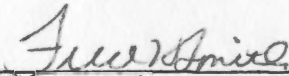
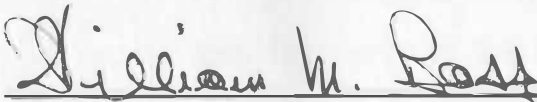
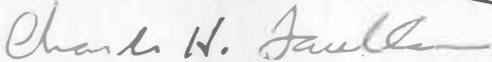


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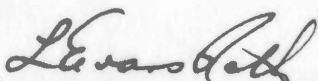
I am submitting herewith a thesis written by Katherine French Higgins entitled "The Ledbetter Landing Site: A Study of Late Archaic Mortuary Patterning." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Anthropology.


Fred H. Smith, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:


Vice Chancellor
Graduate Studies and Research

THE LEDBETTER LANDING SITE: A STUDY OF
LATE ARCHAIC MORTUARY PATTERNING

A Thesis

Presented for the

Master of Arts

Degree

The University of Tennessee, Knoxville

Katherine French Higgins

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ABSTRACT

The Ledbetter Landing site (9BN25) is placed in its environmental context and its archaeological background is discussed. The archaeological studies of the subsistence/settlement patterning for the Ledbetter Phase in the Western Valley physiographic province are also investigated, and some of the results of these studies are found to be suspect. The application of mortuary patterning analysis to determine the type of social organization at a site is discussed in general terms. It is hypothesized that the Ledbetter Landing site's Late Archaic, Stratum 2 burials should reflect an essentially egalitarian social organization. This is tested by examining the significant associations among the following three burial dimensions: 1) Biological dimension--composed of age, sex, and pathologies; 2) Burial character dimension--composed of form of disposal, individuality, and cremation; and, 3) Grave good dimension. The mortuary patterning for an egalitarian social system should reflect only those distinctions of the above burial dimensions that are based upon age and sex. Due to a small sample, the Ledbetter Stratum 2 burials are compared to two other Late Archaic Ledbetter Phase sites--the Big Sandy component (Eva III) at the Eva site, and the Cherry site. A previous mortuary patterning study of the Eva and Cherry sites used factor analysis, but since this

statistical method should not be used with nominal data, the results of this study are suspect. Another statistical method utilizing bivariate comparisons of phi coefficients is better suited for use with nominal data and so is used to re-examine the Late Archaic Eva and Cherry burials and also to examine the Late Archaic Ledbetter burials. No significant associations between the aforementioned burial dimensions are found that cannot be explained by distinctions based upon age and sex. This supports the idea that these sites all had an essentially egalitarian social system.

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INTRODUCTION

The Ledbetter Landing site (9BN25), located in the western Tennessee Valley, was excavated in 1940 by George Lidberg under the direction of Lewis and Kneberg of the University of Tennessee, Knoxville, Tennessee. The burials and accompanying grave goods were never fully examined, although several studies have used the artifacts in an attempt to formulate hypotheses about the subsistence/settlement patterns of the Ledbetter Phase of the Late Archaic (Lewis and Kneberg 1947, 1959; Bowen 1975, 1977). The Ledbetter Phase is represented at the Cherry and Ledbetter sites, as well as the Big Sandy component (Eva III) at the Eva site, among others. The time span is approximately 2500-1000 B.C. (Bowen 1975; Faulkner and McCollough 1974: 297, 316).

An attempt was made to determine if the mortuary patterning at the Ledbetter Landing site could be used to support the idea that the hunters and gatherers occupying this site had an essentially egalitarian level of social organization. It was found that only Stratum 2 could be definitely assigned to the Late Archaic time period, so the number of burials in the sample was drastically reduced. Therefore, it was felt that any findings for Ledbetter should be compared to other Late Archaic Ledbetter Phase sites in close proximity to Ledbetter Landing. For this reason, the Big Sandy component at the Eva site and

the Cherry site were chosen to be compared to Ledbetter Landing.

Magennis (1977) examined the mortuary patterning of the Eva and Cherry sites. However, her study of the Eva and Cherry burials employed a statistical method ill-suited to her proposed model, which conceivably renders her findings somewhat suspect. A more appropriate method utilizing bivariate comparisons of phi coefficients is used in this study to test for any significant associations among the burial dimensions of biological, burial character, and grave good for all appropriate burials for all three sites. The results exhibit no distinctions not explainable on the basis of age and sex. This agrees with Magennis' findings and suggests that all three of these sites had an egalitarian level of social organization during the Late Archaic.

CHAPTER I

LEDBETTER LANDING SITE

The Ledbetter Landing site (9BN25) is located in western Tennessee in the southeastern section of Benton County. It is on the western bank of the Tennessee River just north of the intersection of Morgan's Creek with the Tennessee. The flood plain extends to the west of the site for approximately another half mile, and then the land changes to gently rolling hills. There is a high ridge of chert about $1\frac{1}{2}$ miles to the north of the site (Lidberg n.d.: 2) (see Figure 1).

Environment

This area of Tennessee has been designated by Osborne (1943) as the Western Valley physiographic region. It roughly corresponds to the Kentucky and Pickwick Basins. The northernmost part is only slightly beyond the Kentucky Dam while the southern end extends beyond the Pickwick Landing Dam into Mississippi and Alabama. The width of this region varies from 10 to 20 miles with the Highland Rim being east of this area and the Gulf Coastal Plain bordering it on the west. The entire areal extent is approximately 800 square miles (Osborne 1943: 180-182; Figure 21: 181).

Fenneman (1939) designated this area as belonging to the Western Highland Rim section of the Interior Low

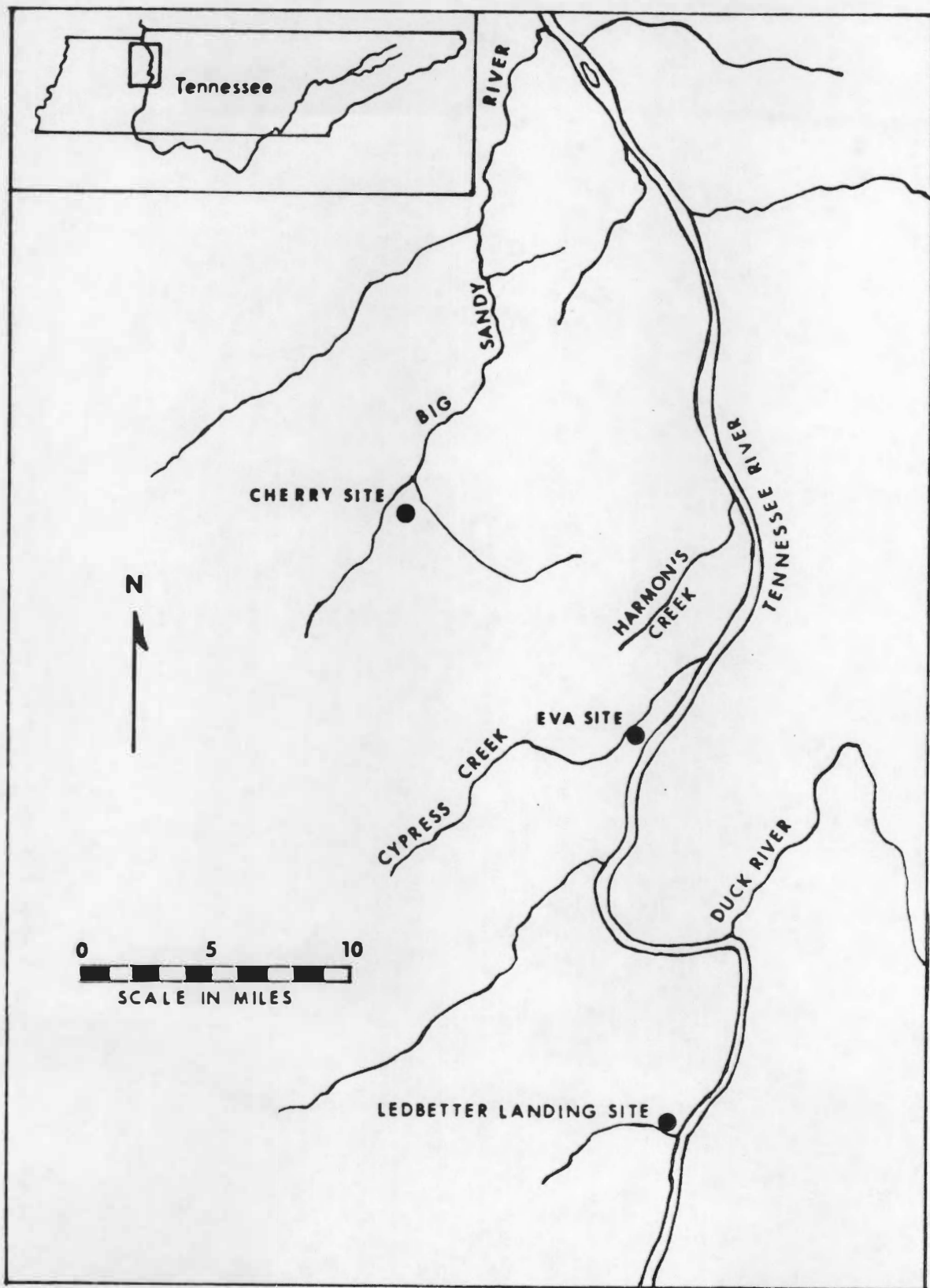


Figure 1. Site Locations.

Plateau Province. Although Fenneman stated that the Tennessee River was the western boundary for this section and province, he felt that the area directly to the west of this river was also part of the Highland Rim physiographic unit.

In their soil survey of Benton County, Odom et al. (1953) divided the county into four smaller physiographic units within the Highland Rim section. One of these units was designated the alluvial plain. The Ledbetter Landing site is located within this unit.

The alluvial plain, which includes the flood plain of the Tennessee and Big Sandy Rivers has a maximum width of about 1 mile. The Tennessee River flood plain is gently undulating and consists of a natural levee near the stream and low ridges and intervening swales or sloughs running nearly parallel with the river. The flood plain is 10 to 25 feet above the normal river level and is subject to overflow. The low terraces, which are 5 to 10 feet above the general level of the flood plain are included in this area. Underlying it is general alluvium washed from a variety of rocks, including limestone, sandstone, shale, and unconsolidated sands, clays, and silts . . . The alluvial plain section includes the Huntington-Egam-Wolftever . . . soil associations (Odom et al. 1954: 8).

The Huntington-Egam-Wolftever soils all have fairly slow external and internal drainage. They are all acidic, especially the Wolftever soils. All three soils contain organic matter with the Huntington silt loam containing the highest amounts (Odom et al. 1953: 56, 72, 112-114).

Perkins et al. (1973) defined the soils of this area of Tennessee as being part of the Ultisols which are the

predominant soils of the southern area of the United States. These soils are acidic and clayey in texture. The combination of rainfall, long and hot summers, and short, mild winters results in rapid nutrient leaching from the soil, which causes it to be relatively infertile. The soil subunits of the Ultisols located in the Western Valley are the Paleudults and the Fragiudults, which have cherty limestone as a parent material and are fairly infertile with low amounts of organic material (Perkins et al. 1973: 73-74).

Benton County has an overall mean temperature of 60.1°F, with winters averaging 41.1°F and summers averaging 78.1°F. Winter also receives the most precipitation (14.61" of rainfall, with 5.6" of snow), while fall is the driest time of the year (10.29" average rainfall). The mean yearly rainfall is 51.49". Usually there are 192 days free of frost starting April 11 and running to October 21 (Odom et al. 1953: 9; Table 1: 9).

Braun (1950) characterized the Interior Low Plateau region as being one of floristic transition and placed it within the Western Mesophytic Forest region:

. . . this region is not characterized by a single climax type. The major vegetation types occurring in this region form a complex mosaic which is the result of present influences and of past influences operating within recent enough time that their effects on vegetation have not yet been eliminated (Braun 1950: 122).

Shelford (1963) included Braun's Western Mesophytic Forest region in his tulip-deer-oak faciation of the Temperate Deciduous Forest Biome:

The climax stage (of the tulip-oak forest) is dominated by tulip, white oak, beech, white basswood, yellow buckeye, sugar maple, American chestnut, red oak, chinkapin oak, and others. Less abundant but important trees are the cucumbertree, white ash, red maple, shagbark and bitternut hickories, blackgum, black cherry, certain species of birch, and hemlock (Shelford 1963: 35).

This area is within the Carolinian Biotic Province (Dice 1943) which has a large variety of fauna. In fact, Cleland (1966: Appendix G) lists over 300 species of vertebrates for this area.

Archaeological Background

The Ledbetter Landing site (9BN25) was first investigated by C.B. Moore during his 1914-1915 expedition along the Tennessee River. At the time of Moore's visit, there was a warehouse on part of the site. Moore dug inside the building as well as in an area around the building, and in a nearby field. He recovered eleven skeletons--seven adults plus four infants and/or children. Two of the subadults and one adult had shell beads interred with them. Only one adult was in an extended position; the other adults were in a tightly or partly flexed position. Five crania were preserved (Moore 1915: 205).

In the summer of 1938, the Tennessee Valley Authority began Kentucky Dam, whose reservoir of 158,000 acres would

cover an area 184.3 miles long and 2.5 miles wide (Bowen 1975: 57). The University of Tennessee directed the archaeological survey and subsequent excavations of 34 sites found within this area. Eleven of these sites were considered to be Archaic and were scattered along a sixty mile area of the Tennessee River and a twenty-five mile area of the Big Sandy River (Lewis and Kneberg 1947: 1).

Each site was excavated following definite guidelines. A 10-foot grid system was used with a central north-south axis (CA) running through the approximated center of the site and an east-west baseline set to a right angle of this central axis. Usually test pits were dug following 0.5-foot arbitrary levels. Then two 5-foot wide test trenches would be dug at 0.5-foot arbitrary levels, along the CA and its baseline. If there was any stratigraphy, the 10-by-10-foot unit squares were excavated following the natural strata of the site (Lewis and Kneberg n.d.; Bowen 1975: 53-54).

The Ledbetter Landing site was excavated during late October through early December of 1940 by George Lidberg. No detailed report has been written about the work done at the site, but Bowen has pieced together the excavation methods used by studying the feature forms and Lidberg's notes:

It appears that the site was excavated by three major methods. First, 12 test pits were randomly placed over the site area. Five of these (number 1-5) were excavated by arbitrary

levels to sterile soil . . .

The next excavation method was the excavation of two test trenches by arbitrary levels, one along the north-south central axis and the other along the 20 line in an east-west orientation with the approximate center of the site. The central axis test trench, designated CA, was composed of fourteen 5-by-10-foot units numbered CA10 through CA23. All except CA10 and CA11 were excavated. All units had their long axis oriented north-south. Therefore the total length of excavated trench was 120 feet. The east-west trench ran west from the southeast corner of unit CA20. This trench was composed of nine 5-by-10-foot units oriented with their long axis running east-west. The units of the trench were numbered from east to west CA20 and 20L1 through 20L8. All units except 20L7 and 20L8 were excavated. This made the total length of excavation in this trench 70 feet.

The final method of excavation was to excavate, by natural strata, a number of 10-by-10 foot units clustering about the test trenches. Several of the test trench units were expanded into 10-by-10-foot units . . . (Bowen 1975: 58, 60) (see Figure 2).

Other than the plowzone and the subsoil, two distinct strata were recognized from the test trench profiles. The 10-by-10-foot units were then excavated following this stratigraphy. The plowzone's average thickness was 0.54-foot. Stratum 1 was a sandy, humic loam mixed with many mussel shells and averaging about 1.4-feet in thickness. Stratum 2 was composed of yellow sand with tiny pieces of shell, charcoal, and burnt soil mixed within it. The average thickness was 1.84-feet. Stratum 2 graded into the yellowish-tan, sandy clay subsoil (Bowen 1975: 60-61; Lidberg n.d.: 2-3) (see Figure 3).

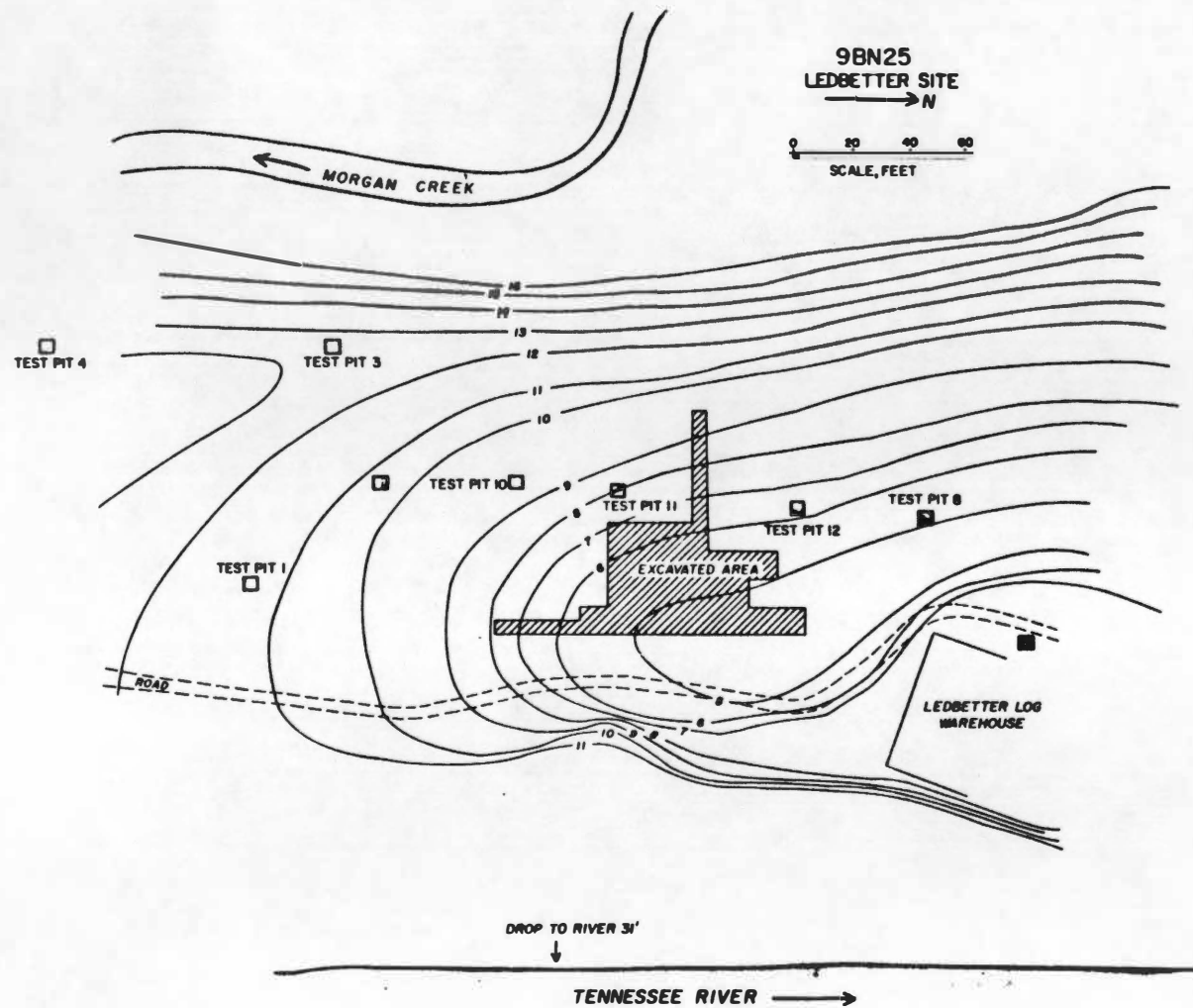


Figure 2. Site Map: 9BN25.

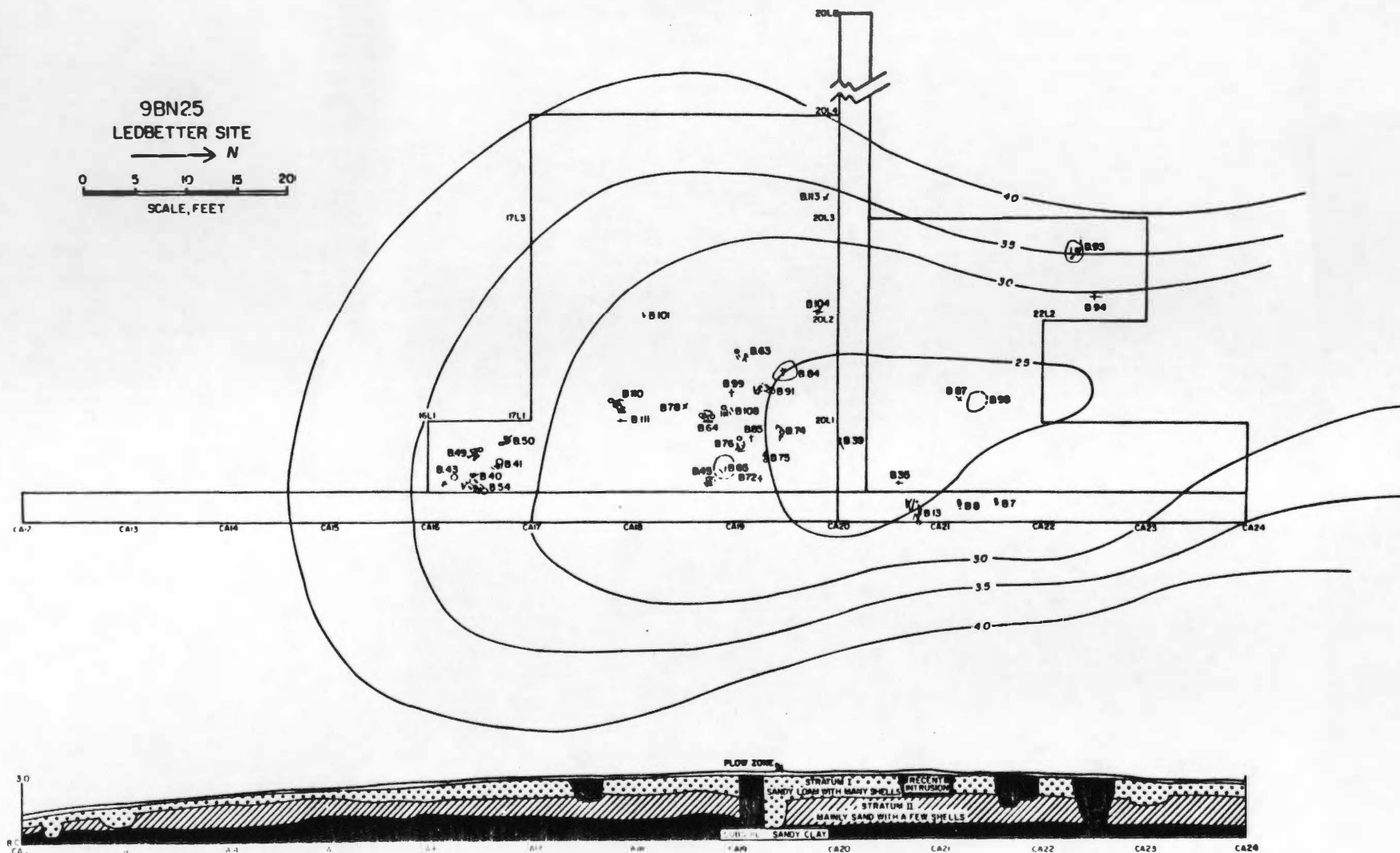


Figure 3. Burial Distribution Map and Stratigraphic Profile: 9BN25.

Lidberg felt that part of the site had been destroyed by the eroding action of the Tennessee River since the burials were scattered throughout the excavated area.

The burials lay in a midden deposit in mound form which reached five feet at its deepest point. Its diameter parallel to the river was about seventy feet, its east-west diameter was about the same though it is suspected that this represents only half of the original extent in this direction. It is highly probable that the habitation site was situated on the area since fallen to the whim of the river (Lidberg n.d.: 2).

However, in his 1975 study of the Ledbetter site, Bowen states that due to the large number of artifacts and features other than burials found within the excavated areas, he suspects that Lidberg's excavations missed the major portion of the site.

During the 1940 excavation at Ledbetter Landing, 114 human burials were removed. Four dog burials were also excavated. The artifacts recovered from this site were either of stone, bone, antler, or shell. All of the recovered stone artifacts were bifacially chipped, but this could have been due to bias on the part of the excavators in not recognizing unifacially chipped tools (Bowen 1975: 61-62).

Although Bowen does not mention that any pottery was found at 9BN25, both Lidberg (n.d.) and Lewis and Kneberg (1947) reported that potsherds were recovered from Ledbetter.

The one thousand potsherds are from at least twenty-one different vessels of four different wares. Alexander Incised, Long Branch Fabric Marked, Harmon's Creek Cord Marked, Wheeler Creek Stamped, and Mississippi loop-handled jars and textile-marked salt pans are all represented (Lewis and Kneberg 1947: 9).

While studying the burials from 9BN25, this author found that many of the burials from Stratum 1 contained pottery. Because one of the distinctions between Late Archaic and Early Woodland is the presence of ceramics in the latter period (Dragoo 1976: 16), it was felt that none of the burials from Stratum 1 could be definitely assigned to the Late Archaic time period. None of the burials from Stratum 2 contained any potsherds, so these burials were used in the Late Archaic mortuary patterning analysis. The four dog burials were not directly associated with any of these Stratum 2 burials so they were also not included within the mortuary patterning analysis.

Archaeological Analysis

Lewis and Kneberg (1959) studied twenty-one Archaic sites from four regions in the Southeast--the Kentucky region, the Tennessee region, the Alabama region, and the Georgia region. They compared trait listings from all the sites in an attempt to group similar sites together under one of two traditions--the Midcontinent Tradition or the Eastern Tradition. Six phases were delineated from ten Archaic sites for the Tennessee region--the Eva Phase, Three Mile Phase, Big Sandy Phase, Kays Phase, Weldon

Phase, and the Ledbetter Phase. The Ledbetter Phase consisted of five components--Kays III, Ledbetter, Thomas, Oak View, and West Cuba. According to Lewis and Kneberg (1959: 172):

Two time horizons can be recognized in this phase . . . The early Ledbetter horizon, . . . was coeval with the Big Sandy phase. Heavier precipitation, with frequent floods, affected the economy of these people, just as it did that of the Big Sandy people, by restricting the mussel supply . . . On the Ledbetter and Oak View sites, the lower strata belong to this horizon.

After studying the other three regions, Lewis and Kneberg grouped the Eva, Three Mile, Big Sandy, and Indian Knoll Phases within the Midcontinent Tradition. The Eastern Tradition was composed of the Stallings Island, Lauderdale, Kays, Weldon, and Ledbetter Phases. There were no radiocarbon dates available for the Ledbetter Phase; however, Lewis and Kneberg (1959: 180) felt that the Ledbetter Phase dated from approximately 1200 B.C. to approximately A.D. 500.

Lewis and Kneberg felt that the settlement pattern for the Archaic time period for western Tennessee was one of long, continuous occupations at a site, with the people being very sedentary:

All (the sites) were inhabited for very long periods with little or no interruption, except in time of floods of short duration. These deep middens contain hearths, pits, burials, occasional postmolds, quantities of animal bone refuse, and artifacts, all of which accumulated slowly over some 50 centuries at

the dwelling places of sedentary hunters whose culture changed but little from generation to generation (Lewis and Kneberg 1959: 161).

Bowen (1975, 1977) discards this idea of a sedentary settlement pattern for the Late Archaic peoples of the western Tennessee Valley. He studied features and artifacts excavated from two sites in the Western Valley (Ledbetter Landing and Cherry), plus seven sites from the upper Duck River Valley impacted by the Normandy Reservoir. Bowen concludes that the sites exhibited locations and functional differences that could be attributed to a settlement pattern characterized by greater mobility, with the sites being occupied for short periods of time on a seasonal basis (Bowen 1975: iii).

Bowen also discards Lewis and Kneberg's idea of two traditions each with several phases, for the Middle South:

It is felt that past efforts at climatological dating and trait comparisons have complicated the interpretation of both the Late Archaic Period and the Archaic tradition as a whole. Therefore, in addition to the five components . . . (previously attributed to the Ledbetter Phase--Kays III, Ledbetter, Thomas, Oak View, and West Cuba), . . . such sites as Cherry and McDaniel . . . (and the other components of the Big Sandy Phase--Eva III, Big Sandy II, and Frazier), heretofore listed as components of the Big Sandy Phase . . . , have been attributed to the Ledbetter Phase, which encompasses both the Big Sandy Phase of the Midcontinent tradition and the Ledbetter Phase of the Eastern tradition (Bowen 1975: 4).

Bowen used activity indices composed of related artifacts to determine what kinds of activities were occurring

at these sites. He then combined indices to form activity categories--hunting, animal processing, plant food processing, tool manufacturing, and also for the Ledbetter and Cherry sites, ornamental and ceremonial. Percentages were calculated for each activity category for every site. The artifacts from each category were then assigned to separate functional categories--cutting, scraping, piercing, and also for the Ledbetter and Cherry sites, perforating, drilling, hammering, and grinding.

Bowen concludes that all but one of the sites in the upper Duck River Valley were seasonal camps exploiting particular environments--in this case, butchering, hide working, and plant food processing were the dominant activities for males and females. The one site that was different seemed to be primarily a hunting camp (Bowen 1975: 81).

The Ledbetter Landing site and the Cherry site were found to have similar activity frequencies with hunting and plant food processing being equally important at both sites. This was not what Bowen had expected to find since: 1) Ledbetter was on a major river bank and had mussel shells and fish hooks in its midden, whereas Cherry was located away from a major waterway on a small tributary and had few shells and no fish hooks; 2) Ledbetter had a deep midden which suggested a longer period of occupation, but no post holes for structures were found. Cherry, however, had many post holes which could have been used for

a structure, perhaps a windbreak; and 3) Ledbetter had no large, kettle-shaped features which could have been used for storage, especially of plant materials, whereas Cherry did. However, after comparing the functional categories for each site, Bowen did find significant differences, especially in the scraping, hammering, and grinding categories. He concludes that these differences were due to the fact that these sites were being exploited for their different environmental resources:

The upland (Cherry) inhabitants seem to have concentrated their efforts on plant food gathering and the hunting of a variety of animals (as evidenced by the storage pits and numerous animal bones in the midden). The people on the flood plain (Ledbetter Landing) were also hunting, but their gathering activities were more concentrated on riverine products--mussels and fish. The storage facilities would tend to indicate that Cherry was occupied during the autumn, winter, and early spring, while Ledbetter Landing was most likely occupied during the driest time of year (summer) when flooding would not hinder flood plain exploitation (Bowen 1977: 115, 117).

However, Bowen did not mention that pottery was found at the Ledbetter Landing site and since he used material from both Stratum 1 (which contained pottery) and Stratum 2 (which was definitely Archaic), some of his findings may not be entirely valid. For example, Bowen felt that the large quantities of mussel shell and fish hooks found at Ledbetter suggested that the site was used to exploit the nearby riverine environment. He contrasted this with the apparent lack of shell and fish hooks at the Cherry

site. However, only Stratum 1 at Ledbetter contained large amounts of shell and fish hooks (none of the burials definitely from Stratum 2 had any fish hooks at all). Probably the two Ledbetter strata should be considered as different components and only Stratum 2 of the Ledbetter Landing site should have been compared and contrasted to Cherry and the other Late Archaic sites, which is what Lewis and Kneberg had stated in their 1959 study. Whether this oversight on Bowen's part would change his findings is debatable at this time.

Bowen dates the Ledbetter Phase as being from 2500 to 1000 B.C. The only reliable radiocarbon date from Normandy for the Ledbetter Phase came from Feature 71 at the Banks V site (40CF111). This date was 2800 ± 260 B.C. (UGa-719: 4030 ± 260 B.P.) (Bowen 1975: 35; Faulkner and McCollough 1974: 297, 316).

Summary

Lewis and Kneberg's hypothesis that the Archaic people of the western Tennessee Valley were occupying sites for extended periods of time and living a sedentary existence is not supported by recent research. Bowen attempted to show that the Ledbetter Phase sites were occupied on a seasonal basis with the inhabitants exploiting the different environmental resources at each site. The Ledbetter Phase is dated to the Late Archaic time period with a time span of 2500 B.C. to 1000 B.C. This phase contains the

following components--Cherry, McDaniel, Eva III, Big Sandy II, Oak View, Frazier, Kays III, Thomas, West Cuba, and at least Stratum 2 of Ledbetter Landing. Reanalysis of the Late Archaic sites by Bowen (1977) suggests the settlement pattern was one of seasonal exploitation of various environmental settings.

Ledbetter Skeletal Sample

As previously mentioned, due to the inclusion of pottery with many of the burials from Stratum 1, only burials from Stratum 2 were considered to be definitely Late Archaic in origin. Therefore, out of 114 burials excavated from Ledbetter Landing, only the 34 burials from Stratum 2 were used for analysis (For burial distribution see Figure 3, p. 11).

These 34 burials contained 43 individuals. Seven burials contained two individuals and one burial contained three individuals (see Appendix B-4). The skeletal sample from Ledbetter Stratum 2 consisted of the following:

Adults:	31	+	Subadults:	12	= 43 total
Males:	12		Fetus:	2	
Females:	9		Infant:	6	
Indet. adult sex:	10		Child:	4	

However, because of the type of statistical method used to analyze mortuary patterning, each burial had to be treated as if it contained just one individual. Therefore, in each burial with more than one individual, only the skeleton that was deemed to be the most complete was used to

represent that burial. This changes somewhat the character of the sample, so that it consists of twenty-five adults and nine subadults with the following breakdown:

Adults:	25	+	Subadults:	9	= 34 total
Males:	12		Fetus:	2	
Females:	8		Infant:	4	
Indet. adult sex:	10		Child:	3	

Seven burials from Stratum 2 were cremations--Burial numbers 39, 65, 84, 93, 101, and 111. Five of these were found in pits filled with charred material, according to the original burial records. Three of these five burials were judged to have been fleshed or green when cremated, while the other two were cremated as dry bone (see Baby 1954; Binford 1972; and Buikstra and Goldstein 1973 for their discussions on analyzing cremated remains). Burial numbers 101 and 111 were only partially burned and no pits were found when these were excavated. All of the cremations were adults--five could not be sexed; Burial number 111 contained two adults females; and Burial number 93 contained an adult male (see Appendix B-4).

CHAPTER II

MORTUARY PATTERNING

There have been numerous studies utilizing burial remains in attempts to correlate mortuary patterning with social organization (see Bartel 1982; Binford 1971; Braun 1981; and Tainter 1978 for discussions of various mortuary studies). Tainter (1975a, 1975b, 1977, 1978) believes that mortuary analysis permits the investigator to determine not only the social interactions between the living and the dead, but also enables the generation of hypotheses concerning the nature of social structure in that society. He writes:

Saxe (1970: 6) noted that the occasion of death will involve an interaction between the deceased person and many of the persons with whom he or she had engaged in identity relationships during life. It can be seen then that death and mortuary ritual call forth a fuller representation of an individual's various social identities than does any occasions during life. Hence, the archaeological record of mortuary ritual should contain a greater range of information about the social identities present in a past society than does any other category of information. Additionally, since individuals acquire social identities by virtue of membership in the structural parts or components of a social system, mortuary ritual will simultaneously convey information about the nature of a past society. Indeed, to the extent to which a mortuary population contains individuals who held membership in the various components of a society, that mortuary population can be expected to reflect the structure of the extinct society (Tainter 1977: 70). There does not appear to be any other category of archaeological data for which this claim might be so confidently advanced (Tainter 1978: 110).

The degree of organizational complexity of different societies has been studied by Fried (1967) and Service (1962). They devised classifications ". . . in which kinds of societies are ranked according to increasing degrees of structural complexity and increasing numbers of mechanisms for organizing populations" (Tainter 1978: 114). Service (1962) used the terms band-tribe-chiefdom-archaic in his model while Fried (1967) used the terms egalitarian-ranked-stratified-state in his model.

Binford (1971) studied 40 societies drawn from the Human Relation Area Files that were of non-state complexity. He studied each society and looked for:

. . . the number of dimensional distinctions (age, sex, social position, sub-group affiliation, cause of death, and location of death) recognized in the performance of formally differentiated mortuary practices (1971: 18).

Less complex societies base their distinctions upon the individual's personal qualities of age, sex, and ability to perform their cultural duties (Service 1962: 54).

Therefore, Binford feels that:

. . . there should be a strong correspondence between the nature of the dimensional characteristics serving as the basis for differential mortuary treatment and the expected criteria employed for status differentiation among societies arranged on a scale from simple to complex (Binford 1971: 19).

Binford found that hunters and gatherers did give greater recognition to age and sex in their treatment of the dead than to any other factors (conditions of death,

location of death, social position, and social affiliation) studied. He concluded that his studies were ". . . indicative of the postulated positive relationships between the structure of mortuary ceremonialism and the status structure characteristic of any given socio-cultural system" (Binford 1971: 20). Therefore, an egalitarian level of social organization should result in a simple mortuary patterning whose distinctions are based upon age and sex.

Variables Used in Analysis of Mortuary Patterning

Because the Ledbetter Landing Late Archaic sample size is relatively small ($n=34$), it was felt that results from the statistical analyses should be compared to some other Late Archaic sites to insure that Ledbetter's mortuary patterning was consistent with that of similar sites and not a spurious result due to the small sample size. The Big Sandy component (Eva III) at the Eva site (6BN12) and the Cherry site (84BN74) were chosen for this comparative analysis for several reasons: 1) They are all within the same physiographic region--the Western Valley; 2) They all date from the same approximate time period--2500-1000 B.C.; and 3) All three sites seem to have had the same type of settlement/subsistence pattern of seasonal exploitation of particular environments (for detailed discussions of the archaeological backgrounds and analyses of the Eva and Cherry sites see Lewis and Kneberg 1947, 1959; Lewis and Lewis 1961; and Magennis 1977).

The mortuary patterning of these two sites has already been analyzed by Magennis (1977), who used a listing of 74 variables (see Appendix A-1). In compiling her list, Magennis followed the four burial dimensions which Binford (1971) and Goldstein (1976) outlined as being important in determining ". . . correlations between characteristics of the social persona given recognition by differential mortuary treatment and the form of the ritual discrimination . . ." (Binford 1971: 21). These four dimensions were:

1. Treatment of the body itself
 - a. Degree of articulation of the skeleton
 - b. Disposition of the burial
 - c. Number of individuals per burial
 - d. Mutilations and anatomical modifications including cremation, dessication, disarticulation, and reburial
2. Differential preparation of the facility in which the body is placed
 - a. Form of the facility (e.g., grave or tomb, variation in materials used for construction, or architectural variability)
 - b. Orientation of the facility (e.g., whether the facility was oriented with respect to some established reference point such as cardinal directions or a topographic feature)
 - c. Location of the facility in relation to the community
 - d. Location of the facility in relation to other individual's facilities
 - e. Location of the facility within the disposal area
 - f. Form of the disposal area (whether a cemetery, house floor, mound, etc.)
3. Burial context within the grave
 - a. Arrangement within grave of specific bones with relation to grave furniture and grave facility
 - b. Form of the grave goods
 - c. Quantity of the grave goods

4. Population profile and biological dimension
 - a. Age
 - b. Sex
 - c. Disease status or circumstances of death
 - d. Nutritional evidence and environmental stress
 - e. Genetic relationships
 (Magennis 1977: 40-41; from Binford 1971: 21 and Goldstein 1976: 31).

Using these four dimensions as a general guide, Magennis extracted four dimensions which she felt were more appropriate for her material. The terminology used for the burial descriptions were based on those suggested by Sprague (1968). Magennis' four burial dimensions were:

1. Treatment of the body itself
 - a. Form of disposal
 - b. Individuality
 - c. Articulation
 - d. Position
 - e. Deposition
 - f. Cremation
2. Preparation of the disposal facility
 - a. Orientation of the body
 - b. Location of the body within the disposal area
3. Grave furniture
 - a. Form of goods
 - b. Quantity of goods
4. Demographic and biological dimensions
 - a. Age
 - b. Sex
 - c. Disease states or health status
 (Magennis 1977: 43; also see pp. 43-46 for a more detailed discussion of above burial dimension numbers 1-3).

The demographic and biological dimension is important because cultures may accord preferential treatment to some individuals based upon their age, sex, and even disease state (Goldstein 1976; Saxe 1970). As was noted earlier, the distinctions of age and sex were found by Binford

(1971: 18-23) to be of primary importance in determining if a society had an egalitarian level of social organization.

The six bone pathology variables used by Magennis to determine disease states were based upon those of Neumann (1967: 7-11) and Morse (1969) and were as follows: 1) anomalies in growth and development; 2) regressive changes; 3) traumatic injury; 4) osteoarthritis; 5) infectious diseases of unknown etiology; and 6) dental pathology (see Magennis 1977: 52-55 for a detailed discussion of each bone pathology variable).

Unlike in Magennis' study (1977: 92-111), a demographic profile was not attempted for the Ledbetter Landing Late Archaic burials, due to the small size of the sample.

Determination of Age and Sex of the Ledbetter Skeletal Material

Two very important factors in the analysis of the mortuary patterning of the Ledbetter Landing site were age and sex. Due to the poor preservation and/or lack of caution when excavating the burials, the skeletal material is often very incomplete. However, an attempt was made to at least determine if the material was subadult or adult; and, when possible, an exact age was assigned. The adult material was also sexed whenever possible. The following two sections discuss the methodology used in determining age and sex.

Age determination. The subadult burials are assigned to one of three age categories: fetus; infant (newborn to 1.5 years); or child (1.5 to 6 years).

Two methods were used to determine if the skeletal material was of fetal age. If the shaft of a long bone was present, it was measured and compared to tables formulated by Johnston (1962; Table 2: 251) for young Amerindian subadults from Indian Knoll. This Late Archaic shell mound, located in south-central Kentucky provided Johnston with the remains of nine fetuses and one hundred and sixty-five infants and young children up to the age of five and one-half years for his study of long bone growth as related to age. Johnston measured the diaphyseal lengths of six long bones: the humerus, radius, ulna, femur, tibia, and fibula. He then calculated the means and standard deviations for the shafts' lengths and matched these to age groupings of: fetal age; newborn to 0.5 years; and then from 0.5 to 1.5 years up to 4.5 to 5.5 years (Johnston 1962: 250-251).

If a long bone shaft was not present or was too badly broken to be even given an approximate length, a second aging method was used, which involved measuring the pars basilaris and/or partes laterales of the occiput. In a 1970 study of 117 Yugoslavian subadults of medieval age and 20 German fetuses, age groups ranging from fetus to adult (20 to 29 years) were associated with the lengths of

the pars basilaris and pars lateralis (Redfield 1970;

Table 4: 216). Redfield's general conclusions were:

(1) If the pars basilaris is longer than it is wide, and the partes laterales are almost the same length as the basilaris, the child probably was a fetus or newborn infant. (2) If the pars basilaris is almost square and the partes laterales are one-third longer than the basilaris, the child may have been a few months old. (3) If the pars basilaris is wider than it is long and the partes laterales are half again as long as the basilaris, the child probably was over six months old (Redfield 1970: 217).

Ages of the infants and children were also partly determined by the two previously discussed methods, especially the diaphyseal lengths of long bones. However, when these two methods could not be used, a third aging method was employed. This involved studying the growth formation of the crown, root, and apex of ten permanent teeth (the maxillary incisors and all eight mandibular teeth) and matching their stage of development to a specific age. Moorrees, Fanning, and Hunt (1963: 1491) studied the dental x-rays of 48 male and 51 female children from the Boston area and 136 male and 110 female children that were part of a Fels Research Institute of Ohio longitudinal growth study. From studying the dental x-rays, Moorrees, Fanning, and Hunt made separate charts for males and females which:

. . . are composed of segments, one for a specific tooth, in which the chronology of its development is recorded graphically by horizontal bars for each stage. On a horizontal bar, the mean age of attainment and the plus and minus one and two standard deviation limits are indicated by symbols.

A scale is provided at the top and bottom of the charts for indicating chronologic age. The assessment of tooth formation is recorded by a check mark at the approximate stages for the different teeth . . .

By drawing a vertical line through corresponding points on the age scales, the rating of tooth development of a child is read directly in standard scores at the points of intersection of this vertical line and the horizontal bars for each specific tooth formation stage (Moorrees, Fanning, and Hunt 1963: 1497).

Because the Ledbetter subadults were not assigned a specific sex, an age was obtained from each chart and then averaged.

The younger adults were assigned an age by determining the amount of epiphyseal closure of various sections of the skeleton, especially the long bones. The amount of epiphyseal closure was graded on a scale from 0 (non-union) to 4 (complete union) for each bone that was studied and then these scores were totaled for an overall score. This was compared to tables giving total scores and age ranges devised by McKern and Stewart from their study of American soldiers killed during the Korean Conflict (McKern and Stewart 1957; McKern 1970). However, this method is only accurate up to about 25 years of age since most epiphyseal unions have occurred by this time or else the closure is too erratic to be used for aging skeletal material with any accuracy.

There are problems with applying McKern and Stewart's epiphyseal closure rates to female skeletal material, since it was based on males only and females tend to have

earlier epiphyseal closures:

Ossification begins earlier in females, and the epiphyses unite earlier in females also, normally some two to three years sooner. This leads to a shorter period of growth in females and accounts for their smaller adult size when compared with males (Bass 1971: 16).

However, the younger Ledbetter adults that were aged by epiphyseal closure just happened to be all males so their age determinations are fairly accurate given that these are Late Archaic hunters and gatherers and the Korean Conflict sample were composed of 20th century males that had a different nutritional background from the Ledbetter material.

The most accurate visual method of aging older adult skeletal material is by observing changes in the pubic symphyses. Todd's work in the 1920's defined 10 phases of changes on the face of the pubic symphysis that he correlated with specific age groupings starting after puberty (Todd 1920, 1921). Todd provided photographs and later, drawings illustrating his phases, which ranged in age from 18-19 years up to 50+ years (1920: 313-314). However, Todd's work was found to average many skeletons (Brooks 1955).

In the early 1950's, McKern and Stewart studied the remains of 450 American soldiers that had been killed in the Korean Conflict. They were able to document skeletal age changes that occurred throughout the body for males from 17 to 50 years of age. Their report documented rates

of epiphyseal closure, suture closure, third molar eruption, and symphyseal age changes (McKern and Stewart 1957). Three components of the pubic symphysis were identified--the dorsal plateau, ventral rampart, and the symphyseal rim; and five stages of age changes were assigned to each component (McKern 1970: 53-54). Each stage was given a number and after scoring the three components, a total score was compared to a table which correlated groups of scores to an age range, mean age, and standard deviation (McKern and Stewart 1957; Table 27: 85). A set of plastic model symphyseal casts devised by McKern and Stewart were used to facilitate this scoring process.

The only problem with using McKern and Stewart's symphyseal casts for aging the Ledbetter burials was that their findings were based on an all male sample, and when used to age females the result was one of the females being underaged, especially in the 40-50 year age range (Gilbert 1973: 39).

Although pubic metamorphosis begins in both sexes about the age 16, the curve of male maturation is steep between 17 and 25, going from 1 to 10 on a 15 point scale. The curve for the female is gradual and regular, being more nearly a straight line relationship between chronological age and skeletal maturation for the period 17-40 years. At 40 years of age however, the line representing pubic skeletal maturation diverges sharply, indicating decreased rate of maturation. This approximates the age of menopausal onset in women (Gilbert 1975: 39-40).

Also, the female pubes are often distorted due to child-bearing which can cause the pubes to be overaged (Stewart 1957, 1962).

Gilbert and McKern's 1973 study of 103 female pubic symphyses enabled them to devise a set of scores correlated to age ranges, means, and standard deviations for the ages 13 to 59 (Table 2: 34). As in McKern and Stewart's study of male pubes, these scores were also based on five stages of changes for the three components of the symphysis--the dorsal demi-face, the ventral rampart, and the symphyseal rim (Gilbert and McKern 1973: 33-34). A set of plastic casts were also made to facilitate the use of this aging method. Some problems have been noted with the use of Gilbert and McKern's aging technique. Suchey reported that after 23 physical anthropologists aged 11 female pubes of known age ". . . only 51% of the assessments yielded age ranges which would include the known age of the specimen in question" (Suchey 1979a: 469). Suchey felt that a larger sample might result in a more accurate method of aging female pubes. However, at the present time Gilbert and McKern's method is the only one available.

Todd and Lyon (1924) tried to devise a means of aging skeletal material through studying the amount of endocranial suture closure of the skull. However, their results were somewhat biased since they deleted any skulls from their sample whose sutures had either closed too

quickly or had remained unclosed too long for its particular age. Also, even Todd and Lyon felt that:

. . . the results in individual cases leave much to be desired for the average deviation is rather more than six years . . . (I)t cannot be denied that so far our work does not justify the uncontrolled use of suture closure in estimation of age (1924: 379).

McKern and Stewart studied ectocranial suture closure among their American soldier skeletal sample and found them to be of little use in aging also.

So erratic is the onset and progress of closure that an adequate series will provide just about any pattern at any age level. Thus, as a guide for age determination, such a trend is of little use. In other words, suture closure, as either direct or supportive evidence for skeletal age identification, is generally unreliable (1957: 37).

Therefore, the Ledbetter adult burials were not given specific ages by studying suture closures. An age was determined only by studying a combination of epiphyseal closures and/or by studying the age changes of those burials where pubic symphyses were present. Most of the burials did not have complete skulls anyway, so it was felt that ignoring suture closures would not affect the ages that could be determined. (Only six adults were actually given an age other than the general term adult due to the scarcity of skeletal material from each burial. See Appendix B-4).

Such general aging processes as osteoarthritis, especially vertebral lipping, and acute dental attrition,

were noted to distinguish between adult and subadult fragmentary skeletal material where these were applicable (see Kerley 1970; Stewart 1958).

Sex determination. An attempt was made to determine sex only for the adult Ledbetter burials, since there is still no agreement among physical anthropologists that subadult skeletal material can be accurately sexed. For example, Snow, in his original report (1948) on the Indian Knoll skeletal material, and Johnston and Snow in their reassessment of the Indian Knoll remains (1961) sexed the subadults, even the newborns. And also Reynolds (1945) showed that there are sexual differences in the pelves of infants but these differences were based on measurements taken from x-rays of live children. But as Stewart points out in his commentary on the sexing techniques used for the Indian Knoll material:

It is one thing, of course, to demonstrate the existence of sex differences by measurements on x-rays taken in life, and quite another to provide the necessary measurement ranges and sex-discriminating values needed to accurately determine sex from dried bones. In the skeleton of a child the primary elements of the innominates are separate and cannot be reassembled to match accurately the arrangement that existed in life. Measurements made on x-rays thus are not applicable to dried bones (1962: 147).

The area of the body which provides the best means of sexing adult skeletal material is the pelvic region. There are some general features that may be used to distinguish between male and female pelves: women have

a greater sub-pubic angle; the sciatic notch in females is wider; and the sacro-iliac articulation area is often raised in females (Bass 1971: 157-159). Changes due to pregnancy may also aid in determining sex. Houghton (1974) found that a certain type of pre-auricular groove of the ilium which he called GP (groove of pregnancy) was found only in females, although not all the time. He felt that these uneven, deep pits were caused by pregnancy. Stewart (1970) found that some female pelves showed pitting along the dorsal side of the pubic symphyses which both he and Angel (1969) attributed to stress incurred during pregnancy and during labor itself. Changes due perhaps to pregnancy were noted on female pubes from the Late Archaic Ledbetter Landing burials. However, these changes were not used as the sole criterion for sex determination since although ". . . there is a statistical association between the number of full term pregnancies and the extent of dorsal pitting . . . in females . . . the correlation is not strong" (Suchey 1979b: 522).

A highly accurate, very easy visual method of sexing adult skeletal material by using the innominates was devised by Phenice (1969). He noted that the ventral arc ". . . a slightly elevated ridge of bone which extends from the pubic crest and arcs inferiorly across the ventral surface to the lateral most extension of the subpubic concavity . . .", is found only in females (Phenice 1969:

298). Phenice also noted that females have a noticeable subpubic concavity, whereas males may only have a slight trace of one (1969: 300). His third sexual difference, the medial aspect of the ischio-pubic ramus, is not quite as clear cut as the first two (males tend to have a broader surface). Phenice states that "If the estimation of sex is based on the one or two criteria which are definitely male or female, the estimate will be right at least 96% of the time" (1969: 300).

The vertical diameter of the femur head was measured when possible and compared to the findings of Thieme and Schull in which they state that females will measure less than 44mm (1957: 253). The head of the humerus was also measured and compared to the findings of Dwight (1904/1905; also see Krogman 1962: 144) to aid in determining sex.

Another sex identification method used was that of measuring the mid-shaft circumference of the femur. Black (1978) found this measurement useful in his study of 107 skeletons from the Libbon Site in Ontario County, Ohio. He determined that measurements of greater than 81mm for the femur's mid-shaft circumference could be considered male.

There are also general sexual characteristics of the skull which were used to determine if the individual was male or female. Such characteristics as the following were used: the male skull is generally more robust,

especially in the occipital area; the eye orbits are more rounded and blunt in males; the supraorbital ridges are more pronounced in males; the mandible's morphology is larger in males; and males have more of a square chin (Krogman 1962: 114-116; Table 31: 115).

From a total of thirty-one Ledbetter adults, nine were designated as male while twelve were designated female on the basis of these above techniques. Ten adult burials could not be accurately sexed due to the scarcity and/or condition of the skeletal material of these individuals (see Appendix B-4).

CHAPTER III

ANALYSIS

Methods

Tainter studied several different statistical methods which could be used in the study of mortuary patterning. He concludes that average-and complete-linkage cluster analysis and the use of chi-square tests were not appropriate since they:

. . . failed to generate burial clusters which differed on attributes reflecting different amounts of energy expenditure . . . (Also), . . . the chi-square statistic was rejected on empirical grounds for generating clusters which frequently differed only in the presence or absence of "idiosyncratic" attributes of burial treatment . . . (and) the chi-square statistic . . . excludes negative matches from the computation of the coefficients of association (Braun 1981: 400 cited from Tainter 1975a 1975b: 61-82, 1978: 119).

For the above reasons, Magennis (1977) used factor analysis as her statistical method to test for any associations between the variables of age, sex, position, deposition, orientation, location within the cemetery, and the type of grave furniture. However, six of these variables were recorded by Magennis employing only nominal scale measurement. (The location within the cemetery was recorded on an interval scale measurement). Reed (1979) points out that by using nominal scale measurements with factor analysis, the associations found and the interpretations made based on these associations should be

questioned as to their correctness and validity (see also Roper 1976 and Rummel 1970 for discussions of factor analysis and nominal data).

Because Magennis' findings could be considered suspect, the data for the Big Sandy component at the Eva site and the Cherry site were reanalyzed along with the Ledbetter Landing data. Each site was analyzed separately, and then combined. The variables were scored relative to presence/absence of a given variable. This type of binary coefficient can be expressed in a 2X2 contingency table as follows (Sneath and Sokal 1973: 130):

		Variable B	
		Present	Absent
Variable A	Present	a	b
	Absent	c	d

Hohn (1976) discusses three categories of binary coefficients: similarity, association, and matching. Hohn feels that association coefficients, especially the phi coefficient, are ". . . directly relatable to chi-square in concept and calculation" (1976: 139). This means that for the phi coefficient, confidence levels for significance of association can be calculated utilizing z scores. The added advantage to the phi coefficient is that unlike the chi-square statistic, it ranges from -1 to +1 so that negative matches (the d cell in the 2X2 contingency table) are also included (Hohn 1976: 139; Hatch 1976: 148-149).

Therefore, the phi coefficient, expressed as (Hatch 1976: 148):

$$\phi = \frac{ad-bc}{\sqrt{(a+b)(c+d)(a+c)(b+d)}}$$

was used for the analysis of the variables for Ledbetter Landing, Big Sandy component at Eva, and Cherry. The confidence intervals for significance at a level of .05 or 95% were calculated utilizing the following formula (Hatch 1976: 149):

$$\phi\sqrt{n} = z$$

Then both positive and negative matches were studied to determine if there were any significant associations between any variables. Only those associations that were not expected were included in the lists of associations (for example it would be expected that adults would have a negative association with subadults, so this was not listed since it would have no information value in this study).

Instead of using four mortuary dimensions like Magennis (1977: 43), only three were chosen for analysis. These three dimensions and the variable categories used to characterize them are as follows:

1. Biological dimension
 - a. Age
 - b. Sex
 - c. Pathologies
2. Burial character dimension
 - a. Form of disposal
 - b. Individuality
 - c. Cremation
3. Grave goods dimension

Due to the differences in statistical treatment between this study and that of Magennis (1977), the variables used by Magennis were recoded. Only those variables (other than site number, burial number, and stratum) that could be characterized as being either present or absent were used and the grave good variables that did not apply to the Late Archaic burials were deleted. Also, the four composite variables of: 1) hunting, fishing, and plant food acquisition tools; 2) domestic tools (woodworking, hideworking, and weaving); 3) exotic trade goods; and 4) ornamental and entertainment artifacts used by Magennis (1977: 45) to group her large number of artifact variables were changed. In an attempt to control idiosyncratic bias due to small sample size, this author grouped the artifact types into the five composite variables of: 1) extractive; 2) domestic; 3) ceremonial; 4) ornamental; and 5) exotic.

The number and percent for the presence or absence of each variable were tabulated for each site and all sites combined (see Appendix C). Then the phi coefficients were calculated for: 1) All variables by all cases for each site and all sites combined; 2) All variables by all burials of known sex for each site and all sites combined; 3) All variables by all burials with grave goods for each site and all sites combined; and 4) All variables by all burials of known sex with grave goods for each site

and all sites combined (see Appendix D). Because the first and third phi coefficient analyses included those burials of unknown sex, the second and fourth phi coefficient analyses were run as a check for bias. Therefore, the associations found when all variables were run against all cases (no. 1) or all burials with grave goods (no. 3) must be viewed with caution if they are also not found when all variables are run against only those burials of known sex (no. 2 and no. 4). Of course there is some bias in testing only the burials of known sex since, as the sample size decreases, the phi values increase. This means that some variables that had been considered significant will no longer be, although they will come very close to the .05 level of significance used in these analyses.

The first two phi coefficient analyses were run to determine if there were any significant associations (positive or negative) between any of the variables characterizing the biological and burial dimensions. The third and fourth phi coefficient analyses were run to determine if there was any patterning between the variables characterizing the grave goods dimension. There should not be class/task specialization in an egalitarian society, except for those distinctions based upon age and sex. Therefore, one would expect to find diverse types of grave goods associated with each other. For example, an adult male could have been given some rare or prized burial

good along with other, more mundane artifacts which reflected every day activities that, as a male, he participated in (e.g., hunting or fishing). Whereas, in a stratified society, the adult male would more likely to have been buried with artifacts that reflected his status. Thus, the higher ranked classes would receive most, if not all of the ceremonial, exotic, and ornamental artifact types with those of lower class rank being buried with artifacts reflecting their specific task-related duties during life.

Results

Appendix B lists the skeletal inventories for each site with the burial number, stratum number, age, and sex of each individual divided into four groups: 1) known sex without grave goods; 2) unknown sex without grave goods; 3) unknown sex with grave goods; and 4) known sex with grave goods. The inventories for Big Sandy component at the Eva site and Cherry were compiled from Magennis' original data sheets.

As already mentioned, there was a total of 34 burials from the Ledbetter Landing site that were used in the binary analyses. Twenty-five (73.5%) of these were adults, and nine (26.5%) were subadults. After sexing the adult material, twelve (35.3%) were determined to be males and eight (23.5%) were classified as females. Fourteen (41.2%) of the individuals had pathologies: either traumata,

osteoarthritis, or some kind of dental pathology (see Appendix C-1 for a complete variable frequency listing for Ledbetter).

Half of the individuals had some kind of grave good buried with them. Three times as many adults (13) as subadults (4) had artifacts associated with them (see Table 1). Twice as many males (8) as females (4) had artifacts associated with them (see Table 2). The more numerous artifact types associated with the Ledbetter burials were: projectile points, animal, exotic, extractive, and domestic.

One special type of artifact found only at Ledbetter was cut and polished human bone: two burials (numbers 78 and 91) each had a human femur shaft whose ends had been cut off and the openings had been ground smooth. Burial 78 was that of a fetus while Burial 91 contained two adults, the most complete skeleton being that of an adult male (aged 26-32 years). Burial 78 also had a large number of other artifact types associated with it. Having a fetus associated with so many artifacts, especially rare ones, seems like an anomaly for an egalitarian society. The photograph of Burial 78 showed just a small pile of artifacts and the Burial Distribution Map (Figure 3, p. 11) does not show any other burials closely associated with 78. The burial form does not provide any assistance in determining if this is really a burial or some kind of feature.

Table 1. Artifact Association by Age: Ledbetter.

Variables	Subadult no.	(%)	Adult no.	(%)	Total no.
Burials with artifacts	4	44.4	13	52.0	17
Burials without artifacts	5	55.6	12	48.0	17
Total	9	100.0	25	100.0	34

Table 2. Artifact Association by Sex: Ledbetter.

Variables	Male no.	(%)	Female no.	(%)	Total no.
Burials with artifacts	8	66.7	4	50.0	12
Burials without artifacts	4	33.3	4	50.0	8
Total	12	100.0	8	100.0	20

Twenty-five of the burials were judged to be of primary interment, while four were thought to have been subjected to some sort of processing before they were interred. Twenty-six burials were individuals and eight were multiple burials, with seven of the burials being cremations.

When all variables by all cases for Ledbetter were tested for significant associations, the males were found to be positively associated with pathologies in general, and specifically with traumata and osteoarthritis. This could be a reflection of the fact that there were more males than females in the sample, or it could possibly be a reflection of injuries received due to male-specific activities (e.g., hunting accidents, warfare). The females were not significantly associated with any variable. The adults as a group were also associated with pathologies, specifically with osteoarthritis, which would be expected. Adults were negatively associated with worked bone, while subadults were positively associated with worked bone. The Form B (secondary interment) burial character was positively associated with cremation, and this was the only significant association found when all variables by only burials of known sex were also tested. The positive association of Form B with cremations reinforces the previously discussed cremation analysis, where it was pointed out that two of the seven cremations were

burned while dry and two others had no pits. This could mean that they had been burned elsewhere and then deposited in a grave (see Chapter I, p. 20).

The Big Sandy component (Eva III) at the Eva site had a total of 59 burials. Forty-seven (79.7%) were adults and 12 (20.3%) were subadults. There were 20 (33.9%) males and 17 (28.8%) females. Almost half of all the burials of the Big Sandy component had some type of pathology, specifically: regressive changes, traumata, osteoarthritis, infectious diseases, or dental pathology (see Appendix C-2 for a complete variable frequency listing for Big Sandy component).

Twenty-two burials had some type of grave good associated with them. Although adults without artifacts slightly outnumber adults with artifacts, only one of the 12 subadults had any artifacts buried with it (see Table 3). Of the 47 adult burials with grave goods, almost twice as many males had grave goods associated with them as females (see Table 4). The artifact types associated with the largest number of burials were: projectile points, hide, extractive, and domestic. All of the burials were of primary interment; all but two were individual burials; and there were three cremations.

The Big Sandy component males were positively associated with pathologies in general, and specifically with traumata, osteoarthritis, and dental pathology. The males

Table 3. Artifact Association by Age: Big Sandy Component.

Variables	Subadult no.	(%)	Adult no.	(%)	Total no.
Burials with artifacts	1	8.3	21	44.7	22
Burials without artifacts	11	91.7	26	55.3	37
Total	12	100.0	47	100.0	59

Table 4. Artifact Association by Sex: Big Sandy Component.

Variables	Male no.	(%)	Female no.	(%)	Total no.
Burials with artifacts	13	65.0	7	41.2	20
Burials without artifacts	7	35.0	10	58.8	17
Total	20	100.0	17	100.0	37

were also positively associated with grave goods, specifically with atlatl, lithic, hide, and extractive. The females were only associated with pathologies in general. The subadults were negatively associated with grave goods in general, but were positively associated with drill and hoe grave goods. This is because only one subadult had any burials goods and they were both the only instance of drill and hoe for this site. The adults were positively associated with pathologies in general, and specifically with osteoarthritis, infectious, and dental. No burial character was associated with any variable.

When only all variables by burials with known sex were tested, no significant associations were found. It seems that the only conclusions which can be drawn about the Big Sandy component at Eva are that males exhibit some association with a few pathologies (which may be sex related) and are also associated with some of the artifact types (which also may be sex related).

The Cherry site contained a total of 65 burials. Forty-nine (75.4%) of these were adults and 16 (24.6%) were subadults. There were 25 (38.5%) males and 15 (23.1%) females. Thirty-seven of the burials exhibited some type of pathology, specifically: regressive changes, traumata, osteoarthritis, infectious diseases or dental pathology (see Appendix C-3 for a complete listing of variable frequencies for the Cherry site).

Slightly less than half of the burials had some type of grave good associated with them. More than twice as many adults had artifacts as subadults (see Table 5). Only slightly more males than females had artifacts associated with them (see Table 6).

The major grave goods associated with the Cherry burials were: projectile points, animal, exotic, hide, ornamental, extractive, and domestic. Fifty of the burials were of primary interment; fifty of the burials were individuals, while thirteen were multiple burials; and there was one cremation.

Once again males were positively associated with pathologies in general, and specifically with traumata, osteoarthritis, and infectious diseases. The females were only associated with pathologies in general. Adults, males, and subadults were all negatively associated with exotic grave goods. When testing for associations between all variables by burials of known sex, nothing was found to be significant.

Out of 158 Late Archaic burials analyzed from Ledbetter, Big Sandy component at Eva, and Cherry, there were 121 adults and 37 subadults. There were 57 males and 40 females. Eighty burials showed some type of pathology, specifically regressive changes, traumata, osteoarthritis, infectious diseases, and dental pathology (see Appendix C-4 for a complete listing of variable frequencies for all

Table 5. Artifact Association by Age: Cherry.

Variables	Subadult no.	(%)	Adult no.	(%)	Total no.
Burials with artifacts	9	56.3	20	40.8	29
Burials without artifacts	7	43.7	29	59.2	36
Total	16	100.0	49	100.0	65

Table 6. Artifact Association by Sex: Cherry.

Variables	Male no.	(%)	Female no.	(%)	Total no.
Burials with artifacts	8	32.0	6	40.0	14
Burials without artifacts	17	68.0	9	60.0	26
Total	25	100.0	15	100.0	40

sites combined. Sixty-eight burials had some kind of grave good. Table 7 gives the number and percent of burials with artifacts for each site and the number and percent of burials without artifacts for each site. It is interesting to note that Cherry and Ledbetter have almost a 1:1 ratio of burials with artifacts to burials without artifacts, whereas Big Sandy component has a 1:2 ratio of burials with artifacts compared to burials without artifacts.

The adults had more burials with grave goods than did the subadults (see Table 8). Half the males had artifacts whereas most of the females did not have artifacts (see Table 9).

The major grave goods associated with all three sites were: projectile points, animal, exotic, hide, extractive, and domestic. Only the four Ledbetter burials had a Form B (secondary) interment; the rest were primary interment or could not be discerned. There were 129 individual burials; 23 multiple burials and 11 cremations.

The males were positively associated with pathologies in general, and specifically with traumata, osteoarthritis, infectious diseases, and dental pathology. Females were also associated with pathologies in general, and specifically with dental pathology. The males were positively associated with hide artifact types; the subadults were positively associated with worked bone and

Table 7. Artifact Association by Site.

Variables	Big Sandy no.	Comp. (%)	Cherry no. (%)	Ledbetter no. (%)	Total no. (%)
Burials with artifacts	22	37.0	29 45.0	17 50.0	68 43.0
Burials without artifacts	37	63.0	36 55.0	17 50.0	90 57.0
Total	59	100.0	65 100.0	34 100.0	158 100.0

Table 8. Artifact Association by Age: Sites Combined.

Variables	Subadult no.	(%)	Adult no.	(%)	Total no.
Burials with artifacts	14	37.8	54	44.6	68
Burials without artifacts	23	62.2	67	55.4	90
Total	37	100.0	121	100.0	158

Table 9. Artifact Association by Sex: Sites Combined.

Variables	Male no.	(%)	Female no.	(%)	Total no.
Burials with artifacts	29	50.9	17	42.5	46
Burials without artifacts	28	49.1	23	57.5	51
Total	57	100.0	40	100.0	97

exotic. When only those burials of known sex were tested by all variables, the males were positively associated with traumata and hide grave goods; the females were negatively associated for the same variables.

The above summary of associations and frequencies lists only those considered to have some bearing on the social structure of these Late Archaic sites. Some of the non-informative, expected associations were not discussed.

All variables by all burials with grave goods and all variables by all burials of known sex with grave goods were also tested and significant associations noted for each site and all sites combined (see Appendix D-3 and D-4). The purpose of this was to see if any significant associations might be found that could be attributed to task specializations. If none could be found then this would support the idea that these sites had an egalitarian type society during the Late Archaic. None of the sites exhibited any type of distinction based on artifact associations. For example, Ledbetter had projectile points positively associated with ceremonial artifacts; the Big Sandy component at Eva had lithics positively associated with ornamental and ceremonial artifacts; and the Cherry site had worked bone and cutting positively associated with ceremonial items. This supports the idea of an egalitarian social organization since in a ranked

type of society one would have expected to find minimal associations between utilitarian types of artifacts and the rarer, non-utilitarian types of burial goods.

The only noteworthy aberration was that worked bone and exotic items were negatively associated with adults and males; even when all variables by all burials of known sex with grave goods were tested, the males were still negatively associated with these two artifact types. The subadults were positively associated with these two items. This could mean that there was some slight degree of preferential treatment afforded subadults as far as these two burial items are concerned. However, the overall patterning still showed no discernable task related distinctions.

CHAPTER IV

CONCLUSIONS

Bivariate statistical analyses, utilizing phi coefficients, were used to test for significant associations between variables characterizing biological, burial character, and grave good mortuary dimensions. Based on these analyses, the following statements can be made about the social organization of the Late Archaic sites of Ledbetter Landing, Big Sandy component at Eva, and Cherry:

1. More adults had grave goods than did subadults;
2. More males had grave goods than females;
3. Males had positive associations with pathologies in general and with several specific types of pathologies. Even when all variables by all only all burials of known sex were tested, males were still positively associated with traumata. Females were negatively associated with traumata;
4. None of the females were positively associated with any grave goods at a significant level, and only when all variables by all burials of known sex for all sites combined were tested, did females show a negative association with hide-working artifacts;

5. Males were significantly associated with a few grave goods at some of the sites. But when all variables by all burials of known sex for all sites were tested, only hide-working was considered to be significantly associated with males;
6. Most of the burial goods were of a utilitarian nature with few ornamental or ceremonial type items. The exotic items were the most frequently represented of the non-utilitarian type burial good, but these were not as numerous as the domestic and extractive type artifacts;
7. When evaluating significant associations between grave goods and other grave goods, no task-specific distinctions were evident;
8. The burial character was essentially the same for all three sites. These were mostly individual interments with few multiple burials or cremations.

All of the above statements made about these sites tend to support the idea that an egalitarian level of social organization was in existence during the Late Archaic in the Western Valley area of Tennessee. The findings corroborate those of Magennis (1977) for the Big Sandy component at the Eva and the Cherry sites. The only distinctions found among the Late Archaic mortuary patterning for all

three sites can be explained as being distinctions based upon age and sex which is to be expected for egalitarian hunters and gatherers.

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APPENDIXES

APPENDIX A-1. CODING OF VARIABLES USED BY MAGENNIS (1977)
FOR EVA AND CHERRY SITES.

<u>VAR. #</u>	<u>COL. #</u>	
1	1	Site Number 1. 6BN12 2. 84BN74
2	2-4	Burial Number
3	5-6	Stratum 1. plowzone 2. stratum I 3. stratum II top 4. stratum II middle 5. stratum II bottom 6. stratum III 7. stratum IV top 8. stratum IV bottom 9. stratum V 10. stratum II 11. stratum IV 12. general midden 99. indeterminate
4	7	Phase designation 1. Eva 2. Three Mile 3. Big Sandy
5	8-9	Age 1. 0-5 2. 5-10 3. 10-15 4. 15-20 5. 20-25 6. 25-30 7. 30-35 8. 35-40 9. 40-45 10. 45-50 11. 50+ 12. adult 13. subadult 99. indeterminate
6	10	Sex 1. male 2. female 3. indeterminate subadult 4. indeterminate adult 5. indeterminate age or sex
7	11	Form of disposal 1. primary-inhumation 2. secondary-reduction process, secondary, or final disposal
8	12	Individuality 1. single 2. double 3. multiple 4. mass 5. fragmentary 6. partial 9. indeterminate

<u>VAR. #</u>	<u>COL. #</u>	
9	13	Articulation 1. articulated 2. semi-articulated 3. disarticulated 4. rearticulated 9. indeterminate
10	14	Position 1. extended 2. semi-flexed 3. flexed 4. tightly flexed 9. indeterminate
11	15	Deposition 1. right side 2. left side 3. back 4. face 5. sitting 9. indeterminate
12	16	Orientation-head is pointing in: 1. N 2. S 3. E 4. W 5. NE 6. NW 7. SE 8. SW 9. indeterminate
13	17-18	Orientation-body is facing: 1. N 2. S 3. E 4. W 5. NE 6. NW 7. SE 8. SW 10. up 11. down 99. indeterminate
14	19	Cremation 1. no 2. yes
15	20-21	Anomalies in growth and development 0. absent 1. present
16	22-23	Regressive changes 0. absent 1. present
17	24-25	Traumata 0. absent 1. present
18	26-27	Osteoarthritis 0. absent 1. present
19	28-29	Infectious diseases and unknown etiology 0. absent 1. present
20	30-31	Dental pathology 0. absent 1. present
21-32	32-67	Long bone measurements

<u>VAR. #</u>	<u>COL. #</u>	
33	68	Associated dog burial
		0. absent
		1. present
34A	69-72	X coordinate for burial location
34B	73-76	Y coordinate for burial location
35	1	Site Number-Card 2
		1. 6BN12
		2. 84BN74
36	2-4	Burial Number
37	5	Grave Goods
		1. utilitarian
		2. ceremonial or ornamental
		3. both 1 and 2
		4. none
38	6	Projectile point
39	7	Blade
40	8	Drill
41	9	Adz
42	10	Hoe
43	11	Atlatl hook
44	12	Atlatl weight
45	13	Shaft straightener-bone or antler
46	14	Flaker or drift
47	15	Worked animal bone
48	16	Unworked animal bone
49	17	Indigenous shell-unworked; spoons
50	18	Trade shell-worked, dippers, gorgets
51	19	Ground stone beads
52	20	Worked bone beads
53	21	Shell beads
54	22	Copper beads
55	23	Bone awl
56	24	Bone needle
57	25	Bone hair pin
58	26	Bodkin-spatulate weaving tool
59	27	Bone whistle
60	28	Turtle shell necklace
61	29	Ochre
62	30	Unworked bone necklace
63	31	Turtle shell rattle
64	32	Ground stone tubular pipe
65	33	Bone projectile point
66	34	Scraper
67	35	Crinoid bead
68	36	Turtle shell-plastron, unworked
69	37	Lignite-cannel coal
70	38	Knife
71	39	Preform blank
72	41	Fish hook
73	42	Hammerstone
74	43	Bone pendant

APPENDIX A-2. RECODING OF FINAL VARIABLES USED IN BINARY ANALYSIS OF LEDBETTER LANDING, BIG SANDY (EVA III), AND CHERRY SITES.

<u>VAR. #</u>	<u>COL. #</u>	
1	1	Site Number 1. 6BN12 2. 84BN74 3. 9BN25
2	2-4	Burial Number
3	5-6	Stratum 1. plowzone 2. stratum I 3. stratum II top 4. stratum II middle 5. stratum II bottom 6. stratum III 7. stratum IV top 8. stratum IV bottom 9. stratum V 10. stratum II 11. stratum IV 12. general midden 99. indeterminate
4	7	Component 1. Big Sandy 2. Cherry 3. Ledbetter
	8-space	
5	9	Male
6	10	Female
7	11	Subadult
8	12	Adult
9	13-space	
10	14-space	
11	15	Big Sandy
12	16	Cherry
13	17	Ledbetter
	18-space	
14	19	Pathologies (includes var. 15-20) 0. absent 1. present
15	20	Anomalies in growth and development 0. absent 1. present
16	21	Regressive changes 0. absent 1. present
17	22	Traumata 0. absent 1. present

VAR. # COL. #

18	23	Osteoarthritis 0. absent 1. present
19	24	Infectious diseases and unknown etiology 0. absent 1. present
20	25	Dental pathology 0. absent 1. present
	26-space	
21	27	Grave Goods (includes var. 18-34) 0. absent 1. present
22	28	Projectile point 0. absent 1. present
23	29	Drill 0. absent 1. present
24	30	Hoe 0. absent 1. present
25	31	Cutting (blades, knives) 0. absent 1. present
26	32	Atlatl (hooks, weights) 0. absent 1. present
27	33	Lithic (shaft straightener, flaker, pre- form blanks, hammerstone) 0. absent 1. present
28	34	Worked bone 0. absent 1. present
29	35	Animal (unworked bone, indigenous shell, unmodified turtle shell) 0. absent 1. present
30	36	Exotic (trade shell, shell beads, copper beads, ochre) 0. absent 1. present
31	37	Hide (bone awls, scrapers) 0. absent 1. present

<u>VAR. #</u>	<u>COL. #</u>	
32	38	Ornamental (bone pin, crinoid bead, unworked bone necklace, turtle shell bracelet, ground stone beads, worked bone beads, bodkin) 0. absent 1. present
33	39	Ceremonial (bone whistle, turtle shell rattle) (musical) 0. absent 1. present
34	40	Ground stone tubular pipe 0. absent 1. present
35	41	Lignite-cannel coal 0. absent 1. present
36	42	Fish hook 0. absent 1. present
37	43	Cut and polished human bone 0. absent 1. present
38	44	Associated dog burials 0. absent 1. present
	45-space	
39	46	Extractive (var. 22, 24, 25, 26, 27, 36, 38) 0. absent 1. present
40	47	Domestic (var. 23, 28, 31) 0. absent 1. present
41	48	Ceremonial (var. 33, 34, 37) (group) 0. absent 1. present
	49-space	
42	50	Form A-Primary inhumation 0. absent 1. present
43	51	Form B-Secondary-reduction process, secondary or final disposal 0. absent 1. present
44	52	Individual burial 0. absent 1. present

<u>VAR. #</u>	<u>COL. #</u>	
45	53	Multiple burial 0. absent 1. present
46	54	Cremation 0. absent 1. present

APPENDIX B-1. SKELETAL INVENTORY OF LEDBETTER LANDING SITE
USED IN BINARY ANALYSIS.

No. of burials: 34

<u>BURIAL NO.</u>	<u>STRATUM</u>	<u>AGE</u>	<u>SEX</u>	
13	II	Adult	F	Known sex without grave goods
49	II	Adult	M	
54	II	Adult	M	
72	II	Adult	F	
93	II	Adult	M	
99	II	Adult	M	
104	II	Adult	F	
113	II	Adult	F	
7	II	Subadult	-	Unknown sex with- out grave goods
8	II	Subadult	-	
39	II	Adult	?	
65	II	Adult	?	
84	II	Adult	?	
85	II	Subadult	-	
87	II	Subadult	-	
94	II	Subadult	-	
101	II	Adult	?	
35	II	Subadult	-	Unknown sex with grave goods
50	II	Subadult	-	
63	II	Subadult	-	
78	II	Subadult	-	
98	II	Adult	?	
40	II	Adult	M	Known sex with grave goods
41	II	Adult	M	
43	II	Adult	M	
45	II	Adult	F	
64	II	Adult	M	
74	II	Adult	F	
75	II	Adult	M	
76	II	Adult	M	
91	II	Adult	M	
108	II	Adult	M	
110	II	Adult	F	
111	II	Adult	F	

APPENDIX B-2. SKELETAL INVENTORY OF BIG SANDY (EVA III)
COMPONENT USED IN BINARY ANALYSIS.

No. of burials: 59

<u>BURIAL NO.</u>	<u>STRATUM</u>	<u>AGE</u>	<u>SEX</u>	
2	GM	Adult	F	Known sex without grave goods
4	I	Adult	F	
6	I	Adult	F	
8	I	Adult	M	
9	I	Adult	F	
14	PZ	Adult	M	
28	I	Adult	M	
39	II	Adult	F	
71	II top	Adult	M	
67	I	Adult	M	
81	II	Adult	M	
113	II top	Adult	F	
125	I	Adult	F	
150	II middle	Adult	F	
151	II middle	Adult	F	
152	II middle	Adult	F	
166	I	Adult	M	
1	GM	Adult	?	Unknown sex without grave goods
5	I	Adult	?	
10	I	Subadult	-	
17	I	Adult	?	
18	I	Adult	?	
23	I	Subadult	-	
34	I	Adult	?	
35	I	Adult	?	
38	I	Subadult	-	
47	I	Subadult	-	
59	II top	Subadult	-	
60	II top	Subadult	-	
68	I	Adult	?	
79	I	Subadult	-	
80	I	Adult	?	
98	I	Adult	?	
112	II top	Subadult	-	
116	II top	Subadult	-	
123	I	Subadult	-	
137	II top	Subadult	-	

<u>BURIAL NO.</u>	<u>STRATUM</u>	<u>AGE</u>	<u>SEX</u>	
3	I	Adult	?	Unknown sex with grave goods
24	PZ	Subadult	-	
19	GM	Adult	M	Known sex with grave goods
40	GM	Adult	M	
62	I	Adult	M	
64	I	Adult	M	
65	I	Adult	M	
66	I	Adult	F	
69	I	Adult	M	
73	I	Adult	M	
76	II	Adult	M	
85	I	Adult	F	
110	I	Adult	M	
111	II top	Adult	F	
115	II top	Adult	F	
124	I	Adult	M	
7	I	Adult	F	
129	I	Adult	F	
131	I	Adult	M	
145	II bottom	Adult	M	
146	II bottom	Adult	F	
169	II top	Adult	M	

APPENDIX B-3. SKELETAL INVENTORY OF CHERRY SITE USED IN
BINARY ANALYSIS.

No. of burials: 65

<u>BURIAL NO.</u>	<u>STRATUM</u>	<u>AGE</u>	<u>SEX</u>	
2	GM	Adult	F	
5	GM	Adult	M	
6	GM	Adult	M	
7	GM	Adult	M	
12	GM	Adult	M	
13	GM	Adult	M	
21	GM	Adult	M	
23	GM	Adult	F	
26	GM	Adult	F	
28	GM	Adult	M	
32	GM	Adult	F	
37	GM	Adult	M	
38	GM	Adult	F	
40	GM	Adult	M	
42	GM	Adult	M	
44	GM	Adult	F	
46	GM	Adult	M	
50	GM	Adult	F	
54	GM	Adult	M	
56	GM	Adult	M	
57	GM	Adult	F	
62	GM	Adult	M	
66	GM	Adult	M	
71	GM	Adult	M	
73	GM	Adult	M	
74	GM	Adult	F	Known sex without grave goods
8	GM	Subadult	-	
10	GM	Subadult	-	
31	GM	Subadult	-	
36	GM	Subadult	-	
39	GM	Subadult	-	
45	GM	Subadult	-	
52	GM	Adult	?	
58	GM	Subadult	-	
60	GM	Adult	?	
64	GM	Adult	?	Unknown sex without grave goods

<u>BURIAL NO.</u>	<u>STRATUM</u>	<u>AGE</u>	<u>SEX</u>	
3	GM	Adult	?	Unknown sex with grave goods
4	GM	Subadult	-	
11	GM	Adult	?	
16	GM	Subadult	-	
19	GM	Subadult	-	
20	GM	Subadult	-	
24	GM	Subadult	-	
34	GM	Subadult	-	
35	GM	Subadult	-	
41	GM	Adult	?	
43	GM	Adult	?	
51	GM	Adult	?	
55	GM	Subadult	-	
65	GM	Subadult	-	
67	GM	Adult	?	
1	GM	Adult	M	Known sex with grave goods
9	GM	Adult	M	
14	GM	Adult	M	
18	GM	Adult	F	
25	GM	Adult	M	
29	GM	Adult	M	
33	GM	Adult	M	
47	GM	Adult	F	
48	GM	Adult	F	
53	GM	Adult	M	
59	GM	Adult	M	
61	GM	Adult	F	
63	GM	Adult	F	
69	GM	Adult	F	

APPENDIX B-4. COMPLETE LATE ARCHAIC STRATUM 2 SKELETAL
INVENTORY OF LEDBETTER LANDING SITE.

<u>BURIAL NO.</u>	<u>INDIVIDUAL</u>	<u>MULTIPLE</u>	<u>AGE</u>	<u>SEX</u>	<u>CREMATION</u>
7	1		0.5-1.5	-	
8	1		infant	-	
13	1		adult	F	
35		2	infant*	-	
			adult	?	
39	1		adult	?	yes
40	1		22-28	M	
41	1		35-47	M	
43	1		adult	M	
45	1		adult	F	
49	1		adult	M	
50	1		5-6	-	
54	1		adult	M	
63	1		5-6	-	
64	1		adult	M	
65	1		adult	?	yes
72	1		44-45	F	
74		2	adult*	F	
			17-19	?	
75		3	25-30*	M	
			0.5-1.5	-	
			3.5-4.5	-	
76	1		26-32	M	
78	1		fetus	-	
84	1		adult	?	yes
85		2	4-5*	-	
			adult	?	
87	1		fetus	-	
91		2	26-32*	M	
			adult	?	
93	1		adult	M	yes
94	1		infant	-	
98	1		adult	?	yes
99	1		adult	M	
101	1		adult	?	yes
104	1		adult	F	
108		2	adult*	M	
			adult	?	
110	1		adult	F	
111		2	adult*	F	yes
			adult	F	
113		2	adult*	F	
			infant	-	
34	+	26	+	8	=
43 indiv.					7 crem.

* This was chosen to represent the burial for analysis.

APPENDIX C-1. FREQUENCY LISTING FOR LEDBETTER LANDING SITE.

No. of burials: 34

(0=absent; 1=present)

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Male	0.-22 1.-12	64.7% 35.3%
Female	0.-26 1.-8	76.5% 23.5%
Subadult	0.-25 1.-9	73.5% 26.5%
Adult	0.-9 1.-25	26.5% 73.5%
Pathologies	0.-20 1.-14	58.8% 41.2%
Traumata	0.-28 1.-6	82.4% 17.6%
Osteoarthritis	0.-25 1.-9	73.5% 26.5%
Dental pathology	0.-24 1.-10	70.6% 29.4%
Grave goods	0.-17 1.-17	50.0% 50.0%
Projectile points	0.-28 1.-6	82.4% 17.6%
Drill	0.-31 1.-3	91.2% 8.8%
Atlatl	0.-33 1.-1	97.1% 2.9%
Lithic	0.-31 1.-3	91.2% 8.8%
Worked bone	0.-31 1.-3	91.2% 8.8%
Animal	0.-29 1.-5	85.3% 14.7%

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Exotic	0.-27	79.4%
	1.-7	20.6%
Hide	0.-30	88.2%
	1.-4	11.8%
Cut & polished human bone	0.-32	94.1%
	1.-2	5.9%
Extractive	0.-26	76.5%
	1.-8	23.5%
Domestic	0.-28	82.4%
	1.-8	17.6%
Ceremonial (group)	0.-32	94.1%
	1.-2	5.9%
Form A	0.-9	26.5%
	1.-25	73.5%
Form B	0.-30	88.2%
	1.-4	11.8%
Individual	0.-8	23.5%
	1.-26	76.5%
Multiple	0.-26	76.5%
	1.-8	23.5%
Cremation	0.-27	79.4%
	1.-7	20.6%

APPENDIX C-2. FREQUENCY LISTING FOR BIG SANDY (EVA III)
COMPONENT.

No. of burials: 59

(0=absent; 1=present)

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Male	0.-39 1.-20	66.1% 33.9%
Female	0.-42 1.-27	71.2% 28.8%
Subadult	0.-47 1.-12	79.7% 20.3%
Adult	0.-12 1.-47	20.3% 79.7%
Pathologies	0.-30 1.-29	50.8% 49.2%
Regressive changes	0.-55 1.-4	93.2% 6.8%
Traumata	0.-49 1.-10	83.1% 16.9%
Osteoarthritis	0.-42 1.-17	71.2% 28.8%
Infectious diseases	0.-42 1.-12	79.7% 20.3%
Dental pathology	0.-37 1.-22	62.7% 37.3%
Grave goods	0.-37 1.-22	62.7% 37.3%
Projectile points	0.-49 1.-10	83.1% 16.9%
Drill	0.-58 1.-1	98.3% 1.7%
Hoe	0.-58 1.-1	98.3% 1.7%
Cutting	0.-57 1.-2	96.6% 3.4%

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Atlatl	0.-57	96.6%
	1.-2	3.4%
Lithic	0.-57	96.6%
	1.-2	3.4%
Worked bone	0.-58	98.3%
	1.-1	1.7%
Animal	0.-54	91.5%
	1.-5	8.5%
Exotic	0.-56	94.9%
	1.-3	5.1%
Hide	0.-51	86.4%
	1.-8	13.6%
Ornamental	0.-58	98.3%
	1.-1	1.7%
Ceremonial (music)	0.-58	98.3%
	1.-1	1.7%
Dog	0.-58	98.3%
	1.-1	1.7%
Extractive	0.-45	76.3%
	1.-14	23.7%
Domestic	0.-49	83.1%
	1.-10	16.9%
Ceremonial (group)	0.-58	98.3%
	1.-1	1.7%
Form A	0.-13	22.0%
	1.-46	78.0%
Form B	0.-59	100.0%
	1.-0	0.0%
Individual	0.-5	8.5%
	1.-54	91.5%
Multiple	0.-57	96.6%
	1.-2	3.4%
Cremation	0.-56	94.9%
	1.-3	5.1%

APPENDIX C-3. FREQUENCY LISTING FOR CHERRY SITE.

No. of burials: 65		(0=absent; 1=present)
<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Male	0.-40	61.5%
	1.-25	38.5%
Female	0.-50	76.9%
	1.-15	23.1%
Subadult	0.-49	75.4%
	1.-16	24.6%
Adult	0.-16	24.6%
	1.-49	75.4%
Pathologies	0.-28	43.1%
	1.-37	56.9%
Regressive changes	0.-59	90.8%
	1.-6	9.2%
Traumata	0.-49	75.4%
	1.-16	24.6%
Osteoarthritis	0.-41	63.1%
	1.-24	36.9%
Infectious diseases	0.-54	83.1%
	1.-11	16.9%
Dental pathology	0.-45	69.2%
	1.-20	30.8%
Grave goods	0.-36	55.4%
	1.-29	44.6%
Projectile points	0.-56	86.2%
	1.-9	13.8%
Drill	0.-63	96.9%
	1.-2	3.1%
Cutting	0.-63	96.9%
	1.-2	3.1%
Lithic	0.-62	95.4%
	1.-3	4.6%

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Worked bone	0.-63 1.-2	96.9% 3.1%
Animal	0.-59 1.-6	90.8% 9.2%
Exotic	0.-55 1.-10	84.6% 15.4%
Hide	0.-58 1.-7	89.2% 10.8%
Ornamental	0.-58 1.-7	89.2% 10.8%
Ceremonial (music)	0.-64 1.-1	98.5% 1.5%
Ground stone tubular pipe	0.-64 1.-1	98.5% 1.5%
Dog	0.-61 1.-4	93.8% 6.2%
Extractive	0.-51 1.-14	78.5% 21.5%
Domestic	0.-56 1.-9	86.2% 13.8%
Ceremonial (group)	0.-63 1.-2	96.9% 3.1%
Form A	0.-15 1.-50	23.1% 76.9%
Form B	0.-65 1.-0	100.0% 0.0%
Individual	0.-15 1.-50	23.1% 76.9%
Multiple	0.-52 1.-13	80.0% 20.0%
Cremation	0.-64 1.-1	98.5% 1.5%

APPENDIX C-4. FREQUENCY LISTING FOR ALL THREE SITES
COMBINED.

No. of burials: 158

(0=absent; 1=present)

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Male	0.-101 1.-57	63.9% 36.1%
Female	0.-118 1.-40	74.7% 25.3%
Subadult	0.-121 1.-37	76.6% 23.4%
Adult	0.-37 1.-121	23.4% 76.6%
Pathologies	0.-78 1.-80	44.4% 50.6%
Anomalies in growth and development	0.-158 1.-0	100.0% 0.0%
Regressive changes	0.-148 1.-10	93.7% 6.3%
Traumata	0.-126 1.-32	79.9% 20.3%
Osteoarthritis	0.-108 1.-50	68.4% 31.6%
Infectious diseases	0.-135 1.-23	85.4% 14.6%
Dental pathology	0.-106 1.-52	67.1% 32.4%
Grave goods	0.-90 1.-68	57.0% 43.0%
Projectile points	0.-133 1.-25	84.2% 15.8%
Drill	0.-152 1.-6	96.2% 3.8%

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Hoe	0.-157 1.-1	99.4% 0.6%
Cutting	0.-154 1.-4	97.5% 2.5%
Atlatl	0.-155 1.-3	98.1% 1.9%
Lithic	0.-150 1.-8	94.9% 5.1%
Worked bone	0.-152 1.-6	96.2% 3.8%
Animal	0.-142 1.-16	89.9% 10.1%
Exotic	0.-138 1.-20	87.3% 12.7%
Hide	0.-139 1.-19	88.0% 12.0%
Ornamental	0.-150 1.-8	94.9% 5.1%
Ceremonial (music)	0.-156 1.-2	98.7% 1.3%
Ground stone tubular pipe	0.-157 1.-1	99.4% 0.6%
Cut & polished human bone	0.-156 1.-2	98.7% 1.3%
Dog	0.-153 1.-5	96.8% 3.2%
Extractive	0.-122 1.-36	77.2% 22.8%
Domestic	0.-133 1.-36	84.2% 15.8%
Ceremonial (group)	0.-153 1.-5	96.8% 3.2%
Form A	0.-37 1.-121	23.4% 76.6%

<u>VARIABLE</u>	<u>NUMBER</u>	<u>PERCENT</u>
Form B	0.-154	97.5%
	1.-4	2.5%
Individual	0.-29	18.4%
	1.-129	81.6%
Multiple	0.-135	85.4%
	1.-23	14.6%
Cremation	0.-148	93.7%
	1.-10	6.3%

APPENDIX D-1. LIST OF SIGNIFICANT ASSOCIATIONS OF ALL VARIABLES BY ALL CASES FOR LEDBETTER, BIG SANDY (EVA III), CHERRY, AND ALL SITES COMBINED.

LEDBETTER

Sex

Male:

Pathologies	+
Traumata	+
Osteoarthritis	+
Nothing	

Female:

Age

Subadult:

Worked bone	+
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Adult:

Pathologies	+
Osteoarthritis	+
Worked bone	-

Burial Character

Form B:

Cremation	+
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BIG SANDY (EVA III)

Sex

Male:

Pathologies	+
Traumata	+
Osteoarthritis	+
Dental	+
Grave goods	+
Atlatl	+
Lithic	+
Hide	+
Extractive	+
Pathologies	+

Female:

Age

Subadult:

Grave goods	-
Drill	+
Hoe	+

Adult:

Pathologies	+
Osteoarthritis	+
Infectious	+
Dental	+
Grave goods	+
Drill	-
Hoe	-

Burial Character

Nothing

CHERRYSex

Male:

Pathologies	+
Traumata	+
Osteoarthritis	+
Infectious	+
Exotic	-
Pathologies	+

Female:

Age

Subadult:

Exotic	-
--------	---

Adult:

Pathologies	+
Traumata	+
Osteoarthritis	+
Dental	+
Exotic	-

Burial Character

Individual:

Cremation	-
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ALL SITES COMBINEDSex

Male:

Pathologies	+
Traumata	+
Osteoarthritis	+
Infectious	+
Dental	+
Hide	+
Form A	+
Pathologies	+
Dental	+

Female:

Age

Subadult:

Worked bone	+
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Adult:

Exotic	+
Pathologies	+
Traumata	+
Osteoarthritis	+
Infectious	+
Dental	+
Worked bone	-
Exotic	-

Burial Character

Form B:

Cremation	+
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APPENDIX D-2. LIST OF SIGNIFICANT ASSOCIATIONS OF ALL VARIABLES BY ALL BURIALS OF KNOWN SEX FOR LEDBETTER, BIG SANDY (EVA III), CHERRY, AND ALL SITES COMBINED.

LEDBETTER

Sex

Males and females were not significantly associated with anything

Burial Character

Form B:	Cremation	+
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BIG SANDY (EVA III)

Sex

Males and females were not significantly associated with anything

Burial Character

This was not significantly associated with anything

CHERRY

Sex

Males and females were not significantly associated with anything

Burial Character

This was not significantly associated with anything

ALL SITES COMBINED

Sex

Male:	Traumata	+
	Hide	+
Female:	Traumata	-
	Hide	-

Burial Character

This was not significantly associated with anything

APPENDIX D-3. LIST OF SIGNIFICANT ASSOCIATIONS OF ALL VARIABLES BY ALL BURIALS WITH GRAVE GOODS FOR LEDBETTER, BIG SANDY (EVA III), CHERRY, AND ALL SITES COMBINED.

LEDBETTER

Projectile points:	Drill	+
	Animal	-
	Exotic	-
	Cut/pol. human bone	+
	Ceremonial (group)	+
Drill:	Lithic	+
	Extractive	+
Lithic:	Worked bone	+
	Hide	+
	Domestic	+
	Individual	-
Animal:	Extractive	-
	Individual	+
	Multiple	-
Worked bone:	Subadult	+
	Adult	-

BIG SANDY (EVA III)

Projectile points:	Animal	-
Drill:	Hoe	+
	Cutting	+
Hoe:	Cutting	+
Lithic:	Ornamental	+
	Ceremonial (music)	+
	Dog	+
	Ceremonial (group)	+
Animal:	Extractive	-
Ornamental:	Ceremonial (music)	+
	Dog	+
Ceremonial (group):	Dog	+
Dog:	Ceremonial (group)	+
Extractive:	Domestic	-
Adult:	Drill	-
	Hoe	-

CHERRY

Projectile points:	Cutting	+
	Worked bone	+
Cutting:	Worked bone	+
	Ceremonial (music)	+
	Ceremonial (group)	+
Lithic:	Animal	+
Worked bone:	Ceremonial (music)	+
	Ceremonial (group)	+
	Grd. stone tub. pipe	+

Exotic:	Extractive	-
	Ceremonial (group)	+
Male:	Hide	+
<u>ALL SITES COMBINED</u>		
Male:	Dental	+
	Worked bone	-
	Exotic	-
Subadults:	Worked bone	+
	Exotic	+
	Grd. stone tub. pipe	+
	Hoe	+
Adult:	Hoe	-
	Worked bone	-
	Exotic	-
	Grd. stone tub. pipe	-
Big Sandy (Eva III):	Animal	-
Cherry:	Ornamental	+

APPENDIX D-4. LIST OF SIGNIFICANT ASSOCIATIONS OF ALL
VARIABLES BY ALL BURIALS OF KNOWN SEX WITH
GRAVE GOODS FOR LEDBETTER, BIG SANDY (EVA
III), CHERRY, AND ALL SITES COMBINED.

LEDBETTER

Projectile points:	Animal	-
	Exotic	-
Drill:	Lithic	+
	Hide	+
Lithic:	Hide	+
	Domestic	+
Animal:	Extractive	-
	Individual	+
	Multiple	-

BIG SANDY (EVA III)

Projectile points:	Animal	-
Lithic:	Ornamental	+
	Ceremonial (music)	+
	Dog	+
	Ceremonial (group)	+
Animal:	Extractive	-
Ornamental:	Ceremonial (music)	+
	Dog	+
	Ceremonial (group)	+
Ceremonial (group):	Dog	+
Dog:	Ceremonial (group)	+

CHERRY

Male:	Hide	+
	Domestic	+
Female:	Hide	-
	Domestic	-
Drill:	Lithic	+
	Animal	+
Lithic:	Animal	+
Exotic:	Extractive	-
Dog:	Individual	-
	Multiple	+

ALL SITES COMBINED

Male:	Worked bone	-
	Exotic	-
Projectile points:	Drill	+
	Animal	+
	Exotic	-

Drill:	Lithic	+
Atlatl:	Exotic	+
Lithic:	Hide	+
	Ceremonial (music)	+
	Domestic	+
Exotic:	Form A	-
	Cremation	+
Ornamental:	Ceremonial (music)	+
	Ceremonial (group)	+
Ceremonial (group):	Dog	+
Cut/Pol. human bone:	Individual	-
	Multiple	+
Dog:	Ceremonial (group)	+

VITA

Katherine French Higgins was born in Chattanooga, Tennessee on July 8, 1953. She grew up in eastern Pennsylvania and graduated from Unionville High School in June 1971. She attended Catawba College in Salisbury, North Carolina and received a Bachelor of Arts degree in Anthropology, with honors, in June 1976.

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