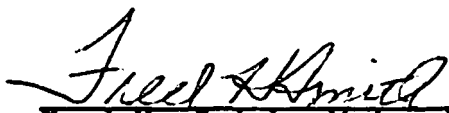
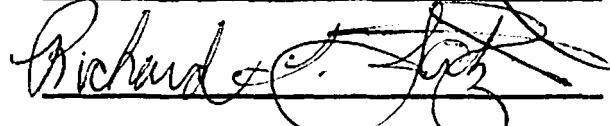


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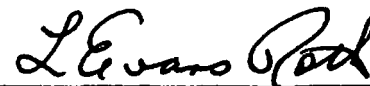
I am submitting herewith a thesis written by Ann L. Magennis entitled "Middle and Late Archaic Mortuary Patterning: An Example from the Western Tennessee Valley." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Anthropology.


Fred H. Smith, Major Professor

We have read this thesis
and recommend its acceptance:


Accepted for the Council:


Vice Chancellor
Graduate Studies and Research

Thesis
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MIDDLE AND LATE ARCHAIC MORTUARY PATTERNING:
AN EXAMPLE FROM THE WESTERN
TENNESSEE VALLEY

A Thesis
Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Ann L. Magennis
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ABSTRACT

The purpose of this study is to describe and analyze the social organization and structure of Middle and Late Archaic populations in the western Tennessee Valley. The stratified Middle and Late Archaic Eva site yielded a temporally sequential skeletal series that allowed for the examination of changes in social and demographic structure through time at a single site. Comparison of the Late Archaic Eva series with the Late Archaic Cherry sample facilitated the examination of spatial differences in these two parameters.

Results of the analysis of mortuary activity indicate that there was little elaboration in the mortuary ritual and that all individuals were afforded similar treatment at death. There was a continuation through time and between locations of the essential features of mortuary activity. Any differences in treatment of the dead can be explained in terms of age or sex. There was no evidence for differential treatment that could be indicative of status positions. The hypothesis is supported that an egalitarian social system is in operation during both the Middle and Late Archaic culture periods in the western Tennessee Valley.

Analysis of the population structure of these Archaic hunters and gatherers was accomplished by means of a life table assuming stable population conditions. Results of the analysis suggest that the Eva and Cherry cemetery samples are not representative of true biological populations. It was proposed that continually shifting settlement and subsistence with concomitant fluctuation in the size and internal age

composition is a plausible explanation for the observed biases in the skeletal samples.

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CHAPTER I

INTRODUCTION

Comprehensive investigations of skeletal remains from Archaic culture periods in the Eastern United States are rare. This is due to the frequency of small sample size as well as various other problems. Thus conclusions or hypotheses concerning the ecology, biology, health status, or adaptive efficiency of Archaic Indians remain highly speculative. To further compound the problem, continually shifting settlement and considerable time depth of individual sites present a challenge to the researcher in trying to determine the nature of the cemetery sample. This segment of prehistory cannot be ignored for analysis of the human remains holds great potential for the investigation of behavior and ecology of these hunters and gatherers.

Examination of the residues of mortuary behavior add insight to the social and biological organization of the group. Bone pathology and its distribution can be indicative of the ability to deal with problems of disease and environmental stress. Demographics of a skeletal series can provide information about subsistence-settlement patterns and the adaptive success of the population.

The present study examines Middle and Late Archaic skeletal series from the Eva and Cherry sites. Both sites are located in the western Tennessee River Valley, Benton County, Tennessee. Mortuary activity is examined at these two sites to glean information pertaining to the social structure and organization of these Archaic hunters and gatherers. The vital statistics are reconstructed to better understand

the dynamic interaction between subsistence activity, shifting settlement, and the social and biological organization of these groups.

The Eva and Cherry sites were selected for this study for three main reasons. First, the stratified Middle and Late Archaic Eva series facilitates the evaluation of temporal changes in social organization and population dynamics at a single site. Secondly, the Eva and Cherry sites are in close spatial proximity to one another. The Late Archaic component at Eva and the Cherry site are chronologically and culturally related. Lastly, the sites are in differing physiographic locations. The Eva site is a main river valley shell midden. The Cherry site is located away from the main waterways near the Big Sandy River, a tributary to the Tennessee River. These two sites apparently served different functions in the settlement-subsistence activity of the region and comparisons of Late Archaic mortuary patterning between locations with different settlement-subsistence activities can be made. Additionally, the effects of shifting settlement and subsistence on the age structure of Late Archaic groups can be evaluated.

There are three major objectives of the present study. First, a description of the burial mode at the two sites is a necessary initial step. This includes basic skeletal data such as age and sex, as well as the archeological context and associated burial goods. Second, an analysis of the mortuary activity for each component is conducted. This includes the context of the series as well as the demographic structure. Third, the demographic structure and mortuary patterns will be compared to elucidate spatial and temporal differences.

Few comprehensive investigations of mortuary practices or the

demographic structure of Archaic skeletal series have been conducted. Thus, there is very little material that is suitable for comparison of these dynamic processes. This research will provide a base-line study for Archaic skeletal series in Tennessee and will demonstrate the analytical and interpretive potential of such material. A cursory review of the pertinent analytical works will place this study in perspective with regard to our present understanding of Archaic populations.

The Indian Knoll site, a large shell midden situated on the Green River in Ohio County, Kentucky has yielded the largest skeletal series of the Late Archaic culture period in the Eastern Woodlands. In 1915, C. B. Moore began the first excavations at the site and removed 298 burials (Johnston and Snow 1961). Of these, only 70 individuals were saved, presumably those in a good state of preservation, and are housed at the U.S. National Museum. Subsequent excavations in the 1930's by Webb (1946) produced 880 skeletons. It is to the latter portion of the series that Snow (1948) directed his attention. The resulting report is a detailed description of the cemetery sample.

Refinements in the techniques of age and sex determination of skeletal material prompted a later re-evaluation of these characters for the Indian Knoll series (Johnston and Snow 1961). Originally, Snow had relied on the degree of cranial suture closure to determine the age of adult individuals. Since this technique often produces dubious age estimations, additional criteria were utilized in the reassessment. Regressive changes in the symphyseal face of the os pubis, the amount of dental attrition, and in cases of extreme fragmentation, the degree of cranial suture closure were relied on. The "new" age and sex

distribution results are compared with those of 1948. Comparisons of the frequency distribution of age at death of Indian Knoll with other series are presented (Johnston and Snow 1961).

Stewart (1962) criticizes Johnston and Snow (1961) on a number of issues. The use of dental attrition, although helpful in distinguishing between young and old adults, is probably not a valid indicator in distinguishing a 30-year-old individual from one that is 40 years old. Another problem that Stewart points out is the failure to consider distortion in the symphyseal surface among adult females. This often results in an over-estimation of the age of an individual. ✓
Further, Johnston and Snow (1961) estimate the sex of prepubescent individuals, including newborns. Sexing subadults has met with limited success, thus these estimates are highly suspect (Stewart 1962).
Stewart's evaluation of Johnston and Snow's work pinpoints the inadequacy of the research and results. It should be cautioned that the Indian Knoll series is in need of reassessment of age and sex and is of limited utility for comparison with other skeletal series. ✓

To date, little effort has been directed toward the study of bone pathology of prehistoric human osseous remains. Denied examination of soft tissue, the researcher must content himself with a visual inspection and description of generalized boney responses. Since morphological changes may be the result of multiple disease vectors that are often very similar, it is often impossible to determine which disease entity is responsible for the observable pathology.

