 4	Late Miller III	47	Late Miller III
5	Late Miller III	* 48	Late Miller III
6	Late Miller III	* 49	Late Miller III
7	Undetermined	* 50	Late Miller III
8	Late Miller III	* 51	Late Miller III
9	Undetermined	52	Late Miller III
10	Undetermined	53	Late Miller III
11	Late Miller III	54	Late Miller III
12	Undetermined	55	Late Miller III
13	Undetermined	* 56	Late Miller III
14	Late Miller III	57	Undetermined
15	Late Miller III	58	Late Miller III
* 16	Late Miller III	59	Late Miller III
17	Late Miller III	60	Late Miller III
18	Undetermined	61	Late Miller III
19	Undetermined	62	Early Miller III
20	Undetermined	* 63	Late Miller III
21	Late Miller III	* 64	Late Miller III
22	Late Miller III	65	Late Miller III
23	Late Miller III	* 66	Late Miller III
24	Late Miller III	* 67	Late Miller III
25	Late Miller III	68	Late Miller III
26	Late Miller III	69	Early Miller III (?)
27	Late Miller III	70	Late Miller III
28	Late Miller III	71	Late Miller III
29	Undetermined	72	Late Miller III
* 30	Late Miller III	73	Late Miller III
* 31	Late Miller III	* 74	Late Miller III
32	Late Miller III	* 75	Late Miller III
33	Late Miller III	76	Undetermined
* 34	Late Miller III	* 77	Late Miller III
35	Late Miller III	* 78	Late Miller III
36	Late Miller III	* 79	Late Miller III
37	Late Miller III	80	Late Miller III
38	Early Miller III	81	Late Miller III
39	Late Miller III	82	Late Miller III
40	Late Miller III	* 83	Late Miller III
41	Early Miller III (?)	* 84	Late Miller III
* 42	Late Miller III	* 85	Late Miller III
* 43	Late Miller III	86	Late Miller III

* Indicates feature contained a small amount of shell tempered pottery.

Table 3. Age Distribution of Individuals Interred at Site 1P161

Age	Early Miller III			Late Miller III			Undetermined		
	Undet.	Male	Female	Undet.	Male	Female	Undet.	Male	Female
0.0 - 2.9	2	-	-	12	-	-	4	-	-
3.0 - 4.9	-	-	-	4	-	-	2	-	-
5.0 - 9.9	-	-	-	4	-	1	-	-	-
10.0 - 14.9	1	-	-	2	3	1	2	2	-
15.0 - 19.9	-	-	-	-	1	3	-	-	-
20.0 - 24.9	-	-	-	-	2	5	-	-	1
25.0 - 35.0	-	1	1	2	10	13	-	1	1
35.0 - 45.0	-	1	-	-	8	4	-	-	-
50+	-	-	-	-	2	-	-	-	-

Table 4. Burial Data from Site 1P161

Burial	Burial Type	Age	Sex	Pathology
1	primary, semi-flexed, single	1.5-2.0 years	?	cribra orbitalia
2	single, primary, flexed	30±5 years	M	trauma
3	single, primary, flexed	40+ years	F	degenerative pathologies, trauma
4	single, primary, flexed	6-7 years	?	possible systemic infection
5	single, primary, flexed	25-35 years	F	degenerative pathologies
6	single, primary, semi-flexed	older adult	F ?	degenerative pathologies
7	single, primary, seated	10±2 years	M ?	-
8	single, primary, semi-flexed	25+ years	F	mycetoma
9	?	fetus	?	possible infection
10	?	10±3 years	?	possible infection
11	single, primary, flexed	30+ years	F	trauma, degenerative pathologies

Table 4. (Continued)

Burial	Burial Type	Age	Sex	Pathology
12	single, primary, flexed	25-35 years	F	degenerative pathologies
13A	multiple, primary, flexed	infant	?	-
B	multiple, primary, flexed	19-22 years	F	trauma
C	multiple, primary, flexed	adolescent	M ?	trauma
14	single, primary, flexed	adult	M ?	-
15	single, primary, flexed	30+ years	F ?	malnutrition, degenerative pathologies
16A	single, primary, flexed	20-28 years	F	trauma, porotic hyperostosis
B	single, primary, extended	6-9 months	?	porotic hyperostosis
17	single, primary, flexed	15-17 years	F ?	-
18	single, primary, flexed	30+ years	M ?	degenerative pathologies, possible trauma
19	single, primary, semi- flexed	10-11 years	?	cribra orbitalia, possible systemic infection
20	single, primary, flexed	8-9 months fetal	?	possible sytemic infection
21	single, primary, flexed	9-12 months	?	-
22	single, primary, flexed	25+ years	?	-
23	single, primary, flexed	30±5 years	F	possible systemic infection and trauma, degenerative pathologies
24	single, primary, flexed	35-45 years	M	trauma, possible systemic infection
25	single, primary, flexed	35+ years	M	trauma, degenerative pathologies
26	single, primary, flexed	25-35 years	M	malnutrition, degenerative pathologies
27	single, primary, semi- flexed	25-35 years	M	degenerative pathologies
28	single, primary, seated	16 years	F	-
29	?	child	?	-
30	single, primary, flexed	35+ years	F	trauma, degenerative pathologies
31	secondary ?, single	adult	?	-
32	single, primary, flexed	8±1 years	?	cribra orbitalia, possible systemic infection
33	single, primary, flexed	30±5 years	F	-
34	single, primary, flexed	50+ years	M	trauma, degenerative pathologies, systemic infection
35	single, primary, flexed	35 years	M	trauma, degenerative pathologies

Table 4. (Continued)

Burial	Burial Type	Age	Sex	Pathology
36	single, primary, flexed	19-22 years	F	tuberculosis, trauma
37	single, secondary ?	adolescent	?	-
38	single, primary, flexed	10-11 years	?	systemic infection
39	single, primary, flexed	30-35 years	F	possible trauma
40	single, primary, flexed	9-11 years	? (M)	-
41	single, primary, semi-flexed	0.0-0.5 years	?	systemic infection
42	multiple, primary, semi-flexed	50+ years	M	degenerative pathologies, trauma, systemic infection
43	multiple, primary, semi-flexed	45±5 years	M	trauma, degenerative pathologies, malnutrition
44	multiple, primary, semi-flexed	35+ years	F	possible trauma, degenerative pathologies, porotic hyperostosis, systemic infection
45	single, primary, semi-flexed	0-2 months	?	systemic infection
46	single, primary, flexed	20±2 years	F	possible Gaucher's disease or systemic infection
47	single, primary, flexed	20 years	F	-
48	single, primary, flexed	30+ years	M	osteomyelitis
49	single, primary, extended	1 year	?	possible systemic infection
50	single, primary, flexed	9-10 years	? (F)	systemic infection
51	single, primary, flexed	35+ years	M	osteomyelitis
52	single, primary, flexed	25+ years	F	trauma
53	single, primary, flexed	30+ years	M ?	trauma
54	single, primary, flexed	19±2 years	M ?	trauma
55	single, primary, flexed	35±5 years	F	trauma, degenerative pathologies
56	single, primary, flexed	19±2 years	M ?	systemic infection, trauma
57	single, primary, flexed	4-5 years	?	possible systemic infection
58	single, primary, flexed	10 years	?	malnutrition, possible systemic infection
59	single, primary, flexed, seated	21 years	F	-
60	single, primary, flexed	30+ years	F	malnutrition, possible trauma or congenital defect

Table 4. (Continued)

Burial	Burial Type	Age	Sex	Pathology
61A	multiple, primary, flexed	adults & child (7-9 yrs)	M & F	trauma
B	multiple, primary, flexed			
C	multiple, primary, flexed			
62A	multiple, primary, flexed	35 years	M	trauma, degenerative pathologies
B	multiple, primary, flexed	40+ years	M ?	trauma, degenerative pathologies
C	multiple, primary, flexed	25-30 years	F	trauma, infection
63	single, primary, semi-flexed	35+ years	M	degenerative pathologies, trauma, malnutrition
64	single, primary, flexed	8-9 years	? (F)	porotic hyperostosis
65	single, primary, extended	3-4 years	?	-
66A	single, primary, semi-flexed	2-3 years	?	possible infection
B	single, primary, flexed	10-15 years	? (M)	-
67	single, primary, flexed	13-14 years	M ?	possible infection
68	single, primary, extended (?)	25+ years	M	-
69	single, primary, semi-flexed	9 months	?	porotic hyperostosis, systemic infection
70A	multiple, primary, flexed	6-7 years	?	porotic hyperostosis, osteomyelitis, systemic infection
B	multiple, primary, flexed	3-4 years	?	porotic hyperostosis, osteomyelitis, systemic infection
71	single, primary, flexed	30±5 years	F	trauma, infection
72	single, primary, extended	0.0-0.5 years	?	systemic infection
73	single, primary, flexed	45±5 years	M	osteomyelitis, degenerative pathologies, malnutrition
74	single, primary, extended	9-12 months	?	possible infection
75	single, primary, flexed	9 months fetal	?	porotic hyperostosis, systemic infection
76	single, primary, extended (?)	newborn	?	-
77	single, primary, flexed	2±0.5 years	?	porotic hyperostosis, systemic infection
78A	single, primary, semi-flexed	3-3.5 years	?	porotic hyperostosis, systemic infection
B	single, primary, semi-flexed	25-30 years	F	trauma, malnutrition
79	single, primary, semi-flexed	35+ years	M	osteomyelitis, porotic hyperostosis
80	single, primary, flexed	19 years	M	-
81	single, primary, flexed	2.5-3.5 years	?	porotic hyperostosis, systemic infection
82	single, primary, extended (?)	3-4 years	?	possible infection
83	single, primary, extended	40±5 years	F	trauma, degenerative pathologies, possible infection
84	single, primary, semi-flexed	19 years	M	trauma, infection
85	single, primary, semi-flexed	30±5 years	M	trauma, infection
86	single, primary, flexed	2-3 years	?	porotic hyperostosis, systemic infection

Table 5. Cultural Affiliation of Site 1Pi33 Burials

Burial	Cultural Affiliation	Burial	Cultural Affiliation
1	Dog, Late Miller III	*19	Mississippian
?* 2	Mississippian	*20	Mississippian
3	Mississippian (probably Early)	21	Late Miller III
4	Indeterminate		(possibly Early Mississippian)
* 5	Mississippian	22	Middle - Late Miller III
?* 6	Mississippian	?*23	Mississippian
7	Indeterminate	*24	Mississippian
8	Indeterminate	*25	Mississippian
9	Mississippian	*26	Mississippian
10	Mississippian	*27	Mississippian
*11	Mississippian	*28	Mississippian
12	Late Miller III (possibly Mississippian)	*29	Mississippian
13	Middle - Late Miller III	*30	Mississippian (possibly Early)
14	Mississippian	*31	Mississippian
*15	Mississippian	32	Late Miller III
*16	Mississippian	?*33	Mississippian
*17	Mississippian	*34	Mississippian
*18	Mississippian	35	Mississippian (probably Early)
		36	Mississippian

* Indicates burials which are part of what is probably a contemporary group of burials comprising a planned cemetery.

?* Indicates burials which may be part of the cemetery.

Table 6. Age Distribution of Individuals Interred at Site 1Pi33

Age	Late Woodland			Mississippian			Undetermined		
	Undet.	Male	Female	Undet.	Male	Female	Undet.	Male	Female
0.0 - 2.9	1	-	-	4	-	-	-	-	-
3.0 - 4.9	1	-	-	2	-	-	-	-	-
5.0 - 9.9	1	-	-	-	-	-	1	-	-
10.0 - 14.9	1	-	-	2	-	-	-	-	-
15.0 - 19.9	-	-	-	1	2	1	-	-	-
20.0 - 24.9	-	-	-	-	1	1	-	-	-
25.0 - 35.0	-	-	1	2	5	3	1	2	-
35.0 - 45.0	-	-	-	-	1	1	-	-	-
50+	-	-	-	-	1	1	-	-	-

Table 7. Burial Data from Site 1Pi33

Burial	Burial Type	Age	Sex	Pathology
1	dog			
2	single, primary, extended	15 years	M ?	-
3	single, primary, flexed	30±5 years	F	osteomyelitis
4	single, primary, extended	5-10 years	?	-
5	single, primary, extended	15 years	?	osteomyelitis
6	single, primary	2.5-3.5 years	?	porotic hyperostosis
7	multiple, secondary	adults	M	-
8	?	-	-	-
9	single, primary, extended	25-30 years	F	possible trauma
10	single, primary, extended	30+ years	?	-
11	single, primary, extended	2-3 years	?	-
12	single, primary, flexed	35±2 years	F	trauma, osteomyelitis, malnutrition
13	single, primary, flexed	10-11 years	?	-
14	single, primary, extended	4-5 years	?	systemic infection, malnutrition
15	single, primary, extended	50+ years	M	trauma, degenerative pathologies
16	single, primary, extended	50+ years	F	degenerative pathologies
17	single, primary, extended	45±5 years	F ?	degenerative pathologies
18	single, primary, extended	35±5 years	M ?	possible systemic infection
19	single, primary, extended	45±5 years	M	degenerative pathologies
20A	multiple/single, secondary/primary	adult	M ?	-
B	multiple/single, primary, extended	35 years	M	trauma
C	multiple/single, primary, extended	35±5 years	M	osteomyelitis
D	multiple/single, primary/secondary	adult	?	-
21	single, primary, flexed	9 years	?	porotic hyperostosis
22	single, primary, flexed	0.5 years	?	possible systemic infection
23	single, primary, extended	30 years	M ?	trauma, systemic infection

Table 7. (Continued)

Burial	burial type	Age	Sex	Pathology
24	single, primary, extended	9.5-11 years	?	-
25	single, primary, extended	12 years	?	possible systemic infection
26	single, primary, extended	0.5 years	?	-
27	single, primary, extended	35-40 years	M	possible trauma, systemic infection
28A	multiple/single, primary, extended	15 years	F	possible systemic infection
B	multiple/single, primary, extended	21-23 years	M	possible systemic infection
29	single, primary, semi-flexed	45-5 years	M	trauma, degenerative pathologies
30	single, primary, extended	21-23 years	F	-
31	single, primary, flexed	1.5-2.5 years	?	systemic infection, malnutrition
32	single, primary, extended	1-4 years	?	systemic infection, malnutrition
33	single, primary, flexed	28-30	F	osteomyelitis
34	single, primary, extended	45-50	F	degenerative pathologies
35	single, primary, semi-flexed	15 years	M	developmental pathologies
36	single, primary, extended	0.0 years ?	?	-

Table 8. Burial Data from Site 1Gr2

Burial	Burial Type	Age	Sex	Pathology
1	multiple, secondary	adult and subadult	M & F	-
2	single, primary, extended	4.5-5.5 years	?	systemic infection
3	single, secondary	adult	M	-
4	?	adult	M	-
5	multiple, secondary	adult and subadult	M & F	possible porotic hyperostosis (adult)
6	single, primary, extended	50±5 years	M	degenerative pathologies
7	multiple, secondary	adult and subadult	M & F	porotic hyperostosis (child) systemic infection (infant)
8	single, secondary, bundle	adult	M ?	-
9A	single, primary, semi-flexed	3.5-4.5 years	?	dental caries
B	single, primary, flexed	infant	?	-
10	single, primary, extended	7-8 years	?	systemic infection
11	single, primary, extended	adult	F ?	-
12	single, primary, extended	adult	F ?	-
13	?	adult	?	-
14	single, primary, extended	35+ years	F	degenerative pathologies
15	single, primary, extended	young adult	M ?	porotic hyperostosis
16	single, primary, extended	young adult	F	-
17	single, primary, extended	3-4 years	?	-
18	?	?	?	-
19	single, primary, extended	young child	?	-
20	single, primary, extended	45-50 years	M	osteomyelitis, degenerative arthritis
21	?	?	?	-
22	single, primary, extended	25-30 years	M ?	-
23	?	?	?	-
24	single, primary	infant	?	-
25	single, primary, extended	50±5 years	M	trauma, degenerative arthritis
26	single, primary, extended	50+ years	M	possible trauma
27	single, primary	fetal & infant	?	-
28	single, primary	0.0-0.5 years	?	-

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APPENDIX
SKELETAL DESCRIPTIONS

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SITE 1Gr1X1

BURIAL 1

Age. Adult, 40±5 years.

Sex. Female.

Comments. This single primary interment was encountered in what was an apparent refuse pit. The burial seemed to be incidental as no definite pit outline could be ascertained. The skeleton was positioned on its left side in a semi-flexed position, oriented in a NE/SW direction. The bones are in a good state of preservation and only partially fragmented. Descriptive characteristics of the skeleton include thin gracile long bones, thin cortices, small patellae, small hands and feet, gracile clavicles, large parturition pits on the pubic symphysis, elevation of the preauricular sulcus, wide sciatic notch, slight supra-orbital torus, smooth cranial vault, small pointed mastoids, partial fusion of the cranial sutures, and the medial epiphyses of the clavicles are fused and slightly eroded on the articular surfaces. Pathologies and anomalies include manubrium separate from corpus sterni, moderate to pronounced vertebral osteophytosis, extreme dental attrition, abscessing and loss of posterior teeth, and moderate plaque deposits.

Measurements. The following measurements were taken:

max. length right radius	23.2	cm
max. length left femur	41.3	cm,
head diameter	41.0	mm
left humeral head diameter	39.0	mm
right femoral head diameter	41.0	mm
computed stature	156.709±3.816	cm

BURIAL 2

Age. Adult, approximately 35 years.

Sex. Male.

Comments. This single primary interment was encountered in the central portion of a refuse pit. It was placed in a fully flexed position, lying on the right side in an ESE/WNW orientation, head E, and appeared to be an incidental inclusion in the pit fill. The skeletal material is in a good state of preservation and is only partially fragmented. Descriptive characteristics include narrow sciatic notch, no preauricular sulcus, thin long bone cortices, pronounced linea aspera, small hands, large pointed mastoids, partial fusion of cranial sutures, slight occipital torus, slight supra-orbital torus, blunt orbital borders, and the medial epiphyses of the clavicles are fused. Pathologies and anomalies include beginning fusion of sacro-iliac joints, osteophytic deposits on olecranon processes of ulnae (particularly extreme for the left

ulna which also exhibits an inflammatory reaction in this area), extreme osteomyelitis of the diaphysis of the left fibula, osteomyelitis of the left tibia, extreme osteomyelitis of right tibia, osteomyelitis of the right humerus, extreme osteomyelitis of right fibula, porous sternum, osteomyelitis of clavicles, extreme osteomyelitis of the left foot (probable mycetoma), moderate to pronounced vertebral osteophytosis (particularly in cervical region), beginning osteomyelitis of distal left humerus, beginning ossification of costal cartilage, large paccchionian pit on left parietal, extreme dental attrition and abscessing of teeth, moderate plaque deposits, and the manubrium is separate from the corpus sterni. The teeth exhibit staining by reddish-black vegetable dye. Death was caused by an extreme infection (probable mycetoma) from a possible injury of the left foot from stepping on a sharp object, resulting in hematogenous osteomyelitis.

Measurements. The following measurements were taken.

left femoral head diameter	45.0 mm
right femoral head diameter	44.0 mm
left humeral head diameter	46.5 mm
max. length right ulna	26.7 cm
computed stature	172.816±4.05 cm

SITE 1Gr2

The first four burials excavated at this site have been discussed in a previous report (Hill and Smith 1975) and will only be included in Table 8.

BURIAL 5

Comments. This series of interments is represented by four skulls and three clusters of postcranial remains. Having been uncovered by a bulldozer, the skeletal material is extremely fragmented and poorly preserved. It appears to have been a multiple secondary interment in a shallow oval pit. Skull 1 appears to have been that of an adult, possibly male, which exhibits extremely thick diploe of the parietals and occipital and evidence of cribra formation (possible porotic hyperostosis). Descriptive characteristics include a pronounced occipital torus and a completely fused sagittal suture. The age is estimated to be an older adult (30+ years). Skull 2 is that of an adult male which exhibits blunt orbital borders, pronounced supra-orbital torus, and no noticeable pathologies. Skull 3 is that of a younger adult male which exhibits large blunt mastoids, pronounced supra-orbital torus, slight dental attrition and periodontal disease, and moderate staining of the teeth by reddish-black vegetable dye. Skull 4 appears to be that of a young adult female which evidences sharp orbital borders and a slight supra-orbital torus at glabella. The cranial sutures are open, indicating an age of 25-30 years. Cluster 1 is represented by

adult scapula, thoracic and lumbar vertebrae, and foot fragments, with no observable pathologies. Cluster 2 contained poorly preserved fragments of adult feet, ribs, vertebrae, hands, sacrum and patella, perhaps from one individual. Cluster 3 contained poorly preserved post-cranial fragments of a child, with no obvious pathologies. In summary, there are at least five individuals represented: three adult males, one adult female, and a child.

BURIAL 6

Age. Adult, 50±5 years.

Sex. Male.

Comments. The burial was that of an older adult male, partially destroyed by a bulldozer. It was a primary extended interment, placed in a shallow pit in an E/W orientation, head E. The remaining skeletal material is extremely fragmented and very poorly preserved. Descriptive characteristics include dense cortices, pronounced muscle attachments, narrow sciatic notch, large blunt mastoids, slight occipital torus, and complete fusion of the three principal cranial sutures. Pathologies and anomalies include pronounced osteophytosis of cervical vertebrae, medullary cavities of clavicles are completely closed by trabecular bone, impacted third molars, extreme attrition, extreme caries and abscessing of teeth, moderate to heavy plaque deposits, and enamel hypoplasia. The teeth exhibit pronounced staining of teeth by reddish-black vegetable dye.

BURIAL 7

Comments. This was apparently a large secondary interment of several individuals in a shallow oval pit which was partially disturbed by bulldozer activity. The material is extremely fragmented and poorly preserved. Skull 1 and its accompanying mandible are those of an adolescent female. The cranial vault is smooth, with small pointed mastoids. The third molars have not erupted, indicating an age of approximately 15 years. The teeth exhibit slight attrition and heavy staining by reddish-black vegetable dye. Skull 2 is that of an adult of indeterminable sex, aged approximately 35 to 45 years. The cranial sutures are almost completely fused. Skull 3 is that of an older adult male, aged approximately 45 to 55 years. The cranium exhibits large blunt mastoids and blunt orbital borders, and the cranial sutures are fused and almost obliterated. Skull 4 is that of a child, aged 3.5 to 4.5 years. There is pathological evidence of cribra orbitalia, and the teeth are slightly stained by reddish-black vegetable dye. Skull 5 is that of an infant which exhibits endocranial lytic/blastic lesions indicative of inflammation of the meningeal cortex. Area 1 contained poorly preserved fragments of adult left femur and left tibia. Area 2 contained poorly preserved fragments of femora, tibiae, fibulae, radii, and ulnae of at least two adults.

One of the adults is very petite and gracile. There are no obvious pathologies. Area 3 contained poorly preserved fragments of adult femora, tibiae, fibulae, humeri, radii, and ulnae of male and female individuals. One individual is very robust and the other is extremely petite and gracile (perhaps the same one mentioned in Area 2). There are no obvious pathologies. Area 4 contained poorly preserved adult cranial and post-cranial fragments. The teeth exhibit moderate attrition, plaque formation, staining, and large caries along the cemento-enamel junctures. Cluster 5 is represented by adult long bone fragments of right femur, humeri, tibiae, fibulae, radii, and ulnae which are robust in appearance. Pathologies and anomalies include platycnemia of the tibiae and a large septal aperture on the left humerus. Cluster 6 contained the long bones of an extremely petite, gracile adult and the long bones of an infant. Pathologies and anomalies for the adult include anterior swelling of cortex and bowing of left tibia, and a medium-sized septal aperture on the left humerus. Cluster 7 contained adult long bone fragments which exhibit dense cortices, pronounced muscle attachments, and femoral head diameters of left and right femora of 46 mm, all being indicative of a male. There was also another set of adult femora in this cluster. Cluster 8 contained the post-cranial remains of a child, with no obvious pathologies. The innominate components are not fused. In summary, there appear to be a minimum of six individuals represented in this mass interment: two adult males, two adult females, a child and an infant. The cranial and post-cranial fragments of the adults are almost exclusively long bones and crania. The subadult skeletal material also includes torso.

BURIAL 8

Age. Adult.

Sex. Male (?).

Comments. This was a secondary bundle interment of adult long bones. There was no evidence of a pit outline because of disturbance by plowing and bulldozer activity. This burial was approximately three feet north of Burial 7. Descriptive characteristics include dense long bone cortices, pronounced linea aspera, heavy weight density, and femoral head diameter of 46 mm. No pathologies were observed.

BURIAL 9A

Age. Subadult, 3.5 to 4.5 years.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment in an irregular pit, oriented in an E/W position, head E. The burial had been badly disturbed. It appeared to be intrusive into Feature 56.

The sternal components are separate; the neural arches and centra are beginning to fuse; and the epiphyses are separate. The teeth exhibit extreme caries of the deciduous molars which have completely destroyed the crowns.

BURIAL 9B

Age. Newborn infant.

Sex. Undetermined.

Comments. This primary, tightly flexed interment of an infant was located slightly below and to the north of Burial 9A, in the same irregular pit. It did not, however, appear to have been greatly disturbed. There were no obvious pathologies.

Measurements. The following long bone measurements were taken.

max. length right radius	55 mm
max. length right ulna	63 mm
max. length left femur	77 mm
max. length right femur	77 mm

BURIAL 10

Age. Subadult, 7 to 8 years.

Sex. Undetermined.

Comments. This was a single primary interment in a shallow, elliptical pit, placed in an extended position in an E/W orientation, head E. The burial had been badly disturbed. The sternal segments are separate; the humeral epiphyses are separate; and the femoral epiphyses are separate. The skeletal material is extremely fragmented and in a fair state of preservation. There is pathological evidence of a lytic lesion on the endocranial surface and a small drainage sinus (cloaca) on a fibula. There is a slight reddish-brown stain on the teeth.

BURIAL 11

Age. Adult.

Sex. Female (?).

Comments. The field notes indicate that this was probably a primary extended interment placed in an ENE/WSW orientation in a shallow elongated pit, head NE. However, the burial had been very badly disturbed by plowing, aboriginal activity, or rodent gnawing, and consequently was extremely fragmented and poorly preserved. The only bones remaining were ribs, vertebrae, right hand, scapula, right patella, mandible, humerus and feet. Descriptive characteris-

tics include small feet and small teeth. Pathologies and anomalies include periodontal disease, moderate dental attrition, peg-shaped third molars; and the patella is long proximal/distally, thin medial/laterally, and pointed. There are cut marks on the anterior surface of the inferior tip of the patella, indicating disturbance by plowing or aboriginal activity, rather than rodent gnawing.

BURIAL 12

Age. Adult.

Sex. Female (?).

Comments. This was probably a primary extended interment placed in a shallow elongated pit in an ENE/WSW orientation, head ENE. However, very little of the burial remained because of plow disturbance. The only remaining skeletal material were left first rib, hands, right patella, hyoid, and maxillary molars (M^2 and M^3). The hands were small in size and there were extreme carious lesions on both teeth at the cemento-enamel junctures.

BURIAL 13

Age. Adult.

Sex. Undetermined.

Comments. This was a possible burial which was located in a shallow pit at the western edge of Burial 12 and the eastern side of Burial 14. The shallow pit contained several human bone fragments (left fibula and foot), but it could not be ascertained if this represented a disturbed interment or possible remains from Burial 12.

BURIAL 14

Age. Adult, 35+ years.

Sex. Female.

Comments. Burial 14 was a scattered area of bones with the two innominates widely separated. The ribs and vertebrae were in a concentrated area, along with the scapulae and clavicles. The long bones of the arms and legs and the cranium were missing, though the mandible and cervical vertebrae appeared to be in anatomical order. It appeared that the individual had been exhumed after primary interment, as evidenced by the scattering of the remaining skeletal material and the fact that the long bones and cranium were missing. There was no evidence that the disturbed appearance of the burial was related to modern disturbance by plowing. Vertebrae, pelvis,

hands, feet, ribs, patellae, scapulae, clavicles, and manubrium were all that remained of this burial. Descriptive characteristics include wide sciatic notch, elevated preauricular sulcus, large hands and feet, gracile clavicles, smooth pointed mandible, and the medial epiphyses of the clavicles are fused and slightly eroded. Pathologies include partial fusion of sacro-iliac joints, parturition pits on symphysis pubis, hourglass-shaped vertebral centra, moderate attrition, heavy plaque deposits, periodontal disease, enamel hypoplasia, abscessing and antemortem loss of left mandibular premolars and molars and right mandibular second premolar, first molar, and second molar, with subsequent alveolar resorption. The skeletal material was in a good state of preservation and only partially fragmented, placed in what was probably a primary extended position in a large asymmetrical pit along an E/W axis with the head to the east.

BURIAL 15

Age. Young adult.

Sex. Male (?).

Comments. This was a primary extended interment, placed in a shallow elongated pit on an E/W axis, head E. The burial had been partially disturbed by plowing or aboriginal activity. The skeletal material was extremely fragmented and only fairly preserved. Descriptive characteristics include pronounced linea aspera, no preauricular sulcus, and gracile long bones and clavicles. Pathologies include swollen anterior crests of tibiae, medial/lateral bowing of tibiae, platycnemia of right tibia, pronounced cribra parietalis and cribra occipitalis, moderate dental attrition, extreme caries and abscessing of posterior mandibular teeth, and the third molars appear to have been congenitally absent. The teeth were moderately stained by reddish-black vegetable dye.

BURIAL 16

Age. Young adult.

Sex. Female.

Comments. This was a primary extended interment, placed in a shallow, elongated pit in an E/W orientation, head E and the ankles crossed. There was also evidence of disturbance in the upper torso region. Descriptive characteristics include smooth cranial vault, gracile occipital, gracile long bones, small hands, wide sciatic notch, dense cortices, and a right femoral head diameter of 40.5 mm. The femoral epiphyses are fused, and the cranial sutures are open. Pathologies include extreme attrition, caries, abscessing, and antemortem loss of maxillary and mandibular molars. The mandibular teeth exhibit staining by a reddish-black vegetable dye. The skeletal material is extremely fragmented and poorly preserved.

BURIAL 17

Age. Child, 3 to 4 years.

Sex. Undetermined.

Comments. This appears to have been a primary extended interment, placed in a shallow elongated pit, oriented in a NE/SW direction, head NE. The pit was surrounded by post holes, as if some type of structure or covering had originally been constructed over the burial. The long bones and a portion of the cranium were missing. The remaining portions of the skeleton were ribs, clavicles, scapulae, feet, vertebrae, pelvis, left hand, and cranium. The skeletal material is fragmented and in a fair state of preservation. No obvious pathologies were observed.

BURIAL 18

Comments. This burial was represented by linear stains in approximately the same orientation as the remainder of the burials. The burial itself was probably graded away by road patrol.

BURIAL 19

Age. Child (2 to 4 years ?).

Sex. Undetermined.

Comments. This may have been a primary extended interment, placed in a shallow elongated pit, oriented in a NE/SW direction, head NE. However, the burial was not positioned in accordance with the shape of the burial pit, and had probably been disturbed. Only feet, ribs, and vertebrae remained, which were extremely fragmented and poorly preserved. No obvious pathologies were observed.

BURIAL 20

Age. Adult, 45 to 50 years.

Sex. Male.

Comments. This apparently had been a primary extended interment, placed in a narrow elongated pit in a NE/SW orientation, head ENE. However, it also appeared that the burial had been partially exhumed, with some of the bones collected into a secondary bundle and the rest of the skeletal material randomly scattered, in the same pit, and then covered again with pit fill. The long bones were missing. The remaining skeletal materials were hands, feet, pelvis, scapulae, clavicles, ribs, vertebrae, right ulna, cranium, and mandible, which were extremely fragmented and poorly preserved. Descriptive characteristics include large feet, heavy bone density,

robust clavicles, large blunt mastoids, pronounced occipital torus, complete fusion and obliteration of the three principal cranial sutures, and the medial epiphyses of the clavicles are fused and eroded on the articular surfaces. Pathologies include osteomyelitis of the first digit of the left foot, extreme degenerative arthritis and crushing injury of the right hand, extreme degenerative arthritis and possible microorganism infection of the vertebrae, healed fracture of the right clavicle, small pacchionian pits on the parietals, moderate to extreme dental attrition, moderate plaque deposits, and extreme abscessing and antemortem loss of all mandibular teeth, except the right first premolar, right canine, and right lateral incisor, with subsequent alveolar resorption. The teeth exhibit moderate staining by reddish-black vegetable dye. There were also the phalanges of a subadult, possibly 4 to 5 years old, mixed with the remains of this burial.

BURIAL 21

This burial was represented by linear stains in approximately the same orientation as the remainder of the burials. The bones were probably graded away by road patrol.

BURIAL 22

Age. Adult, approximately 25 to 30 years.

Sex. Male (?).

Comments. This had been a primary extended interment placed in a shallow, bathtub-shaped pit with a flat bottom. It was oriented along an ENE/WSW axis, head ENE. It had been badly disturbed, and the skeletal material was extremely fragmented and poorly preserved. Those bones remaining were humeri, ribs, scapulae, fibulae, vertebrae, pelvis, distal femora, proximal tibiae, left radius and ulna, cranium and mandible. Descriptive characteristics include thin long bone cortices, pronounced occipital torus, blunt orbital borders, and large pointed mastoids. The basilar suture is fused, and the three principal cranial sutures are open. Pathologies include slight vertebral osteophytosis, large pacchionian pits on both parietals, moderate attrition, and abscessing of mandibular molars. The teeth exhibit moderate staining by reddish-black vegetable dye.

BURIAL 23

This burial was represented by linear stains in approximately the same orientation as the remainder of the burials. The bones were probably graded away by road patrol.

BURIAL 24

Age. Newborn infant.

Sex. Undetermined.

Comments. This was probably a primary inhumation in a basin pit. The remaining skeletal material was extremely fragmented and poorly preserved. The only bones representative of this burial were left humerus, right radius, left femur, and cranial and post-cranial fragments. There were no obvious pathologies.

Measurements. The following measurements were taken.

max. length right radius	50.5 mm
max. length left femur	71.0 mm

BURIAL 25

Age. Adult, 50±5 years.

Sex. Male.

Comments. This burial appeared to have originally been a fully extended primary inhumation, placed in an elongated pit in an E/W orientation, head E. However, it also appeared that the burial had been partially exhumed. The remaining bones were ribs, vertebrae, patellae, right clavicle, scapulae, sternum, cranium, and mandible, which were fragmented and in a fair state of preservation. Descriptive characteristics include robust clavicles, robust scapulae, robust radius and ulna, pronounced occipital torus, and broad squared mandible. The cranial sutures are completely fused. There appear to be cut marks on the ribs. Pathologies include osteoarthritis of the hands, arthritis of the right shoulder (right clavicle, lateral end), possible dislocation or jamming injury of the first digit of the left foot resulting in destruction of the articular surfaces (and beginning fusion) of the distal and medial phalanges, beginning degenerative arthritis of the tarsal articular surfaces, degenerative arthritis of the vertebral centra (particularly the cervical vertebrae), Colle's fracture of the distal right radius, arthritis of proximal right ulna, periodontal disease and abscessing of posterior teeth, medium plaque leposits, moderate attrition, and injury to the right patella resulting in complete fracture and formation of pseudo-arthritis of right lateral aspect of right patella. Probably a fall of some sort can be attributed to the above injuries.

BURIAL 26

Age. Adult, 50+ years.

Sex. Male.

Comments. This was a primary extended inhumation placed face down in a bathtub-shaped pit, oriented in a NW/SE direction, head NW. Two projectile points were found in direct association with the burial, one located inferior to the right clavicle and the other located at the medial border of the proximal ends of the radius and ulna. Descriptive characteristics include narrow sciatic notches, no preauricular sulcus, square robust mandible, pronounced occipital torus, gracile clavicles, large blunt mastoids, blunt orbital borders, and pronounced supra-orbital torus. The cranial sutures are completely fused. Pathologies include moderate to extreme dental attrition and slight plaque deposits. The teeth exhibit staining by reddish-black vegetable dye. The skeletal material was extremely fragmented and poorly preserved.

BURIAL 27

Age. Approximately 0.5 years.

Sex. Undetermined.

Comments. This was a primary inhumation placed in a shallow basin-shaped pit, oriented along an E/W axis. The burial was represented by fairly well preserved fragments of ilium, radius, ulna, ribs, vertebrae, phalanges, and cranium. No pathologies were observed.

Measurements. The following measurements were taken.

max. length of left radius	62.0 mm
max. length of right ulna	71.5 mm

SITE 1P133

BURIAL 1

Comments. Burial 1 was that of a dog and has been assigned to the Late Miller III time period.

BURIAL 2

Age. Approximately 15 years.

Sex. Male (?).

Comments. This appeared to have originally been a primary extended interment, placed in a bathtub shaped pit in a SE/NW orientation, head SE. However, it also appeared that the burial had been partially exhumed by aboriginal activity. The remaining bones were patellae, sternum, humeri, ulnae, clavicles, ribs, vertebrae, feet, scapulae, hands, femora, innominates, cranium, and mandible, which were disarticulated and fragmented, but in an excellent state of preservation. Only the epiphyses of the humeri and femora were present. Descriptive characteristics include small hands and feet, narrow sciatic notch, small blunt mastoids, and sharp orbital borders. The third molars are partially erupted, the proximal epiphyses of the humeri are separate, the proximal epiphyses of ulnae are fused and the distal ones are separate, the proximal epiphyses of the femora are separate, the innominate components are fused, and the iliac crest and ischial epiphysis are separate. The manubrium and corpus sterni are separate. Pathologies include porous, hourglass-shaped vertebral centra, slight dental attrition and enamel hypoplasia.

BURIAL 3

Age. Adult, 30±5 years.

Sex. Female.

Comments. This was a primary flexed interment, placed in a basin-shaped pit in a N/S orientation, head S. The burial was discovered by a grader and was, therefore, extremely fragmented and in a fair state of preservation. Descriptive characteristics include gracile long bones, small pointed mastoids, beginning fusion of cranial sutures, and a right femoral head diameter of 40.5 mm. Pathologies include beginning osteomyelitis of distal metaphysis of right humerus, extreme hematogenous osteomyelitis of right tibia and fibula and left tibia and fibula, osteomyelitis of distal left femur and distal right femur, beginning osteomyelitis of clavicles and scapulae (at the shoulder), extreme attrition and carious lesions along cemento-enamel junctures, enamel hypoplasia, moderate plaque deposits, and globular calcification of teeth roots.

BURIAL 4

Age. Child (5 to 10 years ?).

Sex. Undetermined.

Comments. This had been a primary extended interment in a bathtub-shaped pit, oriented along an E/W axis, head E. However, most of the burial had been graded away, leaving only post-cranial appendicular fragments. No pathologies were observed. The long bone epiphyses are separate, and the epiphyses of the digits are separate.

BURIAL 5

Age. Approximately 15 years.

Sex. Undetermined.

Comments. This was a primary extended inhumation with the arm flexed toward the face, placed in an E/W orientation, head E. The burial had been badly disturbed by bulldozer activity, and the upper torso and cranium were virtually destroyed. The femoral epiphyses are separate, and the third molars have not erupted. Pathologies include extreme hematogenous osteomyelitis of the left fibula, slight attrition and plaque on mandibular teeth, and enamel hypoplasia.

BURIAL 6

Age. Child, 2.5 to 3.5 years.

Sex. Undetermined.

Comments. This appeared to have originally been a primary interment, possibly placed in a bathtub-shaped pit, in an E/W orientation, head E. The skeletal material had been badly disturbed by bulldozer activity. It also appeared that the burial had been disturbed by aboriginal activity, as indicated by the presence of a large pit which was intrusive on the southeastern edge of the burial. The burial was extremely fragmented, but in a good state of preservation. Pathologies include extreme porotic hyperostosis and enamel hypoplasia.

BURIAL 7

Comments. This was a secondary interment, with no discernible orientation. It was uncovered during grading activities and, consequently, was almost completely destroyed. It is represented by the extremely fragmented remains of at least three individuals: three crania and a small amount of post-cranial fragments. Skull 1

is that of an adult which exhibits enamel hypoplasia and pinpoint carious lesions. It is extremely fragmented and in a fair state of preservation. Skull 2 appears to be an adult male, as evidenced by large blunt mastoids. It is extremely fragmented and in a fair state of preservation. Skull 3 also appears to be that of an adult male which evidences extensive dental attrition, carious lesions and plaque deposits, and blunt orbital borders. It also is extremely fragmented and fairly preserved.

BURIAL 8

The burial and burial pit had been almost totally destroyed by bulldozer activities. No skeletal material remained. It appeared to have possibly been oriented in a NW/SE direction.

BURIAL 9

Age. Adult, 25 to 30 years.

Sex. Female.

Comments. This was a primary extended interment placed in a bathtub-shaped pit, oriented in an E/W direction, head E. The skeletal material is fragmented, but in a good state of preservation. Descriptive characteristics include large septal aperture on left humerus, small septal aperture on right humerus, elevated preauricular sulcus, wide sciatic notch, gracile long bones, dense cortices, small hands, slight supra-orbital torus, and small pointed mastoids. The medial epiphyses of the clavicles are separate. Pathologies and anomalies include possible dislocation of right femur from acetabulum, porous vertebral centra, moderate attrition, numerous pinpoint carious lesions on occlusal surfaces of teeth, enamel hypoplasia, slight plaque deposits, enamel pearl on maxillary first molar, and enamel pearl and Caribelli's cusp on right mandibular third molar.

Measurements. The following measurements were taken.

right femoral head diameter	40.0 mm
left femoral head diameter	40.0 mm
max. length right ulna	23.8 cm
computed stature	159.288±4.05 cm

BURIAL 10

Age. Older adult ? (30+ years).

Sex. Undetermined.

Comments. This was a primary extended interment placed in a bathtub-shaped pit, oriented in a SE/NW direction with the head to

the southeast. It had been very badly disturbed by bulldozer activity and, consequently, was extremely fragmented and poorly preserved. The teeth evidence extreme attrition and caries, and the roots evidence globular calcification.

BURIAL 11

Age. Child, 2 to 3 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed in a bathtub-shaped pit in an E/W orientation, head E. The skeletal material was extremely fragmented and poorly preserved. The epiphyses are separate and the innominate components are separate. There were no obvious pathologies. The left femur of a human fetus was found near the left tibia of this burial.

BURIAL 12

Age. Adult, 35±2 years.

Sex. Female.

Comments. This was a primary tightly flexed inhumation placed in a large basin-shaped pit, lying on the right side facing east. The burial was oriented in a N/S direction, head S. The skeletal material was fragmented and in a good state of preservation. Descriptive characteristics include gracile long bones, wide sciatic notch, elevated preauricular sulcus, small pointed mastoids, blunt orbital borders, and small septal aperture on the right humerus. The medial epiphyses of the clavicles are fused and the articular surfaces are slightly eroded, all long bone epiphyses are fused, and the sagittal suture is fused. Pathologies include beginning osteomyelitis of right humerus, osteomyelitis of left fibula, mid-diaphysis healed displaced fracture of left ulna, proximal diaphysis healed displaced fracture of left radius, osteomyelitis of left tibia, osteomyelitis of left femur, osteomyelitis of left ulna and left humerus, extreme porosity of sternum, porous vertebral centra, cribra parietalis, cribra occipitalis, moderate to extreme dental attrition, slight plaque deposits, enamel hypoplasia, numerous small carious lesions along cemento-enamel junctures, large carious lesion on occlusal surface with accompanying abscess of right maxillary first premolar, periodontal disease, and parturition pits along the sacro-iliac articular surface (preauricular sulcus).

Measurements. The following measurements were taken.

max. length right humerus	30.7	cm,
head diameter	39.0	mm
right femoral head diameter	40.0	mm
computed stature	163.584±4.24	cm

BURIAL 13

Age. Subadult, (10-11 years ?).

Sex. Undetermined.

Comments. This appeared to have possibly been a primary flexed interment placed in a small basin-shaped pit, perhaps oriented in a NE/SW direction. Because it had almost been completely destroyed by grading operations, the skeletal material was extremely fragmented and very poorly preserved. Only amorphous cranial and post-cranial fragments and three teeth remained. No pathologies were observed.

BURIAL 14

Age. Child, 4 to 5 years.

Sex. Undetermined.

Comments. This was a primary extended inhumation, placed in a bathtub-shaped pit with the arms parallel to the sides and the hands under the pelvis. The orientation was along an E/W axis, head E. The long bone epiphyses are separate, the innominate components are separate, and the sternal components are separate. The skeletal material, although complete, is fragmented and in a fair state of preservation. Pathologies and anomalies include slight anterior swelling and medial/lateral bowing of left tibia, cribra orbitalia, and an inca bone at lambda.

BURIAL 15

Age. Senile adult, 50+ years.

Sex. Male.

Comments. This was a primary extended interment placed in a large bathtub-shaped pit in an E/W orientation, head E. The skeletal material is only partially fragmented and in an excellent state of preservation. Descriptive characteristics include pronounced muscle attachments, light bone density, narrow sciatic notches, no preauricular sulcus, male curvature of sacrum, small blunt mastoids, sharp orbital borders, and pronounced supra-orbital torus. The medial epiphyses of the clavicles are fused and the articular surfaces are eroded, the three principal cranial sutures are completely fused, the mandible exhibits senile age changes, and the femoral neck angles are approaching 90° (indicative of old age). Pathologies include mushroom appearance of proximal epiphyses of right fibula (possible compression fracture), healed compression fracture of distal epiphysis of left radius (Colle's fracture), S-shaped ulnae (viewed posteriorly), osteophytic tendon ossification on posterior superior aspects of olecranon processes of ulnae (particularly the right ulna), evidence of trauma to greater troch-

anter of right femur (femoral head not damaged), platycnemia of tibiae, ossification of costal cartilage, extreme lumbar osteophytosis, degenerative arthritis of hands, extreme cervical osteophytosis, moderate to extreme thoracic osteophytosis, temporomandibular joint dysfunction of right mandibular condyle, abscessing and antemortem loss of all mandibular posterior teeth, moderate to extreme attrition, moderate plaque deposits, and extreme bulbous calcification of the roots of the posterior maxillary teeth.

Measurements. The following measurements were taken.

max. length right fibula	34.3 cm
max. length right radius	23.95 cm
max. length left ulna	25.3 cm
max. length left humerus	30.15 cm,
head diameter	43.5 mm
max. length right humerus	30.15 cm,
head diameter	44.5 mm
max. length right femur	40.6 cm,
head diameter	45.5 mm
max. length left femur	40.7 cm,
head diameter	47.0 mm
computed stature	158.361±3.417 cm

BURIAL 16

Age. Senile adult, 50+ years.

Sex. Female.

Comments. This was a primary extended interment placed in a large bathtub-shaped pit in an E/W orientation, head E. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include pronounced muscle attachments, thin long bone cortices, small patellae, small hands and feet, wide sciatic notch, very little elevation of preauricular sulcus, sharp orbital borders, smooth cranial vault, complete fusion of three principal cranial sutures, small pointed mastoids, smooth pointed mandible, senile age changes in mandible and fusion of medial epiphyses of clavicles. Pathologies and anomalies include platycnemia of tibiae, right radius is bowed medial/laterally, S-shaped right ulna, vertebral osteophytosis, extreme globular ossification of molar roots, extreme attrition, caries, abscessing, and antemortem loss of teeth (particularly on left side), extensive plaque deposits (granular in texture), and maxillary abscess of left canine which had perforated the palate.

Measurements. The following measurements were taken.

right femoral head diameter	40.0 mm
max. length right ulna	23.7 cm
max. length left femur	40.1 cm,
head diameter	40.0 mm
computed stature	153.601±3.816 cm

BURIAL 17

Age. Older adult, 45±5 years.

Sex. Female (?).

Comments. This was a primary extended interment with the arms flexed across the chest, placed in a large bathtub-shaped pit, oriented in a SE/NW direction, head SE. The skeletal material is partially fragmented and in a good state of preservation. Descriptive characteristics include small septal aperture on left humerus, dense long bone cortices, pronounced muscle attachments, large feet, elevated preauricular sulcus, medium width sciatic notch, pronounced occipital torus, small pointed mastoids, complete fusion of sagittal and lambdoid sutures, complete fusion of medial epiphyses of clavicles, and senile age changes in mandible. Pathologies and anomalies include platycnemia of tibiae, vertebral osteophytosis, auditory exostoses of both external auditory meati which almost completely blocked the canals, everted gonial angles, temporomandibular joint dysfunction of right mandibular condyle, extreme dental attrition and granular plaque deposits which cover the occlusal surfaces of the posterior teeth and several of the anterior teeth, and abscessing and antemortem loss of mandibular first and second molars with subsequent alveolar resorption.

Measurements. The following measurements were taken.

left femoral head diameter	45.5	mm
right femoral head diameter	45.5	mm
max. length left humerus	30.2	cm,
head diameter	43.0	mm
computed stature	162.124±4.24	cm

BURIAL 18

Age. Adult, 35±5 years.

Sex. Male ?.

Comments. This was a primary extended interment placed in a rectangular box-shaped pit facing north. The orientation was in an E/W direction, head E. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include pronounced muscle attachments, gracile long bones, no preauricular sulcus, medium width sciatic notch, small pointed mastoids, sharp orbital borders, smooth cranial vault, small hands and feet, smooth squared mandible, and complete fusion of medial epiphyses of clavicles. Pathologies include platycnemia of tibiae, extremely thin proximal diaphysis of right fibula, small localized lytic lesion on medial posterior aspect of distal metaphysis of left femur, porous hourglass-shaped vertebral centra, auditory exostosis of right external auditory meatus, slight to extreme attrition, pronounced enamel hypoplasia, moderate plaque deposits, extreme carious lesions and abscessing and loss of mandibular first and second

molars. There is also an unusual pathology involving the sacro-iliac articular surface of the left ilium: the entire surface is sunken, with an oval depression in the center; there is no evidence of lytic/blastic activity, although this appears to have been some form of cyst or tumor, and there is no evidence of dislocation. There is evidence of slight staining of maxillary right first and second molars by reddish-black vegetable dye.

Measurements. The following measurements were taken.

right humeral head diameter	41.0 mm
right femoral head diameter	44.0 mm
max. length left femur	43.7 cm,
head diameter	45.0 mm
computed stature	165.141±3.417 cm

BURIAL 19

Age. Older adult, 45±5 years.

Sex. Male.

Comments. This was a primary extended interment placed in a large bathtub-shaped pit with the arms crossed at the pelvis. It was oriented in an E/W direction, head E. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include pronounced muscle attachments, light bone density, robust long bones, narrow sciatic notches, no preauricular sulcus, pronounced occipital torus, gracile pointed mandible, and small blunt mastoids. The medial epiphyses of the clavicles are fused and the articular surfaces are slightly eroded, the sagittal and lambdoid sutures are completely fused, and the coronal suture is still partially open. Pathologies include plactycnemia of the tibiae, 90° angles of the femoral necks, slight vertebral osteophytosis, extreme dental attrition and caries, moderate plaque deposits, enamel hypoplasia, periodontal disease, and no evidence of dental abscessing. The teeth exhibit slight staining by reddish-brown vegetable dye.

BURIAL 20A

Age. Adult.

Sex. Male ?.

Comments. Burial 20 was a rather complex one which included the skeletal remains of at least four individuals, which have been designated with the letters A, B, C, and D. The burial was oriented in an E/W direction, placed in a large bathtub-shaped pit. Burial 20A was a primary interment of a set of arms and lower legs, perhaps from the same individual, placed over the legs of Burial 20B. The bones of these arms and legs were in anatomical order, indicating that they were in the fleshed state at the time of

interment. They were placed in the same orientation as Burial 20B, with the proximal ends of the humeri and tibiae toward the east. The skeletal material was partially fragmented and in a good state of preservation. Those bones which represent this interment are humeri, radii, ulnae, tibiae, fibulae, hands, feet, and patellae. Descriptive characteristics include robust long bones, large hands and feet, and a large septal aperture on the left humerus. The right fibula was bowed lateral/medially (inward toward the tibia).

Measurements. The following measurements were taken.

max. length left radius	26.4	cm
max. length left humerus	34.1	cm,
head diameter	44.0	mm
max. length right tibia	40.2	cm,
min. length	39.2	cm
computed stature	172.544±2.812	cm

BURIAL 20B

Age. Adult, approximately 35 years.

Sex. Male.

Comments. This was a primary extended interment placed on his back over Burial 20C. The orientation of this individual was also in an E/W direction, head E. The skeletal material was partially fragmented and in a fair state of preservation. The descriptive characteristics of the post-cranial remains include very robust clavicles, robust long bones, extremely broad sternum, no preauricular sulcus, and complete fusion of the medial epiphyses of the clavicles. A triangular projectile point was found in the right side of the chest of Burial 20B. Unfortunately, the cranial fragments from Burials 20B and 20C were mixed together. They were extremely fragmented and in a fair state of preservation. Both crania exhibit typically male characteristics. The mandibles are short and wide. One individual had a very large pacchionian lesion on the right parietal, representing a rather large aneurism. With reference to cranial suture closure, both appear to have at least been in their mid to late 30s in age. The teeth exhibit moderate to extreme attrition, enamel hypoplasia, moderate plaque deposits, caries and abscessing of the molars, and slight staining of the posterior teeth by a reddish-black vegetable dye.

Measurements. The following measurements were taken.

max. length left radius	26.7	cm
max. length right ulna	27.9	cm
max. length left ulna	28.3	cm
max. length right radius	27.0	cm

BURIAL 20C

Age. Adult, 35±5 years.

Sex. Male.

Comments. This was a primary extended interment placed in the bottom of the bathtub-shaped pit, oriented in an E/W direction, head E. Burials 20B, 20D and 20A were placed above Burial 20C. The skeletal material of Burial 20C is fragmented and in a fair state of preservation. Descriptive characteristics include robust long bones and no evidence of a preauricular sulcus. The right femoral head diameter is 48 mm. Pathologies include osteomyelitis of proximal diaphysis of left ulna, extreme osteomyelitis of left radius and ulna, cortical fusiform swelling of mid-diaphyses of left and right tibiae, and porous hourglass-shaped vertebral centra.

BURIAL 20D

Age. Adult.

Sex. Undetermined.

Comments. These were the partial remains of two feet (left and right) which were placed on top of the lower leg of Burial 20B. Burial 20A was placed over 20D. The skeletal material is fragmented and in a fair state of preservation. No pathologies were observed.

BURIAL 21

Age. Child, approximately 9 years.

Sex. Undetermined.

Comments. This was a primary flexed burial placed in a seated position with the back to the northwest on the northwest side of a large bathtub-shaped pit. It was oriented in a NW/SE direction, head E. The skeletal material is fragmented and in a good state of preservation. The long bone epiphyses are not fused, the innominate components are separate, and the neural arches and centra are fused. Pathologies include porous vertebral centra, cribra orbitalia, enamel hypoplasia, and moderate plaque deposits.

Measurements. The following measurements were taken.

max. length left ulna	164	mm
max. length right radius	148	mm
max. length right femur	267	mm
max. length right tibia	220	mm

BURIAL 22

Age. Infant, approximately 0.5 years.

Sex. Undetermined.

Comments. This was a primary flexed interment, lying on the right side in a deep, bowl-shaped pit. It was oriented in a WSW/ENE direction, head WSW. The skeletal material is fragmented and in an excellent state of preservation. The bones are seared on the exterior surfaces, indicating a partial cremation while still in the fleshed state. There is pathological evidence of periostitis of the right tibia.

BURIAL 23

Age. Adult, approximately 30 years.

Sex. Male.

Comments. This was a primary extended interment lying on the back with the knees flexed toward the south, in a bathtub-shaped pit. The left hand was placed on the left femur and the right hand was placed on the pelvis. It was oriented in an E/W direction, head E. The skeletal material was partially fragmented and in an excellent state of preservation. Descriptive characteristics include pronounced linea aspera, thin cortices, very robust clavicles, large hands and feet, pronounced muscle attachments, medium width sciatic notch, slightly elevated preauricular sulcus, large blunt mastoids, prominent occipital torus, sharp orbital borders, robust squared mandible, and final stages of fusion for medial epiphyses of clavicles. Pathologies include possible lumbar injury with resultant osteophytosis, porosity and swelling of distal metaphysis of right fibula, slight periostitis of diaphysis and metaphysis of left fibula, healed fracture callus of right ulna in mid-diaphysis region (perfectly reduced), slight periostitis and cortical swelling of distal metaphysis of right tibia, moderate attrition, extreme abscessing and antemortem loss of right mandibular M_1 , M_2 , and M_3 with subsequent alveolar resorption, antemortem loss of left mandibular first molar, heavy granular plaque deposits on maxillary posterior teeth (PM_1 through M^3) on both sides of maxillae which actually has formed a crust over the occlusal surfaces.

Measurements. The following measurements were taken.

Long Bones

left femoral head diameter	45.0 mm
max. length right fibula	35.9 cm
max. length left ulna	36.8 cm
(pathological) max. length right ulna	27.3 cm
max. length right femur	44.45 cm,
head diameter	44.0 mm

max. length right humerus	31.9	cm,
head diameter	44.0	mm
max. length left humerus	31.2	cm,
head diameter	42.5	mm
computed stature	166.836±3.417	cm
<u>Mandible</u>		
symphysis height	35.5	mm
bigonial diameter	98.5	mm
bicondylar diameter	121.0	mm
left ascending ramus height	60.0	mm
corpal length, go-gn	90.0	mm

BURIAL 24

Age. Subadult, 9.5 to 11 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed in a bathtub-shaped pit, in an E/W orientation, head E. The skeletal material was extremely fragmented and poorly preserved. The long bone epiphyses are separate, and the vertebral components are fused. The teeth exhibit moderate plaque deposits and large carious lesions on the occlusal surfaces of the mandibular molars.

BURIAL 25

Age. Subadult, approximately 12 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed in a bathtub-shaped pit, facing north. The orientation was in an E/W direction, head E. The skeletal material was extremely fragmented and poorly preserved. The long bone epiphyses are not fused, the innominate components are separate, the sacral segments are separate, and there is a septal aperture on the left humerus. Pathologies and anomalies include thin, elongated patellae, periostitis of left calcaneus, barreled mandibular lateral incisors, large carious lesions on occlusal surfaces of mandibular molars, and a possible developmental or traumatic pathology resulting in a deformity of the distal metaphysis of the left humerus (flattened, twisted inward, large callus on anterior aspect).

BURIAL 26

Age. Infant, approximately 0.5 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed in a small bathtub-shaped pit and oriented in an ESE/WNW direction, head ESE. The skeletal material was in an excellent state of preservation and only partially fragmented. The metopic suture is in final stages of closure. The occipital components are separate.

Measurements. The following long bone measurements were taken.

max. length left tibia	78.5	mm
max. length right tibia	78.0	mm
max. length left femur	93.0	mm
max. length right femur	93.0	mm
max. length right radius	63.5	mm
max. length right ulna	72.0	mm
max. length left radius	64.0	mm
max. length left ulna	72.0	mm
max. length left humerus	78.0	mm
max. length ? fibula	73.5	mm
max. length right humerus	77.5	mm

BURIAL 27

Age. Adult, 35 to 40 years.

Sex. Male.

Comments. This was a primary extended inhumation placed in a large bathtub-shaped pit, with the ankles crossed. It was oriented in an E/W direction, head E. It appeared as if the individual was interred on a litter or platform of charred saplings, averaging 0.1 ft in diameter. The skeletal material was fragmented and in a fair state of preservation. Descriptive characteristics include robust long bones, heavy bone density, large hands and feet, narrow sciatic notches, no preauricular sulcus, small blunt mastoids, blunt orbital borders, and 35-39 year category for Todd's (1920) pubic symphysis. The medial epiphyses of the clavicles are fused and the articular surfaces are slightly eroded. Pathologies include possible healed greenstick fracture of proximal diaphysis of left fibula, slightly enlarged and porous distal metaphyses/epiphyses of femora, platycnemia of tibiae, slight vertebral osteophytosis, pyogenic arthritis or osteomyelitis of superior surface of first sacral vertebra, moderate to extreme dental attrition and plaque deposits, extreme abscessing and antemortem loss of all mandibular posterior teeth with subsequent alveolar resorption, periodontal disease, and enamel hypoplasia.

Measurements. The following long bone measurements were taken.

right humeral head diameter	47.0	mm
left humeral head diameter	48.0	mm
max. length left radius	25.2	cm
max. length left femur	46.2	cm,
head diameter	50.0	mm
right femoral head diameter	49.0	mm
computed stature	170.791±3.417	cm

BURIAL 28A

Age. Approximately 15 years.

Sex. Female.

Comments. This was a primary extended inhumation placed over Burial 28B, with the right arm slightly flexed across the pelvis. Both individuals were placed in a large bathtub-shaped pit, oriented in an E/W direction, heads E. The skeletal material for Burial 28A was fragmented and in a fair state of preservation. Descriptive characteristics include thin long bone cortices, gracile long bones, small patellae, small hands and feet, and slightly elevated preauricular sulcus. All epiphyses of the femora are separate from diaphyses, the proximal epiphyses of radii are beginning to fuse, the proximal epiphyses of ulnae are fused, the distal epiphyses of humeri are fused, the proximal and distal epiphyses of tibiae are separate, the distal epiphyses of radii are separate, the iliac crests and ischial epiphyses are not fused, and the third molars have not erupted. Pathologies include platycnemia of tibiae, periostitis of medial end of left clavicle, porous vertebral centra, moderate attrition, and an extensive carious lesion of the occlusal surface of the right mandibular first molar.

BURIAL 28B

Age. Young adult, approximately 21 to 23 years.

Sex. Male.

Comments. This was a primary extended interment placed on the bottom of the pit under Burial 28A. The skeletal material was fragmented and poorly preserved. Descriptive characteristics include heavy bone density, large acetabulum, no preauricular sulcus, and small blunt mastoids. The left femoral head diameter is 46 mm, and the proximal epiphyses of the tibiae are not fused. Pathologies and anomalies include platycnemia of the tibiae, separate sternal components, porous vertebral centra, moderate attrition, enamel hypoplasia, extensive carious lesion of occlusal surface of maxillary molar, slight plaque deposits, and the third molars are impacted and peg-shaped.

BURIAL 29

Age. Adult, 45±5 years.

Sex. Male.

Comments. This was a primary semi-flexed interment placed in the bottom of a large bathtub-shaped pit, oriented in an E/W direction, head E. The knees were tightly flexed and pointed upward to accommodate the pit. The left arm was extended and the right

arm was flexed under the torso. The skeletal material was partially fragmented and in an excellent state of preservation. Descriptive characteristics include extremely robust long bones, thinning long bone cortices, large hands and feet, extremely large clavicles, narrow sciatic notch, no preauricular sulcus, large acetabulum, 39-44 age range for pubic symphysis according to Todd (1920), large blunt mastoids, prominent supra-orbital torus, robust squared mandible, complete fusion of medial epiphyses of clavicles, and complete fusion of the three principal cranial sutures. Pathologies and anomalies include slight scoliosis of the sacrum to the right side, compression fracture of the right side of the fourth and fifth lumbar vertebrae, partial fusion of the right clavicle to the manubrium, ossification of costal cartilage, moderate attrition, slight plaque deposits, two enamel pearls on the left maxillary third molar (also abscessed), extreme decay of right maxillary first molar and an extreme kissing carious lesion of the left mandibular second premolar and first molar with accompanying abscess, and extreme decay of left mandibular third molar with accompanying abscess.

Measurements. The following measurements were recorded.

Long Bones

max. length right tibia	39.5	cm,
min. length	39.0	cm
max. length left femur	45.9	cm,
head diameter	49.0	mm
right femoral head diameter	49.5	mm
max. length left radius	25.4	cm
max. length right ulna	27.7	cm
max. length right humerus	32.7	cm,
head diameter	49.0	mm
max. length left humerus	33.0	cm,
head diameter	48.0	mm
max. length right fibula	37.5	cm
max. length left tibia	39.9	cm,
min. length	39.1	cm
computed stature	170.113±3.417	cm

Cranium

max. length	182.5	mm
max. breadth	138.0	mm
min. frontal breadth	95.5	mm

Mandible

bigonial diameter	102.0	mm
bicondylar diameter	135.0	mm
symphysis height	38.0	mm
left ascending ramus height	73.0	mm
corpal length, go-gn	92.5	mm

BURIAL 30

Age. Adult, 21 to 23 years.

Sex. Female.

Comments. This was a primary extended inhumation placed in a large bathtub-shaped pit in an E/W orientation, head E. The skeletal material was fragmented and in a good state of preservation. Descriptive characteristics include small feet, thin long bone cortices, wide sciatic notch, elevated preauricular sulcus, sharp orbital borders, small rounded mastoids, and gracile mandible. The sacral vertebrae are not completely fused, the iliac crest and ischial epiphyses are in final stages of fusion, the sternal components are recently fused, the distal epiphyses of the humeri are fused and the proximal ones are in final stages of fusion, the proximal and distal epiphyses of the fibulae are fused, the proximal and distal epiphyses of the tibiae are fused, all epiphyses of the femora are fused, and the basilar suture is fused. Pathologies and anomalies include porous vertebral centra, porosity of proximal metaphyses of tibiae, enamel hypoplasia, slight attrition, no plaque deposits, small third molars, and the right maxillary second premolar is turned sideways in the socket between the first premolar and first molar so that the mesial and distal surfaces are exposed buccal/lingually.

Measurements. The following measurements were taken.

Long Bones

max. length right tibia	37.0	cm,
min. length	36.2	cm
max. length left tibia	37.1	cm,
min. length	36.3	cm
max. length left femur	43.5	cm,
head diameter	39.0	mm
max. length left humerus	31.4	cm,
head diameter	37.0	mm
max. length right humerus	31.5	cm,
head diameter	37.0	mm
max. length right femur	43.5	cm,
head diameter	38.5	mm
max. length right fibula	36.0	cm
computed stature	162.407±3.816	cm

Cranium

min. frontal breadth	90.0	mm

Mandible

symphysis height	31.0	mm
bigonial diameter	91.5	mm
bicondylar diameter	120.0	mm
corpal length, go-gn	87.5	mm
left ascending ramus height	55.0	mm

BURIAL 31

Age. Child, 1.5 to 2.5 years.

Sex. Undetermined.

Comments. This was a primary flexed burial placed in a large basin-shaped pit in an E/W orientation, head E, face turned N. It

was placed on its back with the knees drawn up to the chest. The skeletal material was extremely fragmented and in a fair state of preservation. The long bone epiphyses are separate, the innominate components are separate, the squamous portion of the temporal is in final stages of fusion, the lateral portions of the occipital have not fused to the basilar portion, and the metopic suture is fused. Pathologies include a large lytic area on the endocranial surface and cribra parietalis along the sagittal suture of the ectocranial surface, a small lytic/ blastic area on the ectocranial surface at glabella, cribra orbitalia, lytic activity on the internal surface of the palate (lingual surface) and around and inside the teeth sockets, and enamel hypoplasia. A possible diagnosis would be a possible oral cavity infection which spread to the meningeal cortex, which resulted in malnutrition (anemia) from not being able to eat because of the infection. This could happen, for instance, if the mother had a mastitis infection.

BURIAL 32

Age. Child, approximately 3 to 4 years.

Sex. Undetermined.

Comments. This was a primary extended inhumation placed in a small bathtub-shaped pit in an E/W orientation, head E. The skeletal material was fragmented and in a fair state of preservation. The innominate components are separate, the long bone epiphyses are separate, and the occipital components are separate. Pathologies include extreme cortical swelling of the right and left radius and ulna, moderate to pronounced cortical swelling of humeri, pronounced anterior/posterior bowing of femora, pronounced cortical swelling and medial/lateral bowing of tibiae and fibulae, porous vertebral centra, porosity of ribs, and cribra parietalis. The teeth are slightly stained by reddish-brown vegetable dye.

BURIAL 33

Age. Adult, approximately 28 to 30 years.

Sex. Female.

Comments. This was a primary flexed interment, placed in a small bathtub-shaped pit in a WNW/ESE orientation, head WNW. The individual was placed on the back with the legs flexed to the left side of the chest. The right forearm was placed across the abdomen and the left forearm was under the pelvis. The head was turned to the individual's right. The skeletal material is only partially fragmented and in a good state of preservation. Descriptive characteristics include gracile pointed mandible, smooth gracile cranial vault, sharp orbital borders, small blunt mastoids, gracile long bones, large septal apertures on humeri, small feet and hands,

presence of preauricular sulcus, wide sciatic notch, and the medial epiphyses of the clavicles are in beginning stages of fusion. Pathologies and anomalies include porous hourglass-shaped vertebral centra, moderate dental attrition, slight plaque deposits on mandibular teeth, abscessing and antemortem loss of max. ibular left and right first and second molars, large carious lesion on occlusal surface of left mandibular third molar, large wormian bone at lambda (not inca bone), periodontal disease and enamel hypoplasia, slight plaque deposits on maxillary teeth, beginning osteomyelitis of distal metaphysis of left fibula, possible joint infection of both shoulders, joint infections of knees, beginning osteomyelitis of distal half of right fibula, pyogenic arthritis or mycetoma of left foot, and six sacral vertebrae.

Measurements. The following measurements were taken.

Long-Bones

max. length right femur	43.4	cm,
head diameter	41.0	mm
max. length left femur	43.6	cm,
head diameter	42.0	mm
max. length right humerus	32.3	cm,
head diameter	39.5	mm
max. length left humerus	32.0	cm,
head diameter	40.0	mm
max. length right fibula	34.6	cm
max. length left ulna	26.2	cm
computed stature	162.666±3.816	cm

Mandible

symphysis height	31.0	mm
bigonial diameter	99.5	mm
bicondylar diameter	120.0	mm
corpal length, go-gn	88.0	mm
left ascending ramus height	60.0	mm

BURIAL 34

Age. Adult, approximately 45-50 years.

Sex. Female.

Comments. This was a primary extended interment with the left arm flexed so that the left hand was placed over the left clavicle. It was placed in a bathtub-shaped pit in an E/W orientation, head E. The right torso was partially disturbed. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include small hands and feet, thin gracile long bones, pronounced muscle attachments, large septal apertures on humeri, slight elevation of preauricular sulcus, senile age changes in mandible, wide smooth pointed mandible, small pointed mastoids, sharp orbital borders, complete fusion of sagittal and lambdoid sutures (coronal suture is still partially open), and complete fusion of medial epiphyses of clavicles with erosion of articular

surfaces. Pathologies include platycnemia of tibiae, slight vertebral osteophytosis, extreme attrition and moderate to pronounced plaque deposits on mandibular teeth, antemortem abscessing and loss of all posterior mandibular teeth with subsequent alveolar resorption, tempromandibular joint dysfunction of right ramus and condyle of mandible, moderate to extreme attrition and plaque deposits on maxillary teeth, caries along the cemento-enamel junctures, and enamel hypoplasia.

Measurements. The following long bone measurements were taken.

max. length right radius	23.7	cm
max. length left radius	23.3	cm
max. length right femur	42.0	cm,
head diameter	42.0	mm
max. length left femur	42.4	cm,
head diameter	41.5	mm
computed stature	159.558±3.816	cm

BURIAL 35

Age. Adolescent, approximately 15 years.

Sex. Male.

Comments. This was a primary semi-flexed burial placed in a large basin-shaped pit, lying on the right side. The skeletal material is partially fragmented and in an excellent state of preservation. Descriptive characteristics include dense cortices, narrow sciatic notch, no preauricular sulcus, gracile slightly squared mandible, large blunt mastoids, and small teeth. The proximal epiphysis of the radius is in final stages of fusion and the distal epiphysis is separate. The lesser trochanter of the femur is fused, the greater trochanter is in final stages of fusion, and the capital and distal epiphyses are separate (it appears that the capital epiphysis was just beginning to fuse). The proximal and distal epiphyses of the tibia are separate, and the epiphyseal rings are not fused to the vertebral centra. The distal epiphyses of the second, third, fourth and fifth metatarsals and metacarpals are not fused and the proximal ones are fused, and the proximal epiphyses of the first metatarsal and metacarpal are not fused and the distal ones are fused. The innominate components are fused, the iliac crest and ischial epiphysis are not fused, the basilar suture is open, and the distal epiphyses of the ulnae are separate. The proximal epiphyses of the humeri are separate and the distal ones are fused, the sternal components are separate, the sacral segments are beginning to fuse, the medial epicondyles of the humeri are beginning to fuse, and the distal and proximal epiphyses of the fibulae are separate. Pathologies and anomalies include slight attrition, enamel hypoplasia, no plaque deposits, spina bifida occulta of all sacral vertebrae, porosity of distal metaphyses of femora, and the third molars appear to be impacted, there is a slight amount of blastic inflammatory bone at these points on the mandible and maxillae. There appears to have possibly been a

craniopharyngioma on the body of the sphenoid (a neoplasm, also known as Erdheim tumor).

BURIAL 36

Age. Newborn infant (?).

Sex. Undetermined.

Comments. This was a primary extended interment placed in a small, bathtub-shaped pit in an E/W orientation, head E. The skeletal material was extremely fragmented and very poorly preserved. Only the left femur, left ribs, vertebrae, left humerus, cranium, and mandible were recovered. No pathologies were observed.

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BURIAL 1

Age. Infant, 1.5 to 2.0 years.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment placed on the right side in a shallow basin-shaped pit. It was oriented in a NW/SE direction, head NW. The skeletal material is fragmented and in a good state of preservation. The metopic suture is fused and the basilar and lateral portions of the occipital are separate. Pathologies include porous vertebral centra, cribra orbitalia, a small oval blastic lesion in the center of the frontal bone (just to the left of the metopic suture), and a "porous" line of bone along the metopic suture which is possibly indicative of recent closure.

Measurements. The following long bone measurements were taken.

(fragmented) max. length right humerus	108.5	mm
max. length left humerus	112.0	mm
max. length right radius	85.0	mm
max. length left tibia	116.1	mm
max. length right femur	141.0	mm

BURIAL 2

Age. Adult, 30±5 years.

Sex. Male.

Comments. This was a primary fully flexed inhumation placed on the right side in a deep basin-shaped pit. It was oriented in a N/S direction, head S. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include heavy weight density of long bones, thinning long bone cortices, pronounced muscle attachments, narrow sciatic notch, no preauricular sulcus, large hands, small septal aperture on left humerus, pronounced supraorbital torus, slightly pronounced occipital torus, small pointed mastoids, squared mandible and parietal bossing. Pathologies and anomalies include osteophytosis of lumbar vertebrae (with a possible compression fracture), compression fractures of third, fourth and fifth cervical vertebrae, fused roots of third molars which are very small (almost peg-shaped), healed fracture of distal phalanx and medial phalanx of right foot, healed fracture of distal phalanx of left foot, and possible healed green-stick fracture of the medial aspect of the distal diaphysis of the left fibula. Dental pathologies include moderate plaque deposits and periodontal disease. The most outstanding dental pathology is the unusually uneven attrition of the teeth and the fact that the right maxillary and mandibular quadrants are heavily stained with what appears to be a reddish-black vegetable dye. The attrition on these

two quadrants appears to be more uneven than those on the left side.

Measurements. The following long bone measurements were taken.

max. length right radius	25.4 cm
max. length right ulna	27.35 cm
left femoral head diameter	46.0 mm
max. length left humerus	32.2 cm,
head diameter	46.5 mm
max. length right femur	43.0 cm,
head diameter	45.5 mm
max. length left ulna	27.1 cm
computed stature	163.559±3.417 cm

BURIAL 3

Age. Adult, 40+ years.

Sex. Female.

Comments. This was a primary fully flexed interment placed on the left side in an oval basin-shaped pit. It was oriented in a SE/NW direction, head SE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include pronounced muscle attachments, gracile long bone, large septal aperture on both humeri, thin long bone cortices, slight occipital bun, smooth cranial vault, *small pointed mastoids*, and gracile mandible. Pathologies and anomalies include a large inca bone at lambda, small rounded osteochondritic cyst in the center of the head of the right radius (on the articular surface), vertebral osteophytosis in thoracic and lumbar regions, extreme dental attrition and periodontal disease, dental caries, alveolar abscessing, and heavy plaque deposits. It appears that every mandibular tooth was lost antemortemly because of abscessing, with subsequent alveolar resorption. There is one extensive mandibular abscess involving the right PM₁, PM₂, M₁, and M₂. The cervical vertebrae evidence degenerative changes, the joint articular surfaces show signs of degeneration and inflammation, and one of the feet evidences a crushing injury.

Measurements. These measurements were taken.

right femoral head diameter	39.5 mm
left femoral head diameter	39.5 mm
right humeral head diameter	39.5 mm

BURIAL 4

Age. Child, approximately 6 to 7 years.

Sex. Undetermined.

Comments. Burial 4 was badly damaged by bulldozer activity and was extremely fragmented. It is possible that it was a primary interment placed on the right side and oriented in a N/S direction, head S. It was a midden burial. The innominate components are separate and the long bone epiphyses are separate. The tibiae exhibit pronounced cortical swelling. There is also an infant, aged approximately 1 to 2 years, mixed with the material.

BURIAL 5

Age. Adult, 25 to 35 years.

Sex. Female.

Comments. This was a primary flexed interment, placed on the right side in a shallow oval pit and oriented in a N/S direction, head N. It had been badly disturbed by bulldozer activity, and the skeletal material was consequently extremely fragmented, but in a good state of preservation. Descriptive characteristics include thin gracile long bones, thin long bone cortices, preauricular sulcus is present, small hands and feet, complete fusion of epiphyses, and a femoral head diameter of 39.5 mm. Pathologies include degenerative arthritis of hands and feet, beginning fusion of sacro-iliac joints, erosion of acetabulae and femoral heads (degenerative arthritis), and degenerative arthritis (possible mycetoma) of right talus and calcaneus so that they are beginning to fuse together.

BURIAL 6

Age. Older adult.

Sex. Female ?.

Comments. This was a primary interment which had been badly disturbed by bulldozer activity. It appeared that the individual was interred in the midden in a N/S orientation, head N. The right arm was extended, but it is postulated that the burial was at least partially flexed and lying on the left side. The skeletal material was extremely fragmented. Descriptive characteristics include pronounced muscle attachments, thin long bone cortices, and the presence of a preauricular sulcus. Pathologies include degenerative arthritis of the hand and extreme degenerative arthritis of the vertebrae.

BURIAL 7

Age. Subadult, approximately 10±2 years.

Sex. Male ?.

Comments. This burial appeared to have been perhaps placed in a seated position. It had been very badly damaged by bulldozer activity and was extremely fragmented. Very little remained of the burial, and no orientation could be ascertained. The innominate components are separate and the long bone epiphyses are separate. It appeared that the sciatic notch was narrow. No pathologies were observed.

BURIAL 8

Age. Adult, 25+ years.

Sex. Female.

Comments. This was probably a primary semi-flexed interment placed on the left side in a shallow pit and oriented in an E/W direction, head W. It had been disturbed by bulldozer activity so that only the lower arms, pelvis, legs, and mandible remained. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include dense long bone cortices, pronounced muscle attachments, large septal aperture on right humerus, and smooth pointed mandible. Pathologies and anomalies include slight porosity of anterior aspect of proximal epiphysis of left tibia, extremely thin fibulae (with the left being even more pronouncedly thin than the right), evidence in the left foot of advanced chronic hematogeneous osteomyelitis with the concentration of the infection located in the center of the foot (probable mycetoma), the talus shows little evidence of involvement in this infection, moderate attrition and plaque deposits, periodontal disease and fusion of the roots of the third molars.

Measurements. These measurements were taken.

left femoral head diameter	42.0 mm
right femoral head diameter	41.0 mm

BURIAL 9

Age. Fetus (perhaps newborn).

Sex. Undetermined.

Comments. The exact placement characteristics of this interment are not known because the burial was severely disturbed by bulldozer activity. It was a midden interment. The skeletal material is extremely fragmented and poorly preserved. The medullary cavities of the long bones are almost completely obliterated by dense cortical bone.

BURIAL 10

Age. Subadult, 10±3 years.

Sex. Undetermined.

Comments. This was also a midden interment which had been badly disturbed by bulldozer activity. The position and orientation are unknown. The skeletal material is extremely fragmented and in a fair state of preservation. The medial epiphysis of the clavicle is not fused, the proximal epiphysis of the proximal phalanx (first toe) is in final stages of fusion, the components of the humeral head are fused, but this epiphysis is not fused to the diaphysis, and the lesser multangular appears to be immature in its development. Pathologies include periostitis of occipital fragment, zygomatic, fibula, and clavicle, and the medullary cavity of the left clavicle is completely closed out by dense cortical bone. The only bones present are tibia, fibula, left clavicle, first rib, head of humerus, right zygomatic, right temporal (petrous portion), right lesser multangular, proximal phalanx of first toe and occipital.

BURIAL 11

Age. Adult, 30+ years.

Sex. Female.

Comments. This was a primary flexed interment placed on the back in an oval basin-shaped pit and oriented in a N/S direction, head N. The legs were drawn up so that the knees were in the upper abdominal region, with the hands together under the left knee. The skeletal material was fragmented and in a good state of preservation. Descriptive characteristics include thin long bone cortices, pronounced muscle attachments, very small septal aperture on the right humerus, small femoral heads (too fragmented to measure), small patellae, small gracile clavicles, small hands and feet, small pointed mastoids, and blunt orbital borders. Pathologies include a completely healed displaced fracture of the left ulna in the mid-diaphysis region (no evidence of infection), arthritis of left hand, vertebral osteophytosis, destruction of sacro-iliac articular surfaces by arthritis or infection, and extreme dental attrition.

BURIAL 12

Age. Adult, 25 to 35 years.

Sex. Female.

Comments. This was a primary flexed interment, placed on the right side in an oval basin-shaped pit and oriented in a NW/SE direction, head NW. The skeletal material is extremely fragmented

and in a fair state of preservation. Descriptive characteristics include extremely thin gracile long bones, small hands and feet, small pointed mastoids, sharp orbital borders, and smooth pointed mandible. The cranial sutures are open, and the long bone epiphyses are fused. Pathologies and anomalies include vertebral osteophytosis, moderate to extreme dental attrition, enamel hypoplasia, moderate plaque deposits, and a large mental foramen on the right side of the mandible.

BURIAL 13A

Age. Fetal/young infant.

Sex. Undetermined.

Comments. This was one of three individuals which were apparently placed in a multiple primary interment in a shallow oval pit in the midden area. This burial had been disturbed by bulldozer activity, and consequently the skeletal material was extremely fragmented and in a fair state of preservation. Only rib, vertebrae, and cranial fragments remained of Burial 13A. This material was too sparse and fragmented to analyze.

BURIAL 13B

Age. Adult, 19 to 22 years.

Sex. Female.

Comments. This was probably a primary flexed interment placed on the back with the legs flexed to the left side. The right arm was extended and the left arm was flexed across the chest. The cranium was missing and there were two projectile points found in the right chest region. It was oriented in a NW/SE direction, head NW. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include dense long bone cortices, heavy bone density, large bilateral septal apertures, and a right femoral head diameter of 43.0 mm. The epiphyseal rings are not fused to the vertebral centra, the axial inferior border epiphyses of the scapulae are not fused, the iliac crest epiphysis is not fused, the capital epiphysis of the femur is fused, the proximal epiphysis of the ulna is fused, and the proximal epiphyses of the radii are fused. No pathologies were observed (except projectile points).

BURIAL 13C

Age. Subadult (adolescent).

Sex. Male ?.

Comments. Burial 13C was lying next to, and slightly under Burial 13B, and was oriented in the same direction. It was placed on the back with the legs flexed to the left side. The cranium was missing and there was a projectile point in the right chest area. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include narrow sciatic notch and no preauricular sulcus. The proximal epiphyses of the phalanges of the hands and feet are not fused, the distal epiphyses of the metatarsals are not fused, the proximal and distal epiphyses of the radii are not fused, the distal epiphysis of the left ulna is separate, the proximal epiphysis of the femur is separate, the epiphyseal rings of the vertebral centra are not fused, and the innominates are still in three separate components. There is pathological evidence of a healed fracture of the right clavicle, along with the projectile point in the chest.

BURIAL 14

Age. Adult (younger ?).

Sex. Male ?.

Comments. This was a primary fully flexed interment lying on the right side in a shallow midden pit and oriented in a NW/SE direction, head NW. It had been disturbed by grader and rodent activity. The cranium was missing. The skeletal material was extremely fragmented and in a poor state of preservation. There are no septal apertures, and the cortical thickness and density of the long bones are indicative of a younger adult. There is a possible pathology in the spinal column, but it is extremely difficult to determine because of the fragmented nature of the material. There is evidence of osteophytosis.

BURIAL 15

Age. Adult, 30+ years.

Sex. Female ?.

Comments. This was a primary fully flexed interment placed in the midden area lying on the right side in a shallow oval pit. It was oriented in a NE/SW direction, head NE. The skeletal material is extremely fragmented and is in a fair state of preservation. Descriptive characteristics include gracile long bones and pointed mandible, and the long bone epiphyses are all fused. Pathologies include vertebral osteophytosis, cribra parietalis, extreme irregular attrition, extreme caries and abscessing of the teeth, periodontal disease, and moderate plaque deposits.

BURIAL 16

Age. Adult, 20 to 28 years.

Sex. Female.

Comments. This was a primary flexed interment placed on the back with the arms extended and the legs flexed to the left. It was placed in a shallow elongated pit and oriented in an ESE/WNW direction, head ESE. It had apparently been intrusive to Burial 16B. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include very small gracile hands, thin gracile long bones, medium sized bilateral septal apertures, broad square mandible, and the medial epiphyses of the clavicles are not fused. Pathologies include a small osteochondrytic cyst on the right hamate, healed fracture of lateral diaphysis of left clavicle, possible dislocation of left femoral head (unusual fovea capitus), porotic hyperostosis, moderate dental attrition, and numerous caries. The mandible exhibits loss of both second molars with subsequent alveolar remodeling, and probable congenital absence of the left second premolar and both third molars. The left mandibular first premolar is abscessed. The more extreme dental attrition on the central and lateral mandibular incisors can probably be attributed to the absence of the second and third molars.

Measurements. These measurements were taken.

Long Bones

left humeral head diameter	35.5	mm
max. length left humerus	28.4	cm
max. length right radius	20.8	cm
max. length right ulna	22.8	cm
computed stature	154.55±4.04	cm

Mandible

bicondylar diameter	116.0	mm
bigonial diameter	94.0	mm
symphysis height	33.0	mm
ascending ramus height	62.0	mm
corpal length, go-gn	83.0	mm

BURIAL 16B

Age. Infant, 6 to 9 months.

Sex. Undetermined.

Comments. This had been a primary interment (possibly extended) which was intruded upon by Burial 16. It actually appeared that there were possibly two infants represented by this skeletal material. The bones were extremely fragmented and in a fair state of preservation, with only the upper torso remaining. Pathologies include porotic hyperostosis (cribra orbitalia and cribra occipitalis), and swollen humeral cortices.

BURIAL 17

Age. Young adult, 15 to 17 years.

Sex. Female ?.

Comments. This was a primary fully flexed inhumation placed on the left side in a shallow oval pit in the midden area. It was oriented in a SE/NW direction, head SE. The skeletal material is extremely fragmented and in a fair state of preservation. Descriptive characteristics include extremely thin gracile long bones, sharp orbital borders, and small mastoids. The proximal epiphyses of the radii are not fused, the distal epiphyses of the radii are not fused, the epiphyses of the medial phalanges of the hands are not fused, the epiphyseal rings of the vertebral centra are not fused, the capital epiphyses of the femora are not fused, and the third molars are in the process of erupting (root formation is incomplete). No pathologies were evident.

BURIAL 18

Age. Adult, 30+ years.

Sex. Male ?.

Comments. This was a primary flexed interment placed face down and turned slightly to the left. It was deposited in a shallow oval pit in the midden area and was oriented in a NNW/SSE direction, head SSE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include dense long bone cortices, pronounced linea aspera, pronounced occipital torus, small pointed mastoids, and squared chin. Pathologies include a possible healed fracture of the left humerus, osteophytosis and porosity of the vertebral centra, extreme uneven dental attrition, extreme plaque deposits, extreme antemortem abscessing and loss of teeth with subsequent alveolar resorption, and periodontal disease. The teeth are slightly stained by a reddish-brown dye.

BURIAL 19

Age. Subadult, approximately 10 to 11 years.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment which was turned slightly to the right side. The legs had been disturbed by grader activity. It was placed in a shallow elongated pit in the midden area, and was oriented in an E/W direction, head E. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include the fact that the innominate components are separate, the long bone epiphyses are separate, and the vertebral components have fused (except epiphyseal rings). Pathologies include enamel hypoplasia, cribra orbitalia, and the medullary cavities of the clavicles are completely obliterated by dense trabecular bone formation.

BURIAL 20

Age. Fetal, 8 to 9 months in utero.

Sex. Undetermined.

Comments. This was a primary interment, lying on the right side in a shallow rounded pit in the midden area. It was oriented in a NNW/SSE direction, head NNW. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of periostitis of the long bones and extreme periosteal inflammation of the pelvis.

BURIAL 21

Age. Infant, 9 months to 1 year.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the left side in a shallow midden pit and oriented in a NNW/SSE direction, head NNW. It had been badly disturbed by bulldozer activity, and the skeletal material, consequently, is extremely fragmented and poorly preserved. No pathologies were observed.

BURIAL 22

Age. Adult, 25+ years.

Sex. Undetermined.

Comments. This was possibly a primary flexed interment placed on the right side in a shallow midden pit and oriented in a NW/SE direction, head SE. However, it had been almost destroyed by bulldozer activity, and only fragments of the right hand, right patella, long bones, feet, and cranium remained. The linea aspera are pronounced, but the skeletal material is too fragmented for analysis by gross examination.

BURIAL 23

Age. Adult, 30±5 years.

Sex. Female.

Comments. This was a primary fully flexed interment placed on the left side in a shallow midden pit and oriented in a N/S direction, head S. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include pronounced linea aspera, small septal aperture on the right and left humeri, sharp orbital borders, slight occipital torus, small pointed

mastoids, gracile mandible, wide sciatic notch, and elevated preauricular sulcus. Pathologies include obliterated marrow cavity of the right ulna by cortical bone formation, anterior swelling and bowing of diaphysis of right tibia characteristic of sabre shin, posterior/anterior bowing of distal diaphysis of right humerus (possible remnant of green stick fracture), beginning degenerative changes in vertebral centra (hourglass shape), large parturition pit along sacro-iliac articular surface, periodontal disease, moderate dental attrition and plaque deposits, and peg-shaped third molars.

Measurements. These measurements were taken.

right femoral head diameter	39.0 mm
max. length right humerus	30.09 cm,
head diameter	38.5 mm
max. length left femur	41.6 cm,
head diameter	39.0 mm
max. length left humerus	30.05 cm,
head diameter	39.0 mm
(pathological) max. length right ulna	23.7 cm
max. length left ulna	23.0 cm
computed stature	157.486±3.816 cm

BURIAL 24

Age. Adult, 35 to 45 years.

Sex. Male.

Comments. This was a primary flexed interment placed on the back with the legs tightly flexed to the left side (slightly). It was placed in a shallow oval pit in the midden area and oriented in a NW/SE direction, head NW. It had been disturbed by grader activity and was consequently in a fragmented but good state of preservation. Descriptive characteristics include thin long bone cortices, no septal apertures, rounded mastoids, pronounced temporal lines on frontal bone, and pronounced supraorbital torus. The medial epiphyses of the clavicles are fused and the articular surfaces are slightly eroded. Pathologies include fractured proximal phalanx of hand, slight periosteal reaction in mid-diaphysis of right clavicle (possible remnant of fracture callus), healed displaced fracture of mid-diaphysis of left radius, anterior swelling and bowing of left tibia, possible extensive pyogenic compression fracture or tuberculosis of lumbar vertebra (too fragmented to ascertain), vertebral osteophytosis, extensive dental attrition and caries, extensive plaque deposits, and periodontal disease.

BURIAL 25

Age. Adult, 35+ years.

Sex. Male.

Comments. This was a primary flexed inhumation placed on the left side in a shallow oval pit in the midden area. It was oriented in a NEE/SWW direction, head NEE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include dense cortices, robust muscle attachments on long bones, narrow sciatic notch, no preauricular sulcus, blunt mastoids, pronounced supraorbital torus, blunt orbital borders, and squared mandible. Pathologies include a crushing injury of the right hand, osteophyte formation in glenoid cavity of the left scapula, ossification of costal cartilage, vertebral osteophytosis, and moderate attrition and plaque deposits.

Measurements. These measurements were taken.

max. length right ulna	26.3	cm
left femoral head diameter	47.0	mm
right femoral head diameter	47.0	mm
computed stature	168.188±4.05	cm

BURIAL 26

Age. Adult, 25 to 35 years ?.

Sex. Male.

Comments. This was a primary flexed interment placed on the right side in a shallow elongated pit and oriented in a SE/NW direction, head SE. The skeletal material is extremely fragmented and poorly preserved. Descriptive characteristics include dense long bone cortices, heavy long bone density, pronounced muscle attachments, narrow sciatic notch, no preauricular sulcus, large blunt mastoids, and a right femoral head diameter of approximately 46 mm. Pathologies and anomalies include a large septal aperture on the right humerus, vertebral osteophytosis of thoracic and lumbar vertebrae, cribra occipitalis, and extreme dental attrition.

BURIAL 27

Age. Approximately 16 years.

Sex. Female.

Comments. This was a primary interment placed in a seated position in the center of a large circular pit which had straight sides and a flat bottom. It appeared that the floor surface of the pit had been subjected to extreme heat and there were three post holes just behind the individual. The individual was covered with hundreds of tiny shells. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include wide sciatic notch, presence of preauricular sulcus, and smooth

pointed mandible. The distal epiphyses of the radii are not fused and the proximal epiphyses of the ulnae are fused and the distal epiphyses are not fused, the distal epiphyses of the humeri are fused and the proximal epiphyses are not fused, the distal epiphyses of the fibulae are fused, the proximal and distal epiphyses of the tibiae are fused, the proximal epiphyses of the femora are fused, the iliac crests are not fused and the ischial epiphyses are partially fused, the epiphyseal rings of the centra are partially fused, and the third molars have not yet erupted. The femoral head diameters are 40 mm. Pathologies include platycnemia of the tibiae, parturition pits along the sacro-iliac articular surfaces, moderate attrition and moderate plaque deposits.

BURIAL 29

Age. Child.

Sex. Undetermined.

Comments. Burial 29 was a portion of a human cranium recovered from the inside of a dark rectangular stain, the remnants of an aboriginal structure. No pit was detected, and it appears that the cranial fragment was an incidental inclusion in the midden (structure fill). This cranial fragment is extremely fragmented and in a poor state of preservation. It had a white, calcined appearance as if burned, but there was no evidence of charring. No pathologies were observed.

BURIAL 30

Age. Adult, 35+ years.

Sex. Female.

Comments. This was a primary flexed interment placed on the back with the legs flexed to the right. It was deposited in the midden area and oriented in an ENE/WSW direction, head ENE. No pit was evident. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include presence of a preauricular sulcus, wide sciatic notch, and squared mandible. The femoral head diameters are 42 mm. Pathologies include a possible compression fracture of the distal left ulna, porosity and degenerative changes in distal right humerus, possible healed fracture callus of left fibula in mid-diaphysis region, periostitis of the right fibula, degenerative joint changes in hands, healed fractures of two proximal phalanges and a metacarpal of the left hand, degenerative joint changes in the feet, partial fusion of the sacro-iliac joints, and porosity and degenerative changes of vertebral centra.

BURIAL 31

Age. Adult.

Sex. Undetermined.

Comments. The individual represented in this interment was placed in a shallow elongated pit which was oriented in a NE/SW direction. Only portions of the cranium and long bones remained, which were extremely fragmented and poorly preserved. This could have been a primary reburial of some sort (i.e. initially a primary burial which was later exhumed and specific bones, cranium and long bones were then reburied in the same pit). The diploe of the cranium is quite thick; otherwise, there are no obvious pathologies.

BURIAL 32

Age. Child, approximately 8±1 years.

Sex. Undetermined (male ?).

Comments. Burial 32 had been interred in a refuse pit packed with mussel shells. The individual was tightly flexed, lying on the left side in a circular pit and oriented in an E/W direction, head E. The skeletal material is fragmented and in a good state of preservation. The sciatic notch appears to be narrow, the innominate segments are separate, the long bone epiphyses are separate, the segments of the proximal epiphyses of the humeri are separate, the vertebral centra and neural arches are in final stages of fusion, the metopic suture is closed except at glabella, and the basilar segment of the occipital is separate from the lateral segments. The maximum length of the left humerus is 165 mm. Skeletal development indicates an age of approximately 6 years, but dental development indicates an age of approximately 8 years. This type of retarded skeletal development is common when the individual is suffering from prolonged illness or malnutrition. The dental age is considered to be a more accurate indication of the true age. There is no pathological evidence of cribra orbitalia, and the anterior crests of the tibiae are swollen and bowed anteriorly.

BURIAL 33

Age. Adult, 30±5 years.

Sex. Female.

Comments. This was a primary flexed interment placed on the right side in an oval pit and oriented in an E/W direction, head W. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include bilateral septal apertures, thin gracile long bones, dense long bone cortices, small pointed mastoids, and sharp orbital borders. The femoral head dia-

meters are 37 mm. Pathologies and anomalies include platycnemia of the tibiae, large inca bone at lambda, impacted peg-shaped third molars, moderate attrition, and periodontal disease. The teeth exhibit reddish-brown vegetable stains on the right halves of the maxilla and mandible.

BURIAL 34

Age. Adult, 50+ years.

Sex. Male.

Comments. This was a primary flexed inhumation placed on the left side in a shallow oval pit within a large, shallow circular pit. It was oriented in an E/W direction, head E. The skeletal material is partially fragmented and in a good state of preservation. Descriptive characteristics include robust long bones, no septal apertures, narrow sciatic notch, no preauricular sulcus, pronounced supraorbital torus, large blunt mastoids, and squared chin. The medial epiphyses of the clavicles are fused and the articular surfaces are beginning to degenerate, and the cranial sutures are completely closed endocranially and ectocranially (including the nasal bones). Pathologies include beginning arthritic degeneration of the distal epiphyses of the ulnae, completely healed displaced (possibly comminuted) fracture of the mid-diaphysis of the left radius with no evidence of infection, osteophytosis of the sacrum, and the distal metaphysis of the right tibia is slightly swollen and evidences slight periosteal inflammation. The distal diaphysis and metaphysis of the right fibula are slightly swollen and evidence irregular patches of periosteal elevation (blastic lesions and striations) which appear to be the beginnings of osteomyelitis. The proximal metaphysis of this right fibula is very thin. The same periosteal reaction is seen on the left fibula (almost an exact duplicate in pathological response). The distal metaphysis of the left tibia is swollen and evidences slight linear blastic striations (periosteal elevation) which continue up the entire length of the diaphysis. The costal cartilage of the left first rib has ossified. The medial metaphysis of the right clavicle is slightly swollen and evidences slight blastic periosteal activity. There is extreme osteophytic lipping and right lateral erosion and collapse of the centra of the cervical vertebrae, and there is extreme osteophytic lipping and right lateral erosion and collapse of the centra of the thoracic vertebrae, with the beginnings of bridging and eventual fusion of the vertebrae. There is extreme osteophytic lipping, erosion and total collapse of the lumbar vertebrae (particularly L4). There is a completely healed displaced fracture of the left clavicle, which evidences slight infection, and the left acromion process evidences lytic/blastic activity evident of possible infection. All mandibular molars were lost antemortemly with subsequent alveolar resorption. It appears that the anterior mandibular teeth were only clinging to the gingival tissues. There is also evidence of alveolar abscessing, periodontal disease,

numerous caries, extreme attrition and heavy dental plaque deposits covering the occlusal surfaces of the remaining teeth.

Measurements. The following measurements were taken.

left humeral head diameter	48.0 mm
max. length right humerus	33.1 cm,
head diameter	49.5 mm
max. length left femur	45.5 cm,
head diameter	48.0 mm
max. length right femur	45.6 cm,
head diameter	49.5 mm
max. length right radius	25.8 cm
computed stature	169.435±3.417 cm

BURIAL 35

Age. Adult, approximately 35 years.

Sex. Male.

Comments. This was a primary flexed inhumation placed on the right side in a deep oval pit and oriented in a WNW/E-SE direction, head ESE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include pronounced muscle attachments, large acetabulum, narrow sciatic notches, no preauricular sulcus, small pointed mastoids, pronounced supraorbital torus, smooth pointed mandible, pronounced occipital torus, and blunt orbital borders. The sagittal suture is completely fused, and the medial epiphyses of the clavicles are fused. Pathologies and anomalies include a small septal aperture on the right humerus, vertebral osteophytosis, compression fracture of a thoracic vertebra, extreme irregular dental attrition, caries, moderate plaque deposits, and a projectile point embedded in the posterior aspect of the olecranon process of the right ulna with no evidence of healing. A small triangular projectile point was also found in the chest area near the thoracic vertebrae of this individual.

Measurements. The following measurements were taken.

Long Bones

max. length right radius	24.15 cm
max. length right humerus	31.0 cm,
head diameter	44.0 mm
max. length left humerus	30.6 cm,
head diameter	43.5 mm
max. length left femur	42.5 cm,
head diameter	45.0 mm
max. length right femur	42.0 cm,
head diameter	45.0 mm
computed stature	162.429±3.417 cm

Mandible

symphysis height	38.0 mm
bigonial diameter	101.0 mm

bicondylar diameter	120.0	mm
corpal length, go-gn	86.0	mm
right ascending ramus height	63.5	mm

BURIAL 36

Age. Young adult, 19 to 22 years.

Sex. Female.

Comments. This was a primary flexed interment placed on the back with the legs and arms flexed to the right. It was placed in a shallow basin-shaped pit and oriented in a NE/SW direction, head N. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include pronounced linea aspera, wide sciatic notch, sharp orbital borders, small pointed mastoids, and gracile pointed mandible. The distal epiphyses of the ulnae evidence recent closure, the distal epiphyses of the radii are recently closed, the epiphysis of the inferior angle of the right scapula is not fused, the proximal epiphysis of the left humerus is recently closed, the basilar suture is closed, and the third molars have erupted and evidence slight attrition. Pathologies and anomalies include S-shaped ulnae, large bilateral septal apertures, cut marks on the right radius just below the radial tuberosity, a large lytic lesion on the right sacro-iliac articular surface, the fovea capitea are almost obliterated (particularly the right side) by lytic/blastic activity, porous, brittle, hourglass-shaped thoracic and lumbar vertebral centra, and one of the lumbar vertebrae evidences extreme anterior collapse and lytic activity (a gibbous deformity). This appears to be a classic case of spinal tuberculosis. There is also evidence of moderate to extreme dental attrition, periodontal disease, and plaque deposits. A small triangular projectile point was found in the right chest area of this individual.

Measurements. The following measurements were taken.

left femoral head diameter	43.0	mm
max. length right femur	44.4	cm,
head diameter	43.5	mm
computed stature	164.738±3.816	cm

BURIAL 37

Age. Adolescent.

Sex. Undetermined.

Comments. This was perhaps an incidental inclusion or secondary reburial in an oval pit oriented in a NE/SW direction. Only extremely fragmented partial remains of hands, feet, left patella, lumbar vertebrae, and amorphous long bone fragments represent this burial. The feet appeared to have been articulated.

The distal epiphyses of the second, third, fourth and fifth metatarsals are not fused, and the proximal epiphyses are fused. The distal epiphysis of the first metatarsal is fused, and the proximal epiphysis is not fused.

BURIAL 38

Age. Child, approximately 10 to 11 years.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the back with the legs drawn up to the chest. It was interred in a shallow oval pit in the midden area, and was oriented in an ENE/ WSW direction, head WSW. The skeletal material is fragmented and in a good state of preservation. The epiphyses of the long bones are separate, the vertebral components are fused, the first molars have erupted and evidence slight attrition, and the second molars are just beginning to erupt. Pathologies and anomalies include slight fusiform swelling of the diaphyses of the fibulae, slight cortical swelling of the anterior crest of the left tibia, and an unusual cusp formation on the lingual surface of the maxillary lateral incisors. The left maxillary lateral incisor evidences slight staining by reddish-black vegetable dye.

BURIAL 39

Age. Adult, 30 to 35 years.

Sex. Female.

Comments. This was a primary flexed interment placed in the right side in an oval, basin-shaped pit, and oriented in a NW/SE direction, head SE. The skeletal material is extremely fragmented and in a fair state of preservation. Descriptive characteristics include thin long bone cortices, presence of preauricular sulcus, wide sciatic notch, slight occipital torus, small pointed mastoids, and the medial epiphyses of the clavicles are fused. The right femoral head diameter is 42 mm, and the left femoral head diameter is 42.5 mm. Pathologies and anomalies include possible compression fractures of a thoracic vertebra and two lumbar vertebrae with subsequent osteophytic development, moderate dental attrition and plaque formation, numerous caries along the cemento-enamel junctures, enamel hypoplasia, periodontal disease, abscess of left maxillary third molar, and the right maxillary third molar has four roots.

BURIAL 40

Age. Child, 9 to 11 years.

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ARCHAEOLOGICAL INVESTIGATION IN THE GAINESVILLE LAKE AREA OF TH--ETC(U)
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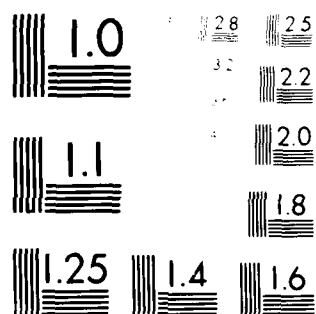
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MICROCOPY RESOLUTION TEST CHART
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Sex. Male ?.

Comments. This was a primary flexed interment placed on the back with the legs and arms flexed to the right side. It was deposited in a shallow, basin-shaped pit, and was oriented in a N/S direction, head to the N. It had been disturbed by grader activity and was, consequently, fragmented but in a good state of preservation. The sacral segments are separate, the epiphyseal rings are separate from the vertebral centra, the sternal segments are separate, the proximal and distal epiphyses of the humeri are separate, the proximal and distal epiphyses of the radii are separate, the proximal and distal epiphyses of the ulnae are separate, the proximal and distal epiphyses of the femora and tibiae are separate, the innominate components are separate, and the innominate components evidence a narrow sciatic notch and no development of a preauricular sulcus. The maximum length of the left radius is 169 mm, and the maximum length of the right ulna is 191.5 mm. No pathologies were observed.

BURIAL 41

Age. Infant, 0.0 to 0.5 years.

Sex. Indeterminable.

Comments. This was a primary semi-flexed interment placed on the left side of a shallow bowl-shaped pit with the face turned to the right. It was oriented in a N/S direction, head N. It had been disturbed by rodent activity, and the skeletal material was extremely fragmented and poorly preserved. All vertebral components are separate, and the basilar and lateral components of the occipital are separate. The cortices of the tibiae are swollen and bowed anteriorly, and the femora evidence cortical swelling.

BURIAL 42

Age. Adult, 50+ years.

Sex. Male.

Comments. This was one of three individuals (Burials 42, 43, and 44) rather haphazardly placed together in a large oval pit, and oriented in a NW/SE direction, heads SE. Individual 42 was placed on the back in a semi-flexed position so that the knees were slightly flexed to the left side. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include dense long bone cortices, pronounced muscle attachments, no septal apertures, no preauricular sulcus, narrow sciatic notch, large blunt mastoids, and squared chin. The medial epiphyses of the clavicles are fused, and the cranial sutures are closed endocranially and ectocranially. Pathologies include slight arthritis of the elbows (bony spurs on olecranon processes), slight linear periosteal

striations on the diaphysis of the right fibula, arthritis (bone spurs) of distal right fibula, extreme lytic erosion (possible mycetoma) of the right calcaneus and talus which has also affected (infected) the proximal epiphyses of the first and second proximal phalanges of the right foot, slight periostitis of distal metaphysis of left fibula, platycnemia of the tibiae, arthritis of the lateral epiphysis of the right clavicle, and lytic erosion of the inferior surface of the acromion process of the right scapula. The distal metaphysis of the left ulna is unusually thin, the medullary cavity of the right ulna is obliterated by dense cortical bone formation, three proximal phalanges evidence a possible crushing injury of the distal metaphyses and epiphyses of the right hand, and the cervical vertebral centra evidence osteophytic erosion and collapse. There is slight osteophytosis of the thoracic vertebral centra and the articular facets are extremely eroded by lytic activity. The lumbar vertebral centra also evidence osteophytosis. The mandibular and maxillary teeth exhibit uneven, moderate attrition, however, there is plaque buildup along the cingulum, and the alveolar bone evidences extreme inflammation of the gingival tissues resulting in lytic response and abscessing. The right half of the mandible is distorted and there is a distortion of the right gonial angle (bone buildup); the abscessing of the teeth is worse on the right side. There are numerous caries, and antemortem loss of the mandibular first and second molars. There is a reddish-brown stain on the molar teeth on both sides, but primarily on the right side.

Measurements. The following measurements were taken.

max. length right radius	24.3	cm
max. length left ulna	26.3	cm
max. length right humerus	31.3	cm,
head diameter	46.0	mm
left femoral head diameter	45.0	mm
right femoral head diameter	45.5	mm
computed stature	166.975±4.04	cm

BURIAL 43

Age. Adult, 45±5 years.

Sex. Male.

Comments. This individual was contained in the same pit as Burials 42 and 44 and was oriented in the same NW/SE direction, head SE. It was placed in a semi-flexed position, with the knees turned to the left, lying on the back. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include large blunt mastoids, squared mandible, pronounced occipital torus, pronounced supraorbital torus, blunt orbital borders, and pronounced linea aspera. The lambdoid suture is fused endocranially and ectocranially, the sagittal suture is fused endocranially and ectocranially, and the left femoral head diameter is approximately

44 mm. Pathologies and anomalies include extremely thin and gracile clavicles, exaggerated development of the deltoid tuberosity of the left humerus (possibly related to the fractures of the left ulna and radius), small septal aperture of left humerus, unusual nutrient foramen of right fibula (a long, deep groove), completely healed displaced fractures in the mid-diaphysis regions of the left ulna and left radius with accompanying arthritic erosion of the distal articular surfaces probably related to improper movement caused by the fractures, pronounced arthritic degeneration of the carpals of the left hand (also related to the fractures), healed fracture callus of a metatarsal of the right foot, slight lytic erosion of the sacro-iliac joints, osteophytosis and lytic erosion and collapse of the vertebral centra (cervical through lumbar), and periostitis of the heads and necks of the ribs. The right patella has an oval lytic lesion on the superior aspect of the medial articular facet, and a similar smaller lesion appears on the left patella. There are cribra on the ectocranial surface of the occipital, and the teeth exhibit extreme dental attrition, caries, periodontal disease, plaque deposits, and antemortem abscessing and loss of teeth with subsequent alveolar resorption.

BURIAL 44

Age. Adult, 35+ years.

Sex. Female.

Comments. This was the third individual in a primary multiple interment lying next to Burial 43 in a semi-flexed position on the back with the right leg flexed to the right and the left leg flexed to the left. It was also oriented in a NW/SE direction, head SE. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include thin long bone cortices, pronounced linea aspera, elevated preauricular sulcus, wide sciatic notch, smooth pointed mandible, supra-orbital torus, and small pointed mastoids. The left femoral head diameter is 43.5 mm, and the right femoral head diameter is 44 mm. The medial epiphyses of the clavicles are fused and the articular surfaces are eroded. Pathologies include arthritis of the hand, ossified costal cartilage, periostitis of ribs, periostitis of fibulae, slight periostitis of tibiae, slight periostitis of left ulna, slight porosity and anterior kyphosis of thoracic centra, lytic degeneration of thoracic articular facets, anterior kyphosis, osteophytosis and degeneration of articular facets of lumbar vertebrae, beginning fusion of sacro-iliac joint and deep parturition pit along sacro-iliac joint of left innominate, slight cribra occipitalis and cribra parietalis, degeneration of cervical vertebrae, and a small pit in the center of the radial tuberosity of the right radius (possible osteochondrytic cyst). The right humerus has a small, oval blastic elevation of the periosteum in the mid-diaphysis region of the deltoid tuberosity (probable ligamentous

ossification), the medullary cavity of the right clavicle is obliterated by cortical bone formation, and the lateral end of the right clavicle diaphysis exhibits a lytic/blastic swollen activity (possible infected fracture callus). Most of the teeth exhibit moderate attrition and plaque deposits; however, a few teeth exhibit extreme attrition and extreme maxillary and mandibular abscessing.

BURIAL 45

Age. Infant, 0 to 2 months.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment, placed on the back with the knees flexed to the left side in a shallow, oval basin-shaped pit which was possibly made after the construction of Structure 3. It was oriented in an ESE/WNW direction, head ESE. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of periostitis of the right femur and right tibia, and endocranial and ectocranial periosteal inflammation.

BURIAL 46

Age. Young adult, 20±2 years.

Sex. Female.

Comments. This was a primary flexed inhumation lying on the left side in a shallow, oval basin-shaped pit and oriented in a NNW/SSW direction, head NNW. The grave fill was heavily packed with mussel shell. The shell seemed to be more concentrated underneath the skeleton. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include small pointed mastoids and a small gracile mandible. The distal epiphyses of the ulnae show recent closure lines, the epiphyseal rings of the vertebral centra are not fused to the thoracic vertebrae, and the third molars have erupted and evidence slight attrition. The right femoral head diameter is 43.5 mm, and the left femoral head diameter is 43.5 mm. Pathologies include fusiform swelling of the left tibia and left fibula, fusiform swelling of the right fibula, and medial/lateral bowing of the diaphyses and slight irregular swelling of the distal metaphysis of the left and right femora (with slightly thickened cortices). The long bones of the arms also have thick, dense cortices and narrow marrow cavities. The medullary cavities of the clavicles are obliterated by dense cortical bone formation. The thoracic and lumbar centra are porous and evidence small lytic pits. One lumbar centrum evidences a left lateral collapse. The differential diagnosis would include Gaucher's disease (cerebroside reticulocytosis). The teeth exhibit enamel hypoplasia, moderate attrition, plaque, and alveolar inflammation.

BURIAL 47

Age. Young adult, approximately 20 years.

Sex. Female.

Comments. This was a primary flexed interment placed on the left side in a shallow, oval basin-shaped pit and oriented in a N/S direction, head N. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include dense long bone cortices, small pointed mastoids, squared mandible, and sharp orbital borders. The epiphyseal rings are not fused to the centra of the thoracic and lumbar vertebrae, the iliac crest epiphysis is not fused, and the third molars have erupted and evidence moderate attrition. The left femoral head diameter is 41.5 mm, and the right femoral head diameter is 42 mm. Pathologies and anomalies include a small septal aperture on the left humerus, possible mastoid infection on the left ear, moderate dental attrition, slight periodontal disease, moderate plaque deposits, and the vertebral centra are pitted and porous.

BURIAL 48

Age. Adult, 30+ years.

Sex. Male.

Comments. This was a primary flexed burial placed on the back with the arms extended by the sides and the legs tightly flexed to the right. It was deposited in an oval, basin-shaped pit and oriented in a SE/NW direction, head SE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include very robust long bones, dense cortices, large hands and feet, narrow sciatic notch, no preauricular sulcus, wide squared mandible, pronounced occipital torus, large blunt mastoids, pronounced supra-orbital torus, and blunt orbital borders. The medial epiphyses of the clavicles are fused. Pathologies and anomalies include large bilateral septal apertures, everted gonial angles, osteomyelitis of the distal metaphysis of the left fibula, hourglass-shaped vertebral centra, moderate attrition and plaque deposits, caries and abscessing of teeth, and cribra parietalis.

Measurements. The following measurements were taken.

max. length left humerus	34.0 cm,
head diameter	47.0 mm
right humeral head diameter	48.5 mm
right femoral head diameter	47.0 mm
left femoral head diameter	47.0 mm
computed stature	173.22±4.24 cm

BURIAL 49

Age. Infant, approximately 1 year.

Sex. Undetermined.

Comments. This was a primary extended inhumation placed in a small oval pit which had a flat bottom and straight sides. It was oriented in a SE/NW direction, head SE. The burial was accidentally cross sectioned, resulting in the destruction of the left half of the skeleton. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of a lytic lesion on the ectocranial surface.

BURIAL 50

Age. Child, approximately 9 to 10 years.

Sex. Female ?.

Comments. This was a primary flexed interment placed in a shallow, oval basin-shaped pit on the back with the legs flexed to the right and the arms folded across the chest. It was oriented in an ESE/WWN direction, head ESE. The skeletal material is fragmented and in a good state of preservation. The components of the humeral heads are fused, the epiphyses of the long bones are not united to the diaphyses, the innominate components are separate, and the innominates appear to have wide sciatic notches. Pathologies include slight periostitis of the lateral aspect of the proximal diaphysis of the left ulna, slight periostitis and cortical swelling of the distal diaphysis of the right ulna, slight periostitis of the diaphysis of the left tibia, slight periostitis of the diaphysis of the right tibia, fusiform swelling and periostitis of the diaphysis of the right fibula, and porous vertebral centra.

BURIAL 51

Age. Adult, 35+ years.

Sex. Male.

Comments. This was a primary flexed interment placed in an oval basin-shaped pit, on the back with the knees drawn straight up, the right arm extended, and the left arm flexed across the abdomen. It was oriented in a SE/NW direction, head SE. The skeletal material is fragmented but in a good state of preservation. Descriptive characteristics include narrow sciatic notch, large acetabulum, no preauricular sulcus, squared mandible, and large blunt mastoids. The medial epiphyses of the clavicles are fused. Pathologies and anomalies include a large septal aperture on the left humerus, chronic pyogenic osteomyelitis of the left and right radii and ulnae, osteomyelitis of the distal metaphysis and epiphysis of

the left humerus, osteomyelitis of the metatarsals of the right foot (also tarsals and phalanges), slight periostitis and cortical swelling of the right femur and left femur, osteomyelitis of the first metacarpal of the right hand, chronic pyogenic osteomyelitis of the left and right tibiae and fibulae, osteomyelitis of the acromion process of the left and right scapulae, osteomyelitis and obliteration of the medullary cavities of the clavicles, swollen cortices of ribs, chronic osteomyelitis of the cervical vertebrae and fusion of the third and fourth cervical vertebrae, osteomyelitis of the thoracic vertebral centra, slight porosity of the lumbar vertebral centra, osteomyelitis of both calcanea, osteomyelitis at pubic symphysis, and moderate attrition.

Measurements. The following measurements were taken.

max. length left humerus	31.3	cm,
head diameter	44.5	mm
right humeral head diameter	45.0	mm
right femoral head diameter	43.5	mm
left femoral head diameter	43.5	mm
computed stature	165.336±4.24	cm

BURIAL 52

Age. Adult, 25+ years.

Sex. Female.

Comments. This was a primary flexed interment placed on the right side in a shallow basin pit and oriented in a NE/SW direction, head NE. The skeletal material is very fragmented but in a good state of preservation. Descriptive characteristics include dense cortices, small pointed mastoids, and gracile pointed mandible. Pathologies include possible beginnings of osteonecrosis of the left lunate, possible healed fracture and slight displacement of the olecranon process of the right ulna, round lytic lesion on epicondyle of right femur, healed displaced fracture of proximal phalanx of left foot, vertebral osteophytosis, and possible tuberculosis (too fragmented), extensive irregular attrition, caries, periodontal disease, and abscessing of teeth, extensive abscesses of the left and right maxillary first molars which have perforated the palate, and slight plaque deposits.

BURIAL 54

Age. Young adult, 19±2 years.

Sex. Male ?.

Comments. This was a primary flexed burial placed on the back with the knees flexed to the right and the arms folded across the

chest. It was deposited in a shallow basin-shaped pit and oriented in a SSW/NNE direction, head SSW. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include dense long bone cortices, thin gracile long bones, narrow sciatic notch, no preauricular sulcus, squared mandible, slight supra-orbital torus, small blunt mastoids, and a trace line of recent closure of the distal epiphyses of the right radius and right ulna. The right femoral head diameter is 42 mm, and the left femoral head diameter is 41.5 mm. Pathologies and anomalies include a fracture callus across the body of the left scapula (it appears that the break occurred in the middle of the axillary border), lytic erosion resultant in anterior and lateral collapse of the thoracic and lumbar vertebrae, slight plaque buildup along the cingulum, moderate attrition, slight alveolar inflammation, peg-shaped third molars, enamel hypoplasia, and slightly thickened diploe of the cranial vault.

BURIAL 55

Age. Adult, 35±5 years.

Sex. Female.

Comments. This was an unusual primary flexed interment placed in a shallow, oval basin-shaped pit, and oriented in a WSW/ENE direction, head WSW. It was placed on the stomach with the hands behind the neck and the knees flexed so that the feet were up on the thoracic region. The cranium was missing, and there were two projectile points in the left thoracic region and one projectile point in the right chest region. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include thin long bone cortices, pronounced muscle attachments, small feet and hands, wide sciatic notch, and elevated preauricular sulcus. The medial epiphyses of the clavicles are fused. Pathologies and anomalies include a medium-sized septal aperture on the left humerus, possible healed fracture of the right fibula (slightly distorted) in the mid-diaphysis, platycnemia of the tibiae, slight periostitis and possible healed fracture of the left fibula in the distal diaphysis, possible healed fracture of the proximal diaphysis of the right ulna, vertebral osteophytosis, and parturition pits along the sacro-iliac articular joints. There is a possible healed fracture callus in the mid-diaphysis of the left humerus. This same lump is seen on the right humerus, and it is possible (even probable) that all of the fractures mentioned above could be developmental consequences of older age. The sternum is very thin ventral/dorsally. There was also a projectile point completely penetrating the right ilium just superior to the sacro-iliac articular surface. It had entered from the dorsal side.

Measurements. The following measurements were taken.

left humeral head diameter	38.0 mm
right femoral head diameter	39.5 mm
left femoral head diameter	38.0 mm
max. length right radius	23.5 cm

max. length right ulna	23.45 cm
computed stature	164.135±4.04 cm

BURIAL 56

Age. Young adult, 19±2 years.

Sex. Male ?.

Comments. This was a primary flexed interment placed on the back with the legs flexed to the right side and the arms folded across the chest. It was deposited in a shallow, oval basin-shaped pit and oriented in a WSW/ENE direction, head ENE. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include light bone density, pronounced linea aspera, no preauricular sulcus, narrow sciatic notch, small pointed mastoids, squared mandible, and small teeth. The epiphyseal rings of the vertebral centra have recently fused, and the third molars are in the occlusal plane but evidence very slight attrition. The femoral head diameters are 40 mm. Pathologies and anomalies include a small septal aperture on the left humerus, periostitis of the lateral aspect of the mid-diaphysis regions of the left and right ulnae, fusiform cortical swelling of the right ulna, osteochondrytic cyst on the right first cuneiform (right foot), healed fracture callus of the distal phalanx of the first toe of the right foot, slight plaque deposits, alveolar inflammation, enamel hypoplasia, moderate dental attrition, and the third molars are crowded (almost impacted), with the roots fused together. The maxillary third molars are peg-shaped.

BURIAL 57

Age. Child, approximately 4 to 5 years.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the right side in a small basin-shaped pit which had a flat bottom. It was oriented in a NW/SW direction, head NW. The skeletal material is extremely fragmented and in a fair state of preservation. The right and left ulnae are extremely swollen and porous; these appear in cross section as consecutive rings of periosteal growth. The tibiae, fibulae, and metacarpals have the same ringed, porous, swollen cortices.

BURIAL 58

Age. Subadult, approximately 10 years.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the back with the right arm extended, the left arm flexed across the chest, and the knees slightly flexed to the left. It was deposited in a shallow, irregular, basin-shaped pit, and oriented in an ENE/WSW direction, head ENE. The skeletal material is fragmented and in a good state of preservation. There are a few bones of at least one other individual present. The maximum length of the right ulna is 183 mm, and the maximum length of the left humerus is 221.5 mm. Pathologies include cribra orbitalia and a brittle, porous manubrium of the sternum. The marrow space is present, but decreased in size, in the right radius. There are two small, rounded pits on the radial tuberosity of the right radius (one above the other), and there is a small, round pit in the radial tuberosity of the left radius. These small pits could be indicative of osteochondrytic cysts. There is some lytic activity evidenced on the anterior surface of the lateral epicondyles of the left and right humeri. There are also small septal apertures on both humeri. The marrow spaces of the left radius and ulna are present, but decreased in size. The marrow space of the left clavicle is obliterated. There is pronounced anterior swelling and bowing of the tibiae, with decreased marrow space.

BURIAL 59

Age. Young adult, approximately 21 years.

Sex. Female.

Comments. This was a primary flexed interment placed in a seated position, with the knees in the chest area and the hands folded in the lap. It was oriented in a WSW/ENE direction. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include thin gracile long bones, small hands and feet, elevated preauricular sulcus, wide sciatic notch, smooth pointed mastoids, and sharp orbital borders. The distal epiphyses of the radii evidence recent closure, the proximal epiphyses of the humeri are in final stages of fusion, the ischial epiphysis is partially fused, the iliac crest is partially fused, and the basilar suture is closed. Pathologies and anomalies include platycnemia of the tibiae, unusual cusp formation of the right mandibular third molar (only small furrows and ridges, with no pattern, such as +4), moderate attrition, slight plaque deposits, enamel hypoplasia, and periodontal disease. The first sacral vertebra is not fused. The maxillary third molars are impacted, these have actually erupted on the buccal alveolar surface (turned out to the sides).

Measurements. The following measurements were taken.

max. length right humerus	29.6	cm
right femoral head diameter	39.0	mm
left femoral head diameter	40.0	mm
computed stature	160.372±4.24	cm

BURIAL 60

Age. Adult, 30+ years.

Sex. Female.

Comments. This was a primary flexed interment placed on the left side in a large basin-shaped pit, and oriented in a N/S direction, head N. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include thin gracile long bones, thin cortices, small hands and feet, elevated preauricular sulcus, small pointed mastoids, and sharp orbital borders. The medial epiphyses of the clavicles are fused. Both femoral head diameters are 40 mm. Pathologies and anomalies include bilateral medium-sized septal apertures, possible congenital synostosis of the right ulna and radius at the distal ends (or crushing injury which resulted in the fusion of these two bones), with pronounced atrophy, extremely thin, brittle and atrophied right humerus, bony spurs (arthritis) on the patellae, thickened diploe and cribra of the parietals, convoluted lambdoid suture with numerous wormian bones, extreme abscessing and loss of the maxillary posterior teeth, extreme dental attrition, heavy plaque deposits, abscessing and loss of mandibular posterior teeth, large mental foramina, and senile mandibular bone modification probably associated with the loss of the posterior teeth. The synostosis mentioned above occurred so that the two bones were crossed at the time of fusion, but the skeletal material is too fragmented to determine a definite diagnosis of the pathology.

BURIALS 61A, 61B, 61C

Comments. These were primary flexed burials placed together in a large basin-shaped pit which was oriented in an ENE/WNW direction. The burial was ruined by flooding before final drawings, notes, and photographs could be taken. Individual 61A was placed on the right side, with the face pointed upward. It was oriented in a NE/SW direction with the head to the northeast. The legs were flexed against the wall of the pit, with the feet drawn up to the pelvis. Both arms were flexed across the chest, with both hands clasped together at the left side of the cranium. This individual was placed directly on top of Burial 61B. The interment contained the skeletal remains of three individuals: an adult male, an adult female, and a child aged approximately 7 to 9 years. The skeletal material was mixed together because of the destruction of the feature by flooding. The male and female exhibit classic sexual dimorphism of the innominates. The skeletal material is extremely fragmented, but in a good state of preservation. The humeri belonging to the female have septal apertures. There is only a slight size differentiation between the male and female, and both appear to have been small and rather gracile. The adults exhibit moderate to extreme dental attrition and slight plaque deposits. All of the adult long bone epiphyses are fused, but there are

no evident pathologies indicative of old age degenerative changes. Therefore, they would both fall into the 25 to 35 year category for age. Evident pathologies include platycnemia and sabre shin of the male tibiae, and fusiform swelling in the mid-diaphysis of the left tibia of the female (possibly a healed fracture callus). There was a projectile point found with the burial.

BURIAL 62A

Age. Adult, approximately 35 years.

Sex. Male.

Comments. Burial 62 was a primary multiple interment in a large basin-shaped pit consisting of three individuals. Burial 62A was the first to be placed in the pit. It was positioned on the right side, with the knees tightly flexed and the feet below the pelvis. The arms were flexed, with the hands in front of the face and under the pelvis of Burial 62B. The knees of Burial 62A rested against the right shoulder of Burial 62B. The posterior portion of the body of Burial 62A rested against the north wall of the pit, and the body was oriented in an E/W direction, head W. The skeletal material of Burial 62A is fragmented and in a good state of preservation. Descriptive characteristics include dense long bone cortices, pronounced linea aspera, narrow sciatic notch, no preauricular sulcus, blunt orbital borders, slight supra-orbital torus, small blunt mastoids, and a squared mandible. The medial epiphyses of the clavicles are fused. Pathologies include a small osteochondrytic cyst in the center of the distal articular surface of the right ulna, porosity of the proximal metaphysis of the left humerus, platycnemia and slight medial/lateral bowing of the left tibia, platycnemia of the right tibia, ossification of the costal cartilage of the ribs, porosity and osteophytosis of the vertebral centra, moderate attrition, numerous caries, slight plaque deposits, crowding of the anterior mandibular teeth, and numerous abscesses of the mandibular teeth. The teeth are slightly stained by a reddish-black vegetable dye. There was also a tip of a projectile point embedded in the left superior articular facet of the second thoracic vertebra, with no inflammatory bone reaction.

Measurements. The following measurements were taken.

max. length right ulna	27.4	cm
right humeral head diameter	46.0	mm
max. length left humerus	31.0	cm,
head diameter	44.0	mm
max. length right femur	45.0	cm,
head diameter	45.0	mm
right femoral head diameter	46.0	mm
computed stature	168.079±3.417	cm

BURIAL 62B

Age. Adult, 40+ years.

Sex. Male ?.

Comments. Individual 62B was the second individual to be placed in the pit, located between Burials 62A and 62C. Burial 62B was placed on the back, with the knees tightly flexed to the left and the feet directly under the pelvis. It was oriented in an ESE/WNW direction, head ESE. The arms were flexed across the chest. The skeletal material is partially fragmented and in a good state of preservation. Descriptive characteristics include thin cortices, light density, pronounced muscle attachments, small patellae, no preauricular sulcus, prominent supra-orbital torus, squared mandible, small blunt mastoids, prominent occipital torus, and a narrow sciatic notch. The medial epiphyses of the clavicles are fused, and the articular surfaces are eroded. Pathologies and anomalies include slight periosteal inflammation of the posterior aspect of the distal epiphysis of the right tibia, possible trauma to the mid-diaphysis anterior crest of the right tibia, small, round, lytic lesion on the medial aspect of the posterior distal metaphysis of the left femur, arthritic degeneration of the articular surfaces of the left calcaneus and right calcaneus, extremely thin diaphyses of the proximal phalanges of the right foot, porosity and tiny bony spicules in and around the maxillary tooth sockets indicative of inflammation and infection, peg-shaped right maxillary third molar, slight periodontal disease and dental plaque deposits, and a large septal aperture on the left humerus. The left central maxillary incisor evidences antemortem break of the occlusal edge, and there is an unusual dentition pattern for the maxillary teeth: the central incisors are flanked by canines, and it appears that the lateral incisors were pushed aside, erupting just lateral and posterior to the canines. The tip of a projectile point is embedded in the anterior superior aspect of the lateral metaphysis of the right clavicle. This appears to have some bone regeneration around it. There was also a projectile point found in the right thoracic area of this individual.

Measurements. The following measurements were taken.

left humeral head diameter	42.0	mm
right humeral head diameter	43.0	mm
right femoral head diameter	42.5	mm
max. length left femur	42.7	cm,
head diameter	43.0	mm
max. length right tibia	34.9	cm
computed stature	162.881±4.417	cm

BURIAL 62C

Age. Adult, approximately 25 to 30 years.

Sex. Female.

Comments. Individual 62C was placed on the left side with the back resting against the south wall of the pit. It was apparently the last individual placed into the pit, and was oriented in an E/W direction, head W. The legs and arms were tightly flexed, and the individual slightly overlapped Burial 62B. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include small pointed patellae, thin gracile long bones, thin cortices, small hands and feet, gracile clavicles, wide sciatic notch, elevated preauricular sulcus, 22-24 age category according to Todd's pubic symphysis method, small pointed mastoids, sharp orbital borders, and moderately pronounced supra-orbital torus. The medial epiphyses of the clavicles are fused, and there are trace lines of fusion for the iliac crest and the proximal epiphyses of the humeri. Pathologies and anomalies include large bilateral septal apertures, a parturition pit along the sacro-iliac joint, medial/lateral bowing of the humeri, platycnemia of the tibiae, lytic activity evidenced at the fovea capita of the left femur, healed fracture callus of the proximal diaphysis of the left fibula which evidences inflammatory bone, separate sternal components, porous hourglass-shaped vertebral centra, enamel pearl on the right maxillary third molar, moderate dental attrition, slight plaque deposits on the lingual surfaces along the cingulum, and seven small pacchionian pits on the endocranial surface. The anterior mandibular teeth exhibit slight staining by reddish-brown vegetable dye.

Measurements. The following measurements were taken.

max. length left humerus	29.4	cm,
head diameter	36.5	mm
max. length right humerus	30.1	cm,
head diameter	38.0	mm
max. length right femur	41.5	cm,
head diameter	38.5	mm
left femoral head diameter	39.0	mm
computed stature	157.227±3.816	cm

BURIAL 63

Age. Adult, 35+ years.

Sex. Male.

Comments. This was a primary semi-flexed interment placed on the back with the legs tightly flexed to the left, the left arm extended, and the right arm flexed across the abdomen. It was placed in an large cylindrical pit, and oriented in an ESE/WSW direction, head ESE. The skeletal material is partially fragmented and in a good state of preservation. Descriptive characteristics include thin long bone cortices, light bone density, pronounced occipital torus, narrow sciatic notch, no preauricular sulcus,

slight supra-orbital torus, eroded pubic symphysis, narrow sub-public angle, narrow, pointed, gracile mandible, small pointed mastoids, and no septal apertures. The medial epiphyses of the clavicles are fused, the third molars are present, the basilar suture is fused, and the sagittal suture is completely fused endocranially. Pathologies include a possible osteochondrytic cyst on the superior aspect of the left patella, blastic activity evidenced on the distal posterior aspect of the right patella, healed fracture callus of metatarsal of the left foot, slight degenerative arthritis in joints, incomplete fusion of the first and second sacral vertebrae, lytic erosion of the left and right femoral necks (angles of the necks are very nearly 90°), oval lytic lesion on the posterior lateral aspect of the left and right distal femoral metaphyses, vertebral osteophytosis of the fourth and fifth lumbar vertebrae, pronounced dental attrition and slight dental plaque deposits and periodontal disease, antemortem abscess and loss of the left mandibular second premolar, extensive carious lesion and abscess of the left maxillary first molar, cribra orbitalia, small round lytic lesion just superior to and to the right of glabella, and a lytic cyst on the internal surface of the greater trochanter of the left femur. The meningeal vessels are heavily etched into the right parietal, and there is one small pacchionian depression and numerous cyst-like lytic holes also on the endocranial surface of the right parietal.

Measurements. The following measurements were taken.

Long Bones

max. length left femur	46.15 cm,
head diameter	44.0 mm
right femoral head diameter	44.0 mm
max. length left humerus	33.7 cm,
head diameter	47.0 mm
max. length left radius	26.3 cm
max. length right radius	26.5 cm
max. length left ulna	28.2 cm
right humeral head diameter	46.0 mm
computed stature	170.678±3.417 cm

Mandible

symphysis height	30.0 mm
bigonial diameter	96.0 mm
bicondylar diameter	116.0 mm
corpal length, go-gn	92.5 mm
left ascending ramus height	57.0 mm

BURIAL 64

Age. Child, approximately 8 to 9 years.

Sex. Female ?.

Comments. This was a primary flexed interment placed in a small bathtub-shaped pit and oriented in an E/W direction, head E.

The individual was placed on the back with the head turned slightly to the left. The legs were tightly flexed to the right. The left thorax was damaged by a post hole placed into the pit sometime after the burial was deposited. This post hole lines up with two others, one at the NW corner of the pit and the other to the SE about 0.9 ft from the pit edge. The skeletal material is fragmented and in a fair state of preservation. There are septal apertures on the humeri, the humeral head components have fused, the epiphyses are separate, the innominate components are separate, and the neural arches and centra are beginning to fuse. The length of the left radius is 150.8 mm. There is pathological evidence of cribra orbitalia and enamel hypoplasia.

BURIAL 65

Age. Child, approximately 3 to 4 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed on the back with the head turned to the right. It was deposited in a small oval pit and oriented in a WSW/ENE direction, head WSW. The skeletal material was extremely fragmented and in a fair state of preservation. No pathologies were observed.

BURIAL 66A

Age. Child, approximately 2 to 3 years.

Sex. Undetermined.

Comments. Burials 66A and 66B were partially destroyed by grader activity, and consequently no pit outlines could be ascertained. It is not known if they were two separate burials or one single burial, but it appears that they were possibly separate interments. Individual 66A was a primary semi-flexed interment placed on the back with the arms extended, and the head and knees turned to the right. It was oriented in an E/W direction, head E. It was extremely fragmented and poorly preserved. There was pathological evidence of erosion of the inner table of the cranial vault, possibly indicative of a meningeal infection.

BURIAL 66B

Age. Subadult, approximately 10 to 15 years.

Sex. Male ?.

Comments. This was a primary flexed interment placed on the right side, facing north, and oriented in an E/W direction, head E.

The skeletal material was extremely fragmented and poorly preserved. The bones of the innominates are not fused, the coracoid process is separate from the scapula, and the cortices of the femora are extremely thick.

BURIAL 67

Age. Adolescent, approximately 13 to 14 years.

Sex. Male ?.

Comments. This was a primary flexed interment placed on the back in the knee-chest position (knees tightly drawn up to the chest), and the arms flexed across the chest. It was deposited in a small bathtub-shaped pit, and oriented in an ENE/WSW direction, head to the ENE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include narrow sciatic notch, no preauricular sulcus, small pointed mastoids, smooth mandible, separate innominate components, separate sacral segments, separate vertebral epiphyseal rings, separate sternal components, separate proximal and distal epiphyses of the humeri, radii, ulnae, femora, tibiae, and fibulae, no supra-orbital torus, no prominent occipital torus, and blunt orbital borders. The vertebral components are in final stages of fusion, the first and second molars have erupted and evidence moderate attrition, the third molars have not erupted, and the basilar suture is open. There is a slight reddish-brown vegetable stain on the right first molar. The sternal components are extremely porous and evidence lytic activity, the vertebral centra are porous, and there is a wormian bone in the lambdoid suture. The teeth exhibit slight periodontal disease, caries, and no plaque deposits.

BURIAL 68

Age. Adult, 25+ years.

Sex. Male.

Comments. This was a rather unusual primary extended (?) interment. Only femora, patellae, pelvis, vertebrae, and ribs remained, which were in anatomical order. It appeared as if the arms and lower legs were deliberately removed. The cranium was also missing, but it may have been removed by grader activity. The individual was placed face down with the chest slightly twisted to the left, in a large basin-shaped pit and oriented in an E/W direction, head W. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include dense cortices, pronounced linea aspera, narrow sciatic notch, no preauricular sulcus, and the femoral epiphyses are fused. Both femoral head diameters are 44 mm. There is pathological evidence of slight vertebral osteophytosis.

BURIAL 69

Age. Infant, approximately 9 months.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment placed on the back with the head slightly turned to the right. It was deposited in a shallow basin-shaped pit and oriented in an ESE/WNW direction, head ESE. The skeletal material is extremely fragmented and poorly preserved, and it has a whitish, calcined appearance as if it had been partially cremated. There is pathological evidence of periostitis and cortical swelling of the long bones, cribra orbitalia, and anterior swelling and bowing of the tibiae.

BURIAL 70A

Age. Child, approximately 6 to 7 years.

Sex. Undetermined.

Comments. Burials 70A and 70B were interred together in a shallow basin-shaped pit and oriented in a NE/SW direction, heads NE. Both were primary flexed interments placed on the right side. The skeletal material is extremely fragmented and in a fair state of preservation. Both individuals evidence extreme pathologies. Individual 70A has the following pathologies: slight cortical swelling of right ulna, slight periostitis and cortical swelling of the humeri, fusiform swelling and obliteration of the medullary cavity in the mid-diaphysis of the right fibula (fracture callus ?), periostitis and cortical swelling of the left tibia and left fibula, possible osteomyelitis of the right hand, cribra orbitalia, osteomyelitis of the lateral portion of the left clavicle, moderate attrition, the first molars are surrounded by inflammatory reactive bone, and the left mandibular first molar appears to have begun to abscess. The metopic suture is fused, and the deciduous teeth are heavily stained by reddish-black vegetable dye.

BURIAL 70B

Age. Child, approximately 3 to 4 years.

Sex. Undetermined.

Comments. This individual exhibits extreme cortical swelling of the left radius and ulna, periostitis of the right ulna, cortical swelling and periostitis of the humeri, cortical swelling and periostitis of the tibiae, fusiform swelling of the right fibula, extreme cortical swelling and possible osteomyelitis of the lateral portion of the left clavicle, and cribra orbitalia. Individuals 70A and 70B are almost identical in terms of pathological response.

BURIAL 71

Age. Adult, 30±5 years.

Sex. Female.

Comments. This was a primary flexed interment placed on the ventral side, with the legs and arms tightly flexed and the face turned to the right. It was deposited in a large, flat bottomed, basin-shaped pit, and oriented in a NE/SW direction, head NE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include slender gracile clavicles, small patellae, small hands, thin and gracile humeri, accentuated muscle attachments on the right radius and ulna possibly compensating for the lack of use of the left arm, wide sciatic notch, elevated preauricular sulcus, small pointed mastoids, slight occipital bun, and slight supra-orbital torus. Pathologies and anomalies include a large septal aperture on the right humerus, parturition scars along sulcus, porosity and possible healed fracture callus of the right clavicle, multiple osteochondritic cysts in the hands and feet, healed fracture callus of the mid-diaphysis of the third metatarsal of the left foot, healed fracture callus of the mid-diaphysis of the distal phalanx which is slightly displaced and slight periostitis of the metatarsal of the first digit of the right foot, healed fracture callus of the distal metaphysis of the left humerus (apparently a green stick fracture) with periostitis possibly indicative of infection (the diaphysis is very thin, possibly due to atrophy), the entire cortex of the diaphysis of the left ulna is swollen and porous with a subsequent narrowing of the medullary cavity, the distal metaphysis of the left radius is swollen and evidences periostitis (possible fracture callus), healed fracture callus of the distal left femoral metaphysis with accompanying periostitis, slight porosity and periostitis of the distal metaphysis of the right femur, healed fracture callus of the distal metaphysis of the left fibula with swelling of the cortex and narrowing of the medullary space and periostitis, the anterior crest of the left tibia is extremely swollen and porous and evidences extreme periostitis, the cortex of the right fibula is extremely swollen on the lateral aspect, the anterior crest of the right tibia is swollen, porous, and evidences periostitis, slight periostitis of the ventral surface of the ribs, slight osteophytosis, wormian bones in the lambdoid suture, dental plaque, periodontal disease, medium dental attrition, and peg-shaped third molars.

Measurements. The following measurements were taken.

max. length right humerus	29.0	cm,
head diameter	38.0	mm
(pathological) max. length left humerus	28.4	cm,
head diameter	38.0	mm
right femoral head diameter	40.0	mm
computed stature	158.62±4.24	cm

BURIAL 72

Age. Infant, 0.0 to 0.5 years.

Sex. Undetermined.

Comments. This was a primary extended interment placed on the back with the face turned to the right. It was deposited in a shallow basin-shaped pit, and oriented in an N/S direction, head S. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of periostitis of the long bones, periostitis of the ectocranial surface, and anterior swelling and bowing of the tibiae.

BURIAL 73

Age. Adult, approximately 45±5 years.

Sex. Male.

Comments. This was a tightly flexed primary interment placed on the right side and oriented in a WNW/ENE direction, head WNW. It was deposited in the south side of an irregularly shaped pit, facing south. The skeletal material is extremely fragmented and in a good state of preservation. Descriptive characteristics include thin long bone cortices, large blunt mastoids, no preauricular sulcus, and pronounced occipital torus. The three principal sutures of the cranium are fused. Both femoral head diameters are 43 mm. Pathologies include joint degenerative changes in the feet and hands, extreme chronic hematogenous osteomyelitis of the posterior aspects of the distal metaphyses of the humeri, extreme osteomyelitis of the posterior aspect of the distal metaphysis of the right femur, extreme hematogenous osteomyelitis of the tibiae, osteomyelitis of the ribs, vertebral osteophytosis, thickened cranial diploe, cribra parietalis, extreme dental attrition, slight plaque deposits, enamel hypoplasia, caries along the cemento-enamel junctures, and abscessing and loss of several anterior and posterior teeth.

BURIAL 74

Age. Infant, approximately 9 months to 1 year.

Sex. Undetermined.

Comments. This was an extended primary interment placed on the back with the face turned to the north and the ankles crossed. It was deposited in a small basin-shaped pit, and oriented in an ENE/WSW direction, head ENE. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of slight periostitis of the left humerus.

BURIAL 75

Age. Fetal, approximately 9 months.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the back with the legs flexed to the right and the arms flexed across the chest. It was deposited in a small bathtub-shaped pit, and oriented in an E/W direction, head E. The skeletal material is fragmented and in a poor state of preservation. There is pathological evidence of cribra orbitalia, cribra parietalis, and large, extreme inflammatory lytic/blastoid lesions on the endocranial surface.

BURIAL 76

Age. Newborn infant.

Sex. Undetermined.

Comments. This was a primary extended (?) interment placed in a small shallow basin-shaped pit, and oriented in an E/W direction, head E. The pit was not well defined, but it appeared to have four small post holes set within the pit walls. Because of the extremely fragmented nature of the skeletal material, no descriptive data could be ascertained.

BURIAL 77

Age. Infant, approximately 2±0.5 years.

Sex. Undetermined.

Comments. This was a primary flexed inhumation placed on the back with the legs flexed to the right and the arms flexed across the chest. It was deposited in a small bathtub-shaped pit, and oriented in an E/W direction, head E. There is pathological evidence of small lytic/blastoid lesions on the endocranial surface, cribra parietalis, and extreme blastoid lesions in the orbits.

BURIAL 78A

Age. Child, approximately 3 to 3.5 years.

Sex. Undetermined.

Comments. This was a primary semi-flexed interment placed on the back with the arms extended and the legs tightly flexed to the left. It was deposited in a large bathtub-shaped pit, and oriented

in an ENE/WSW direction, head ENE. Burial 78B intruded into this interment. The skeletal material is fragmented and in a fair state of preservation. The long bone epiphyses are not fused, the innominate components are separate, the vertebral components are separate, the basilar portion of the occipital is separate, and the maximum length of the left femur is 159 mm. The skeletal age is approximately 1.5 to 2.5 years, and the dental age is 3 to 3.5 years. Stunted growth often occurs as a result of prolonged illness or malnutrition. There is pathological evidence of periostitis and slight cortical swelling of the left ulna, periostitis and extreme cortical swelling of the distal diaphysis of the left radius, slight periostitis of the right radius and ulna, periostitis and pronounced flattening of the diaphysis of the left humerus, slight periostitis and cortical swelling of the tibiae and fibulae, cribra orbitalia, enamel hypoplasia and extreme decay of the maxillary canines (the roots of which are curved outward toward the buccal surface), enamel hypoplasia and extreme decay of the maxillary deciduous first molar and left lateral incisor, numerous pinpoint carious lesions on the deciduous second molars, and inflammatory bone surrounding the permanent first molar sockets.

BURIAL 78B

Age. Adult, approximately 25 to 30 years.

Sex. Female.

Comments. This was a primary semi-flexed interment placed on the back, with the arms extended and the legs flexed to the left. It was deposited in a large bathtub-shaped pit, which intruded into Burial 78A, and was oriented in an ENE/WSW direction, head ENE. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include dense cortices, wide sciatic notch, elevated preauricular sulcus, squared mandible, large blunt mastoids, blunt orbital borders, and slight supra-orbital torus. The medial epiphyses of the clavicles are partially fused. Pathologies and anomalies include large bilateral septal apertures, S-shaped ulnae, healed fracture callus of the distal diaphysis of the left tibia, flattened ribs, parturition pits along the sacro-iliac articular edges, extreme erosion and distortion of the pubic symphysis, irregular dental attrition, abscessing and caries of the mandibular molars, and cribra parietalis.

Measurements. The following measurements were taken.

max. length right radius	22.5	cm
max. length right ulna	24.0	cm
max. length left humerus	30.0	cm,
head diameter	38.0	mm
right humeral head diameter	38.5	mm
left femoral head diameter	40.0	mm
right femoral head diameter	40.0	mm
computed stature	160.585±4.04	cm

BURIAL 79

Age. Adult, 35+ years.

Sex. Male.

Comments. This was a primary semi-flexed interment placed on the back with the arms extended and the legs flexed to the left. It was deposited in a large bathtub-shaped pit, and was oriented in an ENE/WSW direction, head ENE. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include large acetabulum, narrow sciatic notch, squared mandible, blunt orbital borders, large blunt mastoids, pronounced occipital torus, and pronounced supra-orbital torus. The sagittal suture is completely fused. Pathologies include porosity of the proximal metaphysis of the left ulna and osteophyte formation on the edges of the articular surfaces of the olecranon process, osteomyelitis of the right radius and ulna, osteomyelitis of the distal metaphysis and epiphyses of the humeri, osteomyelitis of the carpals, metacarpals, and phalanges of both hands, osteomyelitis of the feet, osteomyelitis of the tibiae and fibulae, osteomyelitis of the femora, lytic lesion on the medial articular facet of the left patella, osteomyelitis of the clavicles, osteomyelitis of the ribs, extreme osteomyelitis and degeneration of the vertebrae, osteomyelitis of the innominates, moderate to pronounced dental attrition, moderate plaque deposits on the lingual surfaces, cribra parietalis, cribra occipitalis, extreme abscessing and loss of the maxillary teeth (only the central and lateral incisors remain, and they are abscessed) with subsequent alveolar resorption. This osteomyelitis is not as extensive as that of Burial 51, though neither evidences cloaca (drainage sinuses). The patellae are very wide and short, and the femoral head diameters of the left and right femora are 45.5 mm and 44.5 mm, respectively.

BURIAL 80

Age. Young adult, approximately 19 years.

Sex. Male.

Comments. This was a primary, tightly flexed interment placed on the ventral side in a circular pit and oriented in a S/N direction, head S. The skeletal material is fragmented and in a good state of preservation. Descriptive characteristics include no preauricular sulcus, narrow sciatic notch, blunt mastoids, and small femoral heads. The proximal epiphyses of the humeri are not fused and the distal ones are fused, the distal epiphyses of the fibulae are not fused, the proximal epiphyses of the tibiae are not fused and the distal ones are not fused, the proximal and distal epiphyses of the femora are not fused, the epiphysis of the glenoid cavity is not fused on the right side and is partially fused on the left side, the proximal epiphyses of the proximal phalanges of the feet are not fused and the distal ones are

fused, the epiphyseal rings of the vertebral centra are not fused, the neural arches evidence recent closure to the centra, the proximal epiphyses of the radii are in final stages of fusion, and the innominate components are fused. Pathologies and anomalies include moderate dental attrition, enamel hypoplasia, very slight plaque deposits, and exaggerated shoveling of the central incisors (almost barreled).

BURIAL 81

Age. Child, approximately 2.5 to 3.5 years.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the left side in a small cylindrical pit, and oriented in a NE/SW direction, head NE. The skeletal material is extremely fragmented and in a fair state of preservation. The neural arches are separate from the vertebral centra. There is pathological evidence of slight cortical swelling of the distal diaphysis of the right radius, anterior/posterior flattening of the proximal diaphysis of the left humerus (the entire upper half of the diaphysis), pronounced cortical swelling of the left tibia, two small pacchionian pits along the middle meningeal artery of the right parietal, cribra orbitalia, and blastic reactive bone on the endocranial surface of the occipital.

BURIAL 82

Age. Child, approximately 3 to 4 years.

Sex. Undetermined.

Comments. This was a primary extended (?) inhumation which was inclusive in the north edge of Feature 211. It was oriented in an E/W direction, head E. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of a possible meningeal cortex infection.

BURIAL 83

Age. Adult, approximately 40±5 years.

Sex. Female.

Comments. This was a primary extended interment with the face turned to the left, which was placed in a large keyhole-shaped pit, and oriented in an E/W direction, head E. It was intrusive upon Feature 211. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include thin long bone cortices, small hands and feet, elevated preauricular

sulcus, wide sciatic notch, sharp orbital borders, small pointed mastoids, and smooth squared mandible. The lambdoid suture is completely fused. The right femoral head diameter is 39 mm, and the left femoral head diameter is 38.5 mm. Pathologies and anomalies include anterior cortical swelling and bowing of the left tibia, compression fracture of a lumbar vertebra, vertebral osteophytosis, moderate dental attrition and plaque formation, abscessing of mandibular second and third molars, secondary cusp formation on the lingual surfaces of the maxillary lateral incisors (large cusps), and pinpoint caries. The teeth evidence slight staining by reddish-brown vegetable dye.

BURIAL 84

Age. Young adult, approximately 19 years.

Sex. Female.

Comments. This was a primary semi-flexed interment placed on the back with the left arm extended, the right arm partially flexed over the abdomen, and the legs tightly flexed to the right. It was deposited in a large bathtub-shaped pit, and oriented in a SE/NW direction, head SW. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include thin long bone cortices, gracile long bones, wide sciatic notch, small pointed mastoids, smooth pointed chin, recent closure line of distal epiphysis of the right fibula, and recent closure lines of the capital epiphyses of the femora. The distal epiphysis of the right radius is not fused, the proximal epiphysis of the left humerus is not fused and the distal epiphysis is fused, the epiphyseal rings of the vertebral centra are not fused, the ischial epiphysis is not fused, the iliac crest epiphysis is not fused, the third molars have erupted, and the basilar suture is not closed. The right femoral head diameter is 39 mm. Pathologies and anomalies include large bilateral septal apertures, extreme periostitis of the left ribs (particularly on the ventral surfaces at the vertebral articular areas), small pacchionian pit on the right parietal, moderate dental attrition, extreme pitted carious lesions on the occlusal surfaces of the molars, enamel hypoplasia, and slight staining of the anterior teeth by reddish-brown vegetable dye.

BURIAL 85

Age. Adult, 30±5 years.

Sex. Male.

Comments. This was a primary semi-flexed interment placed on the back, with the arms extended and the legs flexed so that the knees pointed up. It was deposited in a large bathtub-shaped pit,

and was oriented in a SE/NW direction, head SE. The skeletal material is fragmented and in a fair state of preservation. Descriptive characteristics include robust long bones, large hands and feet, no preauricular sulcus, narrow sciatic notch, large acetabulum, pronounced occipital torus, small blunt mastoids, and wide squared mandible. The sagittal suture is beginning to close. Both femoral head diameters are 48 mm. Pathologies and anomalies include an extremely infected fracture callus of the distal diaphysis of the right ulna, platycnemia of the left tibia, healed fracture callus of the mid-diaphysis of the right fibula, three fractured left ribs (one evidencing non union and infection), hourglass-shaped vertebral centra, extremely convoluted lambdoid suture with numerous wormian bones, moderate dental attrition, enamel hypoplasia, slight plaque deposits, and moderate staining of the teeth by reddish-black vegetable dye on the buccal surfaces of the posterior teeth and on all surfaces of the anterior teeth.

BURIAL 86

Age. Infant, approximately 2 to 3 years.

Sex. Undetermined.

Comments. This was a primary flexed interment placed on the back, with the right arm extended, the left arm tightly flexed, and the knees flexed to the left. It was deposited in a small basin-shaped pit, and was oriented in a SW/NE direction, head SW. The skeletal material is extremely fragmented and poorly preserved. There is pathological evidence of slight cortical swelling and porosity of the tibiae, cribra orbitalia, and slightly thickened diploe and blastic reactive bone on the endocranial surface.

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