Neumann (1967) examined the skeletal remains recovered from the Archaic period Modoc Rock Shelter. This site is located in southwestern

Illinois on the eastern bluff crests of the Mississippi River. The earliest burials are dated at approximately 6219 B. C. $\pm$ 488 and the most recent are dated at 2765 B. C. $\pm$ 300 years (Neumann 1967). All of the burials were recovered from the strata that represented the generalized habitation. Of primary concern to Neumann was the diagnosis and classification of diseases that were manifested in the series. Of the twenty-eight individuals recovered, only three had no evidence of pathology. The most prevalent type of bone pathology was osteoarthritis. This is not surprising since a decidedly "old" age profile is represented. Because of the size and nature of the sample, Neumann stated that meaningful conclusions were difficult to assess. He does suggest, however, that the series could represent that portion of the group that inhabited the shelter. He emphasized that this study would best serve as a basis for comparison with other such populations (Neumann 1967).

In order to determine the inclusive nature of a cemetery sample, the delineation of the burial program is essential. Such an evaluation can demonstrate whether there are sampling biases, either prehistoric or archaeological, or if the sample is representative of a total paleo-population. Employing skeletal remains from Modoc Rock Shelter, Koster, and Gibson Mound⁰¹, all Middle Archaic sites in Illinois, Buikstra (1975) tentatively outlines a three track burial program to explain sample variability. The Koster series, derived from horizons 6 and 7, and the Modoc Rock Shelter skeletal series exhibited certain similarities. While both demonstrate high incidences of age correlated skeletal pathology and similar age-sex distributions, all individuals less than

40 years of age demonstrated imperfectly healed traumata suggesting that these individuals would be limited in the performance of many activities. The age-sex distribution of the Middle Archaic cemetery component at Gibson Mound⁰¹ indicates that most of the sample is comprised of young and middle-age adults. Further, no striking pathologies were noted. Thus it appears that neither site represents a random sample of an entire social group. The absence of infants and children at either site could, perhaps, be explained as factors of cultural choice or problems in preservation. As a result of these comparisons, Buikstra (1975) suggests that the high frequency of pathology for the Modoc and Koster series is not a reflection of extremely rugged conditions of life but, instead a reflection of burial programming where:

1. Individuals not able to perform the range of "normal" adult tasks are relegated to burial in the habitation area;
2. Normal adults [are] buried in bluff-crest cemeteries, and;
3. Infants and young children are possibly interred in still another location (Buikstra 1975:9).

Portions of cemetery samples affiliated with the Indian Knoll culture from Late Archaic sites located along the Green River, Kentucky were employed to glean evidence for the exchange of "exotic" raw materials and manufactured goods (Winters 1968). The materials that Winters examined were mainly marine shell and copper. He suggests that there may have been ties with a center(s) that would serve as the focal point for the redistribution of raw materials or finished goods, rather than "extensive and continuous population movements" (Winters 1968:219).

A major fault with this proposal is that no such centers have been identified in the Midwest. The distribution of wealth as evidenced in trade items within the society show cyclical variation with periods of intensive accumulation and distribution of wealth. Wide distribution of wealth was witnessed initially with increasing wealth confined to a smaller segment of the group later in time. Examination of the other, non-exotic burial associated artifacts for both males and females shows certain classes of artifacts, such as woodworking, fishing and tool manufacturing implements to be associated more often with males. Domestic equipment, certain ornaments, and fabricating and processing equipment were more often associated with females. A fair amount of overlap in sex association of some artifact classes, such as weapons, did occur. Although Winters does not derive specific conclusions from the data, he suggests that the grave goods, in general, reflect cultural norms as to status and sex role and the various age groups, despite any idiosyncracies that may be evidenced. In conclusion, Winters (1968) emphasizes that the point was not to prove anything in particular but rather the objective was the method and technique for interpretation of economics of prehistoric groups and the generation of testable hypotheses.

The brief examination of the studies in print points to the paucity of analytical works undertaken that focus attention on Archaic cemetery samples. This may be due, in part, to the fact that many of the large Archaic sites with sizeable cemetery samples were located on the floodplains of large rivers in the Southeastern United States. Many of the sites were excavated during the 1930's and 1940's with labor

provided by the Works Progress Administration (WPA). The remnants of these sites are now inundated by the numerous reservoirs created by the Tennessee Valley Authority (TVA) dams. The backlog of recovered material remains are stored in museums throughout the region, and much of this material has been subject only to cursory examination and description or remains unanalyzed. Our knowledge of the archeological record has increased in conjunction with the sophistication of analytical techniques both in archeology and physical anthropology over the past 30 years. Potentially, a wealth of information can be gained by studying these WPA salvage collections. When undertaking the examination of these materials, the researcher is usually faced with the frustration of scanty and incomplete field records by today's standards. Also, many of the collections have not been curated, portions of the material have been lost or destroyed over the years, or certain classes of data may not have been collected or saved because they were not deemed important at the time of excavation. Although there are obvious limitations to these data, they are invaluable for descriptive purposes and serve a function for the generation of hypotheses that can be tested with subsequent fieldwork.

CHAPTER II

THE ARCHEOLOGY

Little is known about mortuary practices and population dynamics of Archaic culture periods in the western Tennessee River Valley. Before accurate statements about these processes can be made, the nature of the cemetery sample must be demonstrated. It cannot safely be assumed that an Archaic cemetery is representative of a total population. The temporally sequential Middle and Late Archaic skeletal series at Eva is well suited for an examination of changes in mortuary activity and population dynamics through time. Differences in these two parameters between locations can be evaluated by comparison of the Late Archaic cemetery sample at Eva with the Cherry sample.

Continually shifting settlement and subsistence of these Archaic hunters and gatherers poses obvious problems in the interpretation of mortuary practices and demographic processes. The nature of the site and the role it assumes in the settlement patterning of a region must be known. Further, knowledge of the cultural chronology and length of occupation of a site is essential to the understanding of the biology, demography or social organization. In order to place the Eva and Cherry skeletal series in the proper archeological context, each site will be discussed in some detail. The cultural chronology, as it is presently understood, and settlement pattern models are examined.

The Eva Site (6BN12)

The Eva site was tested in September and October, 1940 under the auspices of the University of Tennessee. Excavations were funded by the

Tennessee Valley Authority (TVA) and the Works Progress Administration (WPA). The Eva site has been partially reported by Lewis and Lewis (1961) and has received brief mention elsewhere (Lewis and Kneberg 1947, 1959). Most of the information concerning the Eva site presented in this study has been drawn from Lewis and Lewis (1961).

Prior to the construction of Kentucky Lake Dam, the Eva site was located in the broad floodplain of the Tennessee River in Benton County, Tennessee. The floodplain had a swell and swale topography and the site was situated on the highest elevation about one mile west of the river. This swell, thought to be an old river bank, is just to the east of Cypress Creek about four miles above its confluence with the Tennessee River (Lewis and Lewis 1961). The Eva site is located at 36° 3' 15" North Latitude and 87° 59' 48" West Longitude. (See Figure 2-1 for location of the Eva site.)

The soils of the swell on which the Eva site was located are a Wolftever silty clay loam. These moderately well drained soils of the stream terraces are mixed alluvium formed partly from limestone. These soils are found on the level to undulating low terraces of the Tennessee River (Odom et al. 1953). The swale just to the west of the site corresponds to the Cypress Creek slough and is a Melvin silt loam. The Melvin silt loam is a poorly drained alluvial soil found chiefly in the low swales. The Melvin silt loam and the Wolftever silty clay loam belong to the Huntington-Egam-Wolftever association. This soil association includes the first bottom and low terraces of the Tennessee River. The first bottoms and low terraces are gently undulating with natural levees and low ridges with intervening swales or sloughs that

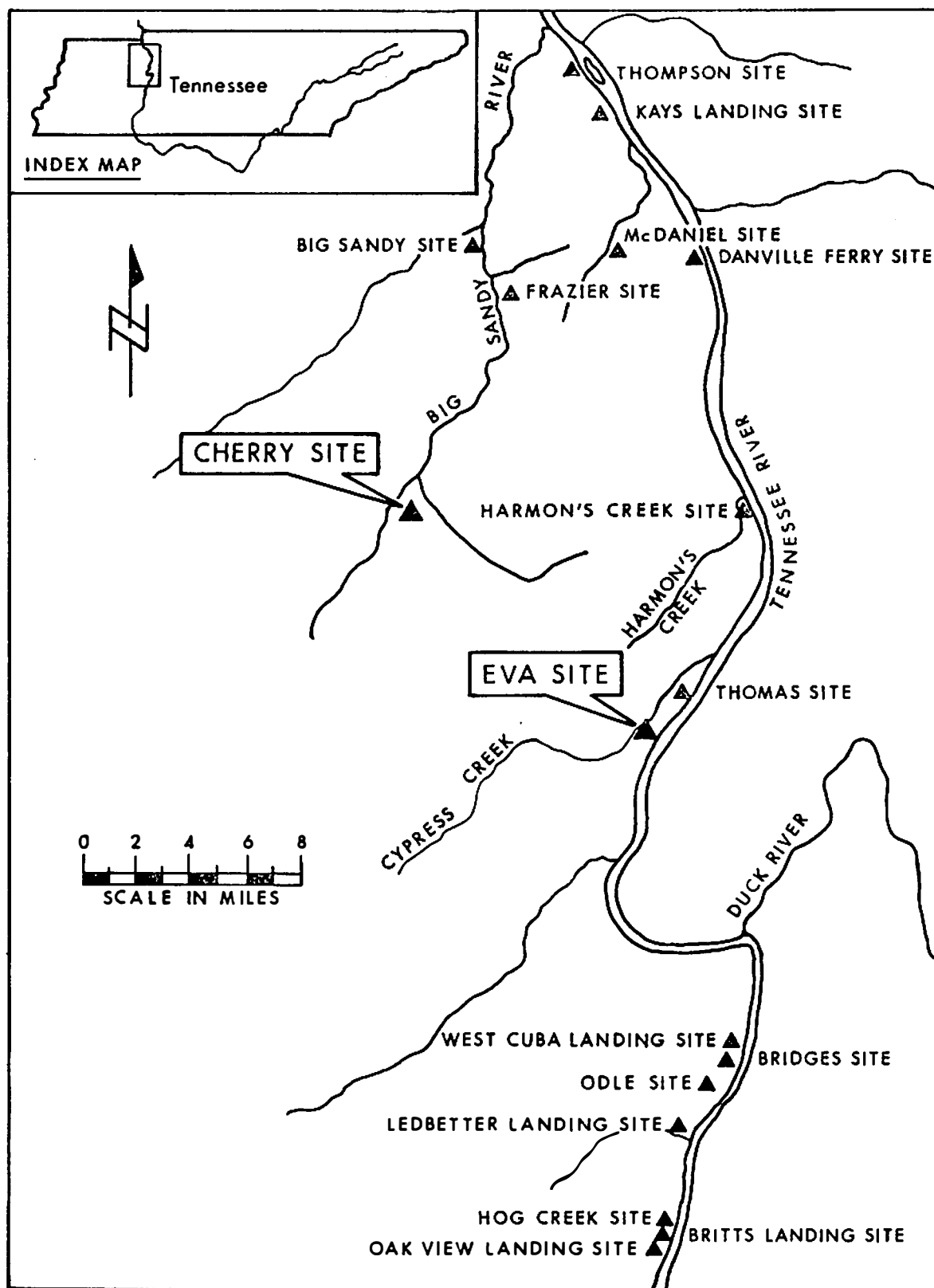


Figure 2-1. Archaic sites in the Western Tennessee Valley (after Lewis and Kneberg 1947).

tend to parallel the river. Wolftever soils are on the level or slightly undulating low terraces while the Melvin soils are mainly in the low swales (Odom et al. 1953).

The midden deposits covered slightly more than an acre while the shell mound portion evident at the surface was confined to the central third of the area (Lewis and Kneberg 1947). A three-foot-wide north-south trench was excavated through the center of the site and revealed the full extent of the midden. After the excavation of an east-west trench, 32 ten-foot squares, removed in .5 foot levels, were opened in the center of the midden. The extent of the site and the excavation units are shown in Figure 2-2. The center of the midden measured 6 feet in thickness, becoming much thinner at the periphery (Lewis and Kneberg 1947; Lewis and Lewis 1961).

Five major strata were identified on the basis of differing midden content. These strata were assigned to three cultural components: Eva I, Eva II, and Eva III. The Eva I component was comprised of strata IV and V. Stratum V is described as a sand and gravel deposit with sparse, scattered inclusions of charcoal and burned soil, varying in thickness from a few inches to one foot. This stratum represents the earliest occupation. Stratum IV was divided into two parts, top and bottom, because of an obvious difference in midden content. Abundant chipping debris and animal bone characterized the top layer while the bottom layer contained a heavier concentration of shell (Lewis and Lewis 1961).

Stratum III has been interpreted as a flood deposit of sand and silt. Artifacts at the bottom of this deposit were assigned to stratum

EVA SITE
6BN12

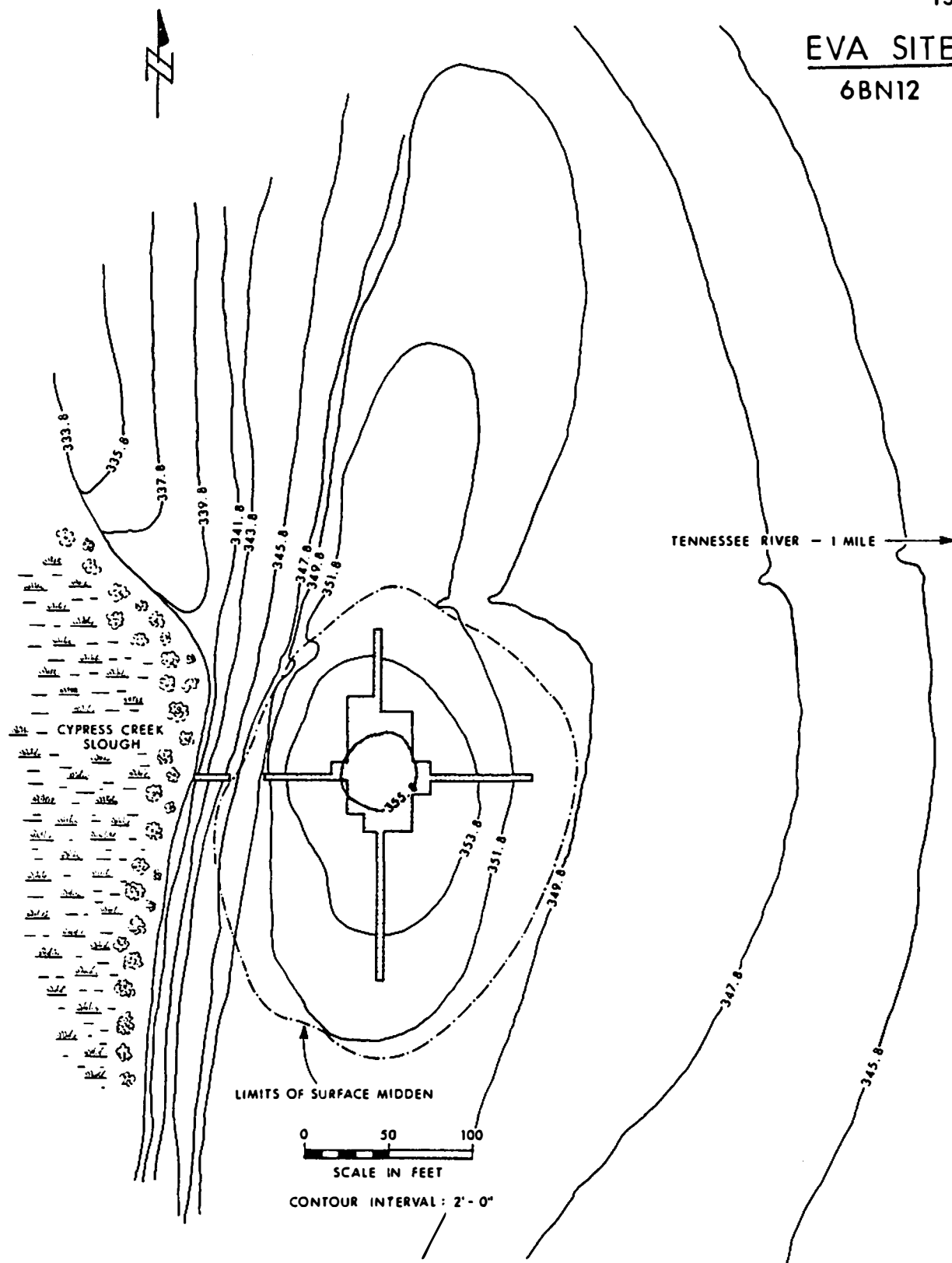


Figure 2-2. Extent of the site and excavation units at the Eva site (after Lewis and Lewis 1961).

IV while those at the top of the deposit were assigned to stratum II. Those artifacts that could not clearly be assigned to either stratum II or IV were excluded from the component analysis (Lewis and Lewis 1961).

Stratum II, which constitutes the Eva II component, was divided into three sub-strata. The upper third was characterized by a rather heavy shell content while the lower two divisions had less shell but a heavier ash concentration. Lewis and Lewis (1961) suggest that the lower two-thirds of the strata represent the period of the longest and most intense occupation. The greatest number of skeletons and material culture remains were recovered from these two layers (Lewis and Lewis 1961).

The Eva III component is comprised of stratum I and the plowzone. The plowzone varied in thickness from 5 to 8 inches. Stratum I had a highly irregular thickness ranging from a thin line to 2.5 feet. This stratum consisted of black, greasy soil with a heavy midden content. The most outstanding feature of this component is the complete absence of mussel shell (Lewis and Lewis 1961).

Few features were excavated at the site. For the most part, these consisted of concentrations of firecracked rocks and/or animal bone or stone implement clusters. There is no evidence for the presence of storage pits. A lack of evidence for post holes suggests an absence of structures, except for feature one which consisted of a series of burned clay levels. Lewis and Lewis suggest that this stratum I feature might represent a dwelling floor (Lewis and Lewis 1961).

The Cherry Site (84BN74)

The Cherry site was tested in August and September, 1941, and was the last TVA-WPA funded archeological project in Benton County prior to the flooding of Kentucky Lake Dam. A formal report has never been written for the Cherry site. It has received only brief mention by Lewis and Kneberg (1947, 1959), and a partial analysis of the lithic artifacts has been conducted (Bowen 1975).

The Cherry site is located about .95 miles east of the Big Sandy River, approximately 22 miles above its confluence with the Tennessee River. The site is situated between two small tributary streams of the Big Sandy River. A small unnamed stream is 200 feet west of the site and Rushing Creek is .4 miles northeast of Cherry. The site is at 36° 10' 29" North Latitude and 88° 08' 45" West Longitude. By contrast to the shell middens in the main river valley, Lewis and Kneberg (1947) consider the Cherry site to be the most remote of the western Tennessee Valley Archaic sites. Figure 2-1, page 11, illustrates the location of the site.

The Cherry site is situated on a slight rise, 15-20 feet above the level of the Big Sandy River bottoms. The site is located on the junction of two soil types: Beechy silt loam and Hatchie silt loam. Beechy silt loam is a poorly drained soil of the first bottom of the Big Sandy River. The Hatchie silt loam is imperfectly drained siltpan soils associated with the nearly level terraces of Rushing Creek. These soils are of the Freeland-Briensburg-Hymon association, characterized by a slightly undulating gently rolling topography, and are associated with the high terraces of the Big Sandy River (Odom et al. 1953). While

Freeland, Briensburg, and Hymon are the most extensive soils of this association, small areas of Beechy and Hatchie silt loam are included as well. The Beechy-Hymon association in which the Beechy silt loam predominates consists of soils of the first bottoms of the Big Sandy River (Odom et al. 1953). Hatchie silt loam is not included in this soil association. Since the Cherry site is located at the junction of the Beechy and Hatchie silt loam soils and these two soil types are included in the Freeland-Briensburg-Hymon association, it would appear that the Cherry site is more likely situated on the higher terraces of the Big Sandy River or Rushing Creek rather than the bottom lands of the Big Sandy River.

The cultural material at the surface of the Cherry site covered about two acres. Initially, two perpendicular test trenches were excavated. The east-west central axis trench was 200 feet in length. The north-south trench, placed at the extreme western end of the excavation unit, measured 60 feet in length. A number of 10-foot squares were opened along the central axis. Figure 2-3 is a map indicating the extent of the site and that portion which was excavated. Both arbitrary and natural stratum levels were removed, yielding a deposit varying in thickness from 1.5 to 2 feet.

Other than the plowzone and yellow clay subsoil, only one stratum was recognized. This stratum varied greatly in thickness throughout the site and was described as a reddish-brown midden with scattered occurrences of mussel shell. Although Lewis and Kneberg (1947) describe this as an unstratified deposit, the bottom and top layers were differentiated on the basis of soil color and texture as well as a

CHERRY SITE
84BN74

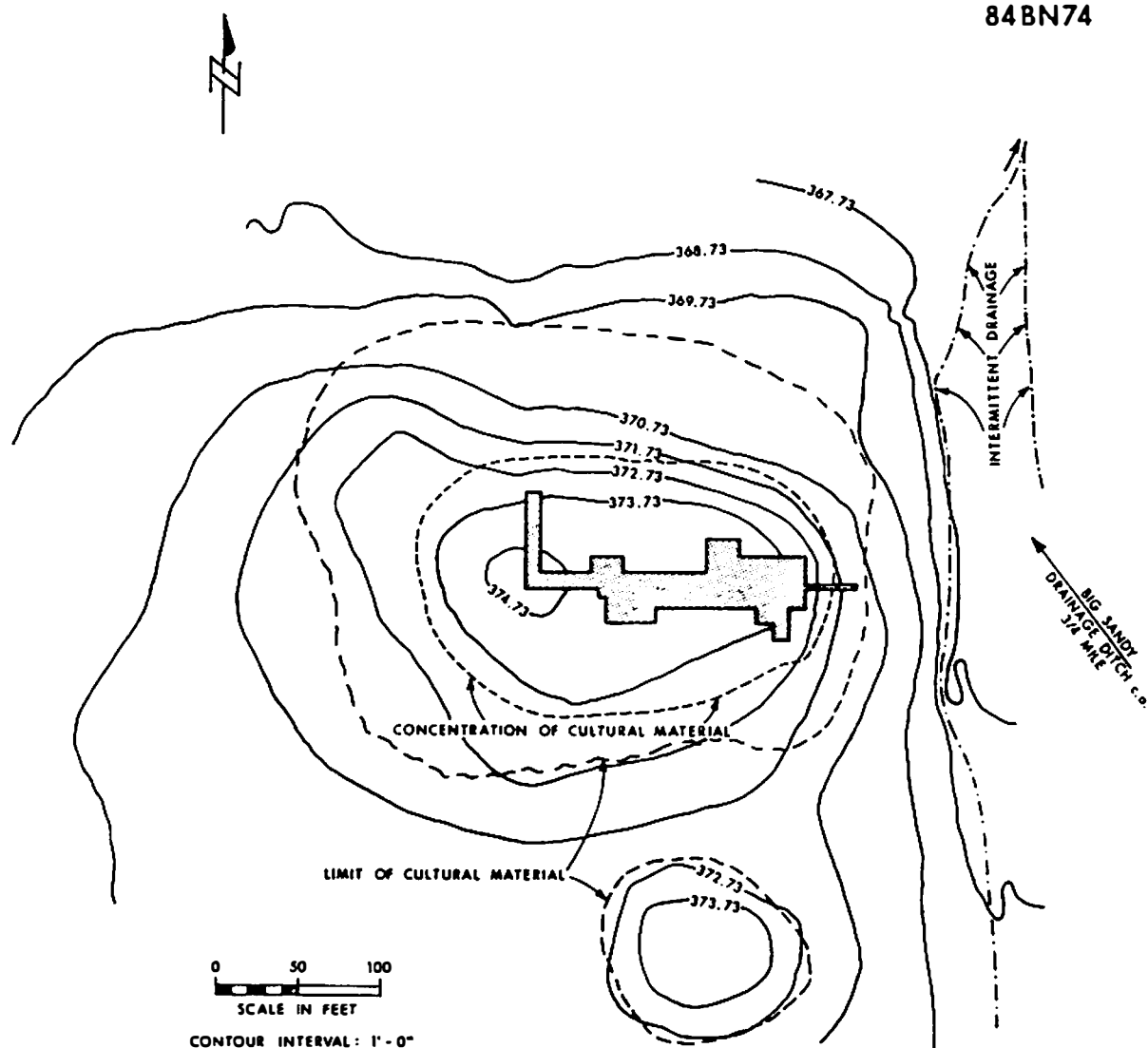


Figure 2-3. Extent of the site and the excavation units at the Cherry site.

sparser debris content in the lower portion.

By contrast to the Eva site, Cherry exhibited a variety of features and pits. Three different types of pits were defined. Two of these types were filled with midden and contained much animal bone, some shell, and occasionally artifacts. A storage function has been suggested for these two types of pits. Of particular importance is the third type of pit. These pits were very large, shallow basin-shaped depressions ranging in diameter from 13 to more than 20 feet. These large depressions were filled with midden and may have been semi-subterranean structures (Lewis and Kneberg 1947), but a lack of associated post holes, hearths, or other interior features does not lend support to this idea. A great number of post holes were found throughout the site, however, and some semi-circular or linear alignments suggest that some type of structures were present.

One salient feature of the Cherry site is its spatial arrangement. The midden concentration and burials were in the eastern portion of the site, while the proposed habitation areas were to the west. This appears to be unique to the Cherry site, but it must be cautioned that only the central portion of the shell midden was excavated at the Eva site. There was a lack of evidence at Eva, however, that would suggest spatial discreteness of the cemetery and habitation areas.

Chronology of the Eva and Cherry Sites

The first attempt to chronologically order the excavated Archaic sites in the Western Valley was undertaken by Lewis and Kneberg (1959). This was accomplished by means of the taxonomic system of Phillips and

Willey (1953). Fifteen identified components from 10 excavated sites were used to define six cultural phases. The 10 sites which were utilized for the study are Eva, Big Sandy, Frazier, Cherry, McDaniel, Thomas, Ledbetter Landing, Oak View, and West Cuba. Location of these sites is represented in Figure 2-1, page 11. Based on trait list differences for the six defined phases, Lewis and Kneberg propose that two traditions existed in the Western Valley, the Midcontinent and Eastern. The Eva, Three Mile, and Big Sandy phases were attributed to the Midcontinent Tradition while the Eastern Tradition was comprised of the Kays, Weldon, and Ledbetter phases.

Subsequent studies suggest that the distinction of two traditions is unwarranted. Phelps (1964) believes that the fallacy of this division lies in misconceptions of time range and inadequate sampling. Results of a recent study of two Late Archaic sites in the Western Valley also indicate the lack of evidence supporting two distinct traditions (Bowen 1975). Bowen suggests that the five components previously assigned to the Big Sandy Phase of the Midcontinent tradition should be attributed to the Ledbetter phase. It is further suggested that the observed differences between sites can be more logically explained as segments of a single subsistence-settlement system based on a seasonal round of activities rather than different socio-cultural manifestations (Bowen 1975).

All evidence indicates that continuing to refer to two traditions is unwarranted, thus two traditions will not be recognized for purposes of this study. Since two traditions are not recognized, the cultural chronology suggested by Lewis and Kneberg (1959) is in need of

modification. In order to do this, however, material culture remains from all the sites in the Western Valley would have to be re-analyzed and it is not within the scope of this research to do so.

Three components were identified at the Eva site: Eva I, Eva II, and Eva III. Each of these were given phase designations. The Eva I component was assigned to the Eva phase and is comprised of strata IV and V. The Eva II component, or stratum II, was designated as the Three Mile phase. The Big Sandy phase corresponds to stratum I and the plowzone; the Eva III component. The cultural phases as defined by Lewis and Kneberg (1947, 1959, 1961) were delineated on the basis of three main criteria: projectile point types, stratigraphy, and correlations with climatic periods. As interpreted by Lewis and Kneberg (1959), the Eva I, Eva II, and Eva III components roughly correspond with the Anathermal, Altithermal, and Medithermal, respectively. The occupation at the Cherry site is considered to be contemporaneous with the Eva III component at Eva and was accordingly assigned to the Big Sandy phase (Lewis and Kneberg 1959).

Relative Dating

Since there is only a single radiocarbon date from the Eva site and none from the Cherry site, it is necessary to place the three components at Eva and the Cherry site in a temporal perspective by means of relative dating. The projectile point types and their frequency of occurrence in each stratum at Eva are based on the original report by Lewis and Lewis (1961).

The Eva I component. The Eva I component is thought to be an early Middle Archaic occupation (Griffin 1967; Lewis and Lewis 1961). Stratum V, however, appears to have an Early Archaic component as evidenced by the presence of Dalton, Kirk Serrated, LeCroy, and Cypress Creek I projectile points. The Cypress Creek I type point is comparable to the Early Archaic Kirk Corner Notched projectile point. Recent excavations at the Icehouse Bottom (40MR23) and the Rose Island (40MR44) sites in Eastern Tennessee produced Kirk and LeCroy components. Radiocarbon dates suggest that these occupations date between 7500-6300 B. C. (Chapman 1976:2-6). It is probable that stratum V is of greater antiquity than originally thought.

An antler sample recovered from the bottom of stratum IV was radiocarbon dated at 5200 B. C. $\pm$ 500 (Lewis and Lewis 1961:13). Although radiocarbon dates of uncharred bone commonly yield dates which are too recent (Butzer 1971; Haynes 1967; Michels 1973), this date with its standard deviation compares reasonably well with dates of early Middle Archaic components in the Little Tennessee Valley (Chapman 1976). The Eva I component is characterized by Eva I type points, followed by Cypress Creek I, Kirk Serrated, and a lesser representation of Big Sandy, Dalton, Eva II, LeCroy, Morrow Mountain I, Straight Stem types, and Sykes. The frequency of occurrence of these point types in the Eva I component is presented in Table 2-1. Examination of the table indicates that the Eva I point type predominates (81.3%). It is estimated that the duration of this component was from 6000-5000 B. C.

Table 2-1. The frequency of projectile point types in each component at the Eva site.

Point Type ^a	Eva III		Eva II		Eva I	
	No.	%	No.	%	No.	%
Straight stemmed	68	54.0	31	24.0	1	.5
Corner removed	34	27.0	10	7.8	2	1.0
Sykes	7	5.6	3	2.3	4	2.0
Side notched	8	6.3	32	24.8	2	1.0
Cypress Creek II	1	.8	13	10.1	1	.5
Morrow Mountain I	2	1.6	11	8.5	1	.5
Eva II	-----		11	8.5	1	.5
Eva I	2	1.6	12	9.3	165	81.3
Kirk serrated	3	2.4	1	.8	9	4.4
LeCroy	-----		1	.8	1	.5
Cypress Creek I	1	.8	3	2.3	13	6.4
Dalton	-----		1	.8	1	.5
Total	126		129		203	

^aStraight stemmed: Ledbetter, Narrow stem, and Straight stem; corner removed: Benton, Expanded stem, and Tapered stem; side notched: Big Sandy and Side notched; Dalton: Dalton and Greenbrier (all other point types are the same as Lewis and Lewis 1961).

The Eva II component. The Eva II component is characterized by the following projectile point types: Eva II, Morrow Mountain I, Sykes, Big Sandy, Side Notched, Cypress Creek II, Benton, Expanded Stem, Tapered Stem, Ledbetter, Narrow Stem, and Straight Stem. The Big Sandy and Side Notched types will be referred to as side notched points. The Cypress Creek II, Benton, Expanded Stem and Tapered Stem types are considered to be corner removed points. The straight stem point type consists of Ledbetter, Narrow Stem, and Straight Stem types. The correlation of any one particular point type with a particular substrata of stratum II is not as distinct as with stratum IV. This may be due, in part, to the sizeable levels excavated by the archeologists (.5 feet) and is undoubtedly a result of extensive aboriginal "excavations." When certain types of projectile points are grouped together, clusters form within the levels of stratum II. Benton, Expanded Stem, Ledbetter, Narrow Stem, Straight Stem and Taper Stem form a Late Archaic cluster. A Middle Archaic cluster is formed by Eva I, Eva II, Morrow Mountain I, Sykes, Big Sandy, Cypress Creek II, and Side Notched. Kirk Serrated, LeCroy, Cypress Creek I, Greenbrier, and Dalton group to form an Early Archaic cluster. The frequency of occurrence of these clusters in each of the three levels of stratum II is presented in Table 2-2. Examination of this table indicates that the top of stratum II contains the greatest frequency of Late Archaic projectile points while the lower two-thirds have about one-third as many. Middle Archaic points predominate in the lower two-thirds of stratum II. Although the top of stratum II has been assigned to the Eva II component which is considered to be a late Middle Archaic occupation, it is possible that

Table 2-2. Early, Middle, and Late Archaic point type clusters for the three levels of stratum II at Eva.

Cluster	Stratum						Total
	IIA		IIM		IIB		
Late Archaic	26	52.0%	7	21.9%	8	16.7%	41
Middle Archaic	23	46.0%	21	65.6%	39	81.3%	83
Early Archaic	1	2.0%	4	12.5%	1	2.1%	7
	50		32		48		

this level represents a transitional or early Late Archaic occupation. For purposes of this study, however, this level is considered to be associated with the Eva II component.

There are no radiocarbon dates for stratum II. Thus, comparisons must be made with sites that have known dates yielding similar components. The only Middle Archaic components with C-14 dates yielded Morrow Mountain and various side notched point types. Morrow Mountain I dates have been reported from Middle and East Tennessee and Northern Alabama. These are presented in Table 2-3. The range of dates for Morrow Mountain is approximately 4000-5000 B. C.

Excavations at the Modoc Rock Shelter in southern Illinois (Fowler 1959) and the Gaston site in eastern North Carolina (Coe 1964), yielded side notched projectile points similar to those recovered from

Table 2-3. Morrow Mountain dates from Tennessee and Alabama.

Radiocarbon Date	Site	Author
5045 $\pm$ 245 B. C.	Icehouse Bottom (40MR23)	Chapman 1976
4575 $\pm$ 165 B. C.	Eoff III (40CF107)	Chapman 1976
4500 $\pm$ 120 B. C.	Stucks Bluff, Alabama	DeJarnette, et al. 1975
4360 $\pm$ 140 B. C.	Russell Cave, Alabama	Griffin 1974
4300 $\pm$ 190 B. C.	"	"
4030 $\pm$ 200 B. C.	"	"

the Eva II component. The side notched projectile point is the predominant point type in excavation levels radiocarbon dated from 5042 $\pm$ 170 B. C. to 3314 $\pm$ 230 B. C. at Modoc Rock Shelter (Fowler 1959). At the Gaston site (HxV 7) the Halifax Side-Notched projectile point type is dated at 3484 $\pm$ 350 B. C. (Coe 1964).

An additional date is reported from the Spring Creek site (40PY207) in the western Tennessee Valley. Cypress Creek II type points were observed stratigraphically below the Benton zone which is dated at approximately 3000-2500 B. C. Peterson believes that a radiocarbon date of 3055 $\pm$ 260 B. C. "may date the probable occurrence of Cypress Creek II points near the known base of the Spring Creek site" (Peterson 1973:44).

The frequency of occurrence of projectile point types in the Eva II component is presented in Table 2-1. Examination of these values

and the point type clusters presented in Table 2-2 indicates that there is a considerable amount of mixing within the Eva II component. Although a great many Late Archaic point types occurred in the top of stratum II, it is believed that the Eva II component represents a late Middle Archaic component as originally suggested by Lewis and Lewis (1961). Comparison with recently recovered C-14 samples suggests that this occupation at Eva may have lasted from about 5000-3000 B. C.

The Eva III component and the Cherry site. The Eva III component is comprised of stratum I and the plowzone. Examination of Table 2-1 indicates that Late Archaic projectile point types predominate. These are straight stemmed types which encompass the Ledbetter, Narrow Stem, and Straight Stem forms and constitute 54% of the sample. The corner removed point types, Benton, Expanded Stem and Tapered Stem, make up 27% of the sample. These straight stemmed and corner removed point types are diagnostic of Late Archaic assemblages throughout much of the Southeastern United States. Contrary to the situation for the Middle Archaic period, there are a number of Late Archaic radiocarbon dates available for comparison. These are presented in Table 2-4.

The Eva III component and the occupation at the Cherry site are considered to be contemporaneous. The predominance of straight stemmed and corner removed projectile points suggests an occupation during the Late Archaic period (Bowen 1975; Lewis and Kneberg 1959). Examination of the radiocarbon dates indicates that this culture period lasted from about 2500-1000/500 B. C.

A summary of the time span that each component at Eva represents

Table 2-4. Late and Terminal Archaic radiocarbon dates from sites in the Southeastern United States.

Culture Period	Site	Author
<u>Late Archaic</u>		
2800 $\pm$ 500 B. C. - 1630 $\pm$ 300 B. C.	Kays (15HY13)	Lewis and Kneberg 1959
2225 $\pm$ 230 B. C.	Harrison Branch (40MR21)	Schroedl 1975
2080 $\pm$ 260 B. C.	Banks V (40CF111)	Faulkner and McCollough 1974
1510 $\pm$ 250 - 1169 $\pm$ 200 B. C.	Riverton, Swan Island, Robeson Hills	Winters 1969
1370 $\pm$ 160 B. C.	Spring Creek (40PY207)	Peterson 1973
1280 $\pm$ 160 - 1020 $\pm$ 150 B. C.	Robinson Site	Morse 1967
1170 $\pm$ 140 B. C.	Icehouse Bottom (40MR23)	Chapman 1973
<u>Terminal Archaic</u>		
1020 $\pm$ 155 - 780 $\pm$ 220 B. C.	Higgs (40L045)	McCollough 1973; McCollough and Faulkner 1973
1010 $\pm$ 135 B. C.	Banks III (40CF108)	Faulkner and McCollough 1974
880 $\pm$ 130 - 460 $\pm$ 200 B. C.	Robinson Site	Morse 1967
775 $\pm$ 155 B. C.	Westmoreland-Barber	Faulkner and Graham 1966

and the time span at the Cherry site is presented in Table 2-5. The estimated duration of the Eva I component is 6000-5000 B. C. The Eva II component dates from about 5000-3000 B. C. and the Eva III component and the Cherry site date from about 2500-1000/500 B. C.

Table 2-5. Estimated duration of the Eva site components and the Cherry site occupation.

Years B. C.		Culture Period
500		Terminal Archaic
1000		
2000	Eva III Cherry	Late Archaic
3000		
4000	Eva II	Late Middle Archaic
5000		
6000	Eva I	Early Middle Archaic
7000		Early Archaic
8000		Paleo Indian

The Eva and Cherry Skeletal Samples

Excavations at the Eva site produced 177 human burials. Each burial was assigned to a particular stratum on the basis of the original field notes. The number of burials in each stratum and hence component differs slightly from the information presented in the Eva site report (Lewis and Lewis 1961:102). The Eva I component yielded 17 human interments. One hundred one burials are attributed to the Eva II component and 59 are assigned to the Eva III component. The burial maps of each strata at the Eva site are presented in Appendix A. Because of the small sample size of the Eva I component, it has been combined with the Eva II component for purposes of this study. Since the original phase designations for each component as assigned by Lewis and Kneberg (1959) and Lewis and Lewis (1961) need to be redefined, the skeletal series from the Eva site shall be referred to by component number rather than phase. The Eva I and II components are referred to as a generalized Middle Archaic adaptation and the Eva III component is designated as a Late Archaic adaptation.

Sixty-nine human burials were recovered from the Cherry site. The burial map of the Cherry site is presented in Appendix A. The Cherry site, considered to be contemporaneous with the Eva III component, will also be referred to as a generalized Late Archaic adaptation.

Settlement and Subsistence

A characteristic of hunters and gatherers is frequent movement within a locale as a response to a variety of environmental and social

forces. Movement is often cyclic, especially in areas of marked seasonal variation (Lee and DeVore 1968, Turnbull 1972). Small-scale societies have an intimate connection with their physical environment which is a factor of great demographic importance in terms of the spatial arrangement of groups within a particular region and the internal group structure as well (Turnbull 1972). Group density and movement may be a response to the amount of available resources while internal age composition may be structured to meet the demands of maximum social or economic efficiency (Damas 1969a, 1969b; Turnbull 1972). Social mobility, or the movement of individuals between groups, is a response not only to economic or subsistence factors, but perhaps more importantly, acts to even out imbalances in the demographic structure of a group as well as to resolve conflict situations (Lee 1972, 1976; Turnbull 1972). The characteristics of spatial and social mobility have important ramifications for the interpretation of the social organization and demographic structure of Archaic hunters and gatherers. The Eva and Cherry sites undoubtedly represent only partial segments of a settlement system in the Western Valley. Thus it cannot be assumed that the cemetery samples from either site represent all aspects of the social organization. Further, it cannot be assumed that any of the three skeletal series is an accurate reflection of the demographic structure of a Middle or Late Archaic population. Therefore, before accurate statements can be made concerning social or demographic processes, the role each site plays in the settlement pattern of the region must be realized.

Lewis and Lewis (1961) proposed a settlement-subsistence model

for the Eva site. They suggest that the site was subject to continual occupation by sedentary hunters and gatherers and that the site was abandoned only during times of flooding. By comparing the quantity of shellfish and vertebrate remains in each of the strata, Lewis and Lewis (1961) suggest that the subsistence pattern changed through time.

The Eva I component is characterized by fewer quantities of mussel shell than the Eva II component. Lewis and Lewis point out that the total quantity of animal bone represented in the Eva I component is five times as great as that for the Eva II component, yet the latter represents twice the depth of deposit (Lewis and Lewis 1961). It is suggested that the smaller quantity of animal bone in the later component is a reflection of a change in environment and a probable decrease in the deer population caused by over exploitation by man. Lewis and Lewis suggest that there is a continuation through time of the basic tool technology, but an increase in the number of fish hooks and abundance of mussel shell in the Eva II component is inferred to suggest that riverine resources served as a dietary staple in the Eva II component and shell fish served as a dietary supplement during the Eva I occupation (Lewis and Lewis 1961).

The rather abrupt disappearance of mussel shells in stratum I is also attributed to environmental changes, thus forcing a change in subsistence (Lewis and Lewis 1961). It is postulated that increased rainfall during the Eva III occupation caused the river to flood so that the mussels were inaccessible. Alternatively, they suggest a change in the course of the river during this period. Since the amount of animal bone remains the same, it is proposed that the environment was

over-exploited and that drastic food shortages might have caused the abandonment of the site (Lewis and Lewis 1961).

The Riverton culture, composed of sites located within the central Wabash River Valley in Illinois has been chronologically and culturally related to Lewis and Kneberg's (1959) Big Sandy Phase of the Midcontinent Tradition (Winters 1969). Although Winters does not imply a direct link between the Riverton culture and sites of the Eva, Three Mile, and Big Sandy phases in Western Tennessee, many similarities in material remains have been noted. The subsistence-settlement system suggested by Winters for Riverton consists of winter settlements, summer base camps, and a transient period in the fall and spring made up of hunting camps, gathering camps and bivouacs (Winters 1969).

It is not possible to apply the settlement-subsistence model proposed by Winters (1969) directly to Western Tennessee Archaic sites. It can be helpful, however, to examine the western Tennessee Valley Archaic sites using the Riverton culture as a basis for comparison. Utilizing data from a large Tennessee River floodplain shell midden, Ledbetter Landing, and the Cherry site, a partial settlement-subsistence model has been recently proposed for the Western Valley during the Late Archaic period (Bowen 1975). Differences in site location, midden content, and the presence or absence of features were considered. Ledbetter Landing was characterized by an abundance of mussel shells, and the presence of fish hooks in the artifact assemblage attest to the importance of riverine resources at that site. The presence of hunting and butchering tools as well as vertebrate remains would indicate that at least some hunting was conducted. Although the deep midden would

suggest that the site was occupied over a long period of time, the lack of evidence for structures might indicate that the site was not inhabited the year round. Bowen (1975) suggests that Ledbetter Landing was occupied during the warmest, driest season of the year (summer) when exploitation of the river would not be hindered by flooding.

By contrast to the Ledbetter Landing site, the Cherry site is located away from the main waterways. The presence of small quantities of mussel shell in the midden suggests that this resource was not ignored but was undoubtedly of lesser importance than other resources. Storage pits do occur at Cherry but not at Ledbetter Landing. Further, the large number of post holes, often in linear alignment, as well as possible semi-subterranean structures at Cherry could indicate that this site was occupied during seasons of more inclement weather with a concentration on the exploitation of non-riverine resources (Bowen 1975).

The partial settlement-subsistence model proposed by Bowen (1975) remains to be tested. The immediate problem, then, is to place the Eva and Cherry sites in a proper settlement perspective. Considerable time depth represented at Eva in addition to the thickness of the midden and the abundance of artifacts and burials attest to the intense occupation of the site. The lack of evidence for structures and storage facilities might suggest that the site occupation was of a transient nature. A cursory evaluation of the artifact assemblage at Eva tends to support this suggestion (Winters 1969). The artifacts were sorted into functional categories by an examination of the illustrations and descriptions in the site report (Lewis and Lewis 1961) in addition to an examination of the actual artifacts (Winters 1969). Winters suggests that the ratio of

functional categories at Eva is indicative of a hunting camp yet the results seem to be at variance with the range of activities indicated from the number of burials and the diversity of artifacts (Winters 1969). Only stratum V of the Eva I component is truly representative of a hunting camp. The remaining four strata have a varied assortment of general utility tools and fabricating and processing tools, but an extreme paucity of domestic and entertainment equipment. Winters cautiously suggests that the first four strata at Eva represent a base or transient camp (Winters 1969).

Evidence suggests that the Eva and Cherry sites were utilized for different functions. This is based on differences in site location, the presence of storage pits and structures at Cherry and the lack of evidence for these features at the Eva site. The proximity of the Eva site to the main waterway and the abundance of mussel shells in the midden suggest that the focus of subsistence activity was on riverine and floodplain resources. The variety of hunting tools and fabricating and processing implements indicates that hunting and gathering activities were conducted. The paucity of mussel shell in the midden at Cherry suggests that riverine resources were not of primary importance. Differing site function is suggested but the specific differences cannot be understood until the total artifact assemblages from these sites in addition to the other Western Valley sites are examined.

CHAPTER III

MORTUARY PRACTICES

Material remains created as a result of human behavior can potentially yield information pertaining to the social structure and organization of prehistoric communities. Of great utility for this kind of study are the physical remains of mortuary activity. Burial remains and funerary rites and customs have drawn the attention of both ethnographers and archeologists for quite some time, yet it has not been until recently that this data class has been examined to explain variation at a particular locale, between locations, or through time.

In mortuary studies, it is of vital importance to relate social structure and social relationships to treatment of the deceased. In order to examine the relationship between these three parameters, there are two basic underlying assumptions of present archeological mortuary studies that must be recognized. These are that:

1. The variables within a mortuary site cluster in such a way that they partition the universe and these partitions represent different social statuses or classes; and
2. The principles which organize the sets of statuses are the same as the organizing social relations in the general society (Goldstein 1976:9).

There are two components of the social sphere that Binford (1971) feels are essential in an evaluation of mortuary activity. The first is the social persona (after Goodenough 1965:7) which is "a composite of the social identities maintained in life and recognized as appropriate

for consideration at death. Secondly is the composition and size of the social unit recognizing status responsibilities to the deceased" (Binford 1971:17). There should be a correlation between the rank of the individual and the number of persons or groups that have duty-status relationships with the deceased.

The organizational principles of social complexity of both Fried (1967) and Service (1962) are often examined in mortuary studies. While differing as to the criteria used for determining the levels of socio-cultural complexity, both agree that different levels do exist, ranging from simple to more complex. Whether one uses Fried's (1967) egalitarian-ranked-stratified-state model or the band-tribe-chiefdom-archaic model of Service (1962), when the socio-cultural system under study resembles a level in one or the other scale, something can be said about the relative degree of social complexity. According to Binford (1971:18) "there should be a high degree of isomorphism between (a) the complexity of the status structure in a socio-cultural system and (b) the complexity of mortuary ceremonialism as regards differential treatment of persons occupying different status positions."

Social complexity and mortuary ceremonialism were examined by Saxe (1970) for societies with an egalitarian type of socio-cultural system. Egalitarian, as Fried (1967 Chapters 2 and 3) defines it is, where there are as many status positions in any age-sex category as there are persons capable of filling them; there is no limit to the number of persons who can exert power; there are leveling mechanisms to prevent the acquisition of wealth or wide gap in ability; and any status differentiation, other than age or sex, is based on personal qualities of

the individual. Saxe postulated that if a system is egalitarian, then the social identities represented in the disposal domain should be those characteristics which are acquired on the basis of age, sex, or personal ability. It was also suggested, conversely, that if the variability in the disposal domain can be examined in terms of age, sex, or personal attributes, then an egalitarian social structure is represented (Saxe 1970:67).

Through a cross-cultural survey of the ethnographic record, Binford (1971) examined a number of groups in an effort to evaluate the complexity of status structure. Because there was a lack of adequate information in the literature pertaining to the number of status positions in any group or any specific information as to social complexity, forms of subsistence were used as a crude measure of complexity. Societies were classified as hunters and gatherers, shifting agriculturalists, settled agriculturalists, and pastoralists. A number of dimensions of the disposal domain for recorded mortuary ritual were defined for each of the four subsistence categories. Binford found that the number of distinctions recognized for settled agriculturalists was significantly greater than for the other three. The hunters and gatherers exhibited more of the egalitarian type of status grading while the settled agriculturalists showed more incidences of ranked or stratified systems of status grading. For the hunters and gatherers, most of the distinctions for social position were made on the basis of age and/or sex, or social affiliation. Therefore, the proposition that there is a direct correlation between the structural complexity of the mortuary ritual and the complexity of the socio-cultural system is supported.

In addition to the correlation between the structural complexity of the mortuary ritual and the level of socio-cultural complexity, a number of other associations are suggested. As was expected, there was a high correlation between the level of corporate involvement in funerary behavior and the selected location for disposal of the body in relation to the community life space. When age was the distinguishing character of the social persona, location of the graves of subadults, rather than adults, was the mode of differentiation. Children were often buried in house floors or in peripheral areas of the settlement, while adults were afforded burial in a more public location or specified areas within the community. Locational distinctions were also noted for subgroup affiliation such as a clan or lineage. When membership groups are present, each may maintain a distinct area for burial, reserved exclusively for members. Further, orientation with respect to certain topographic features or cardinal directions was observed to distinguish between subgroups (Binford 1971).

Differential treatment at death as related to the sex of the individual was of a different form than distinctions due to age. Different types of goods placed with the body representing male-female division of labor or sex-differentiated clothing were most common. Sex distinctions often cross cut other ones such as subgroup affiliation or status position (Binford 1971).

Lastly, Binford (1971) found that social position or status related mortuary treatment was highly variable and most complex. Most often, distinctions were made on the basis of form and quantity of grave goods and location of the interment. Distinctions in treatment of high

status persons may cross cut distinctions as to age, sex, or subgroup affiliation while persons of lower status may be treated only with respect to age, sex, or group membership and no distinctions made concerning social position (Binford 1971).

The findings generated from this cursory analysis allowed Binford to generalize that the form and structure of the mortuary ritual is conditioned by the form and complexity of the culture (Binford 1971). Through the investigation of the variability evidenced within these societies, Binford suggests that:

1. The specific dimensions of the social persona commonly given recognition in differentiated mortuary ritual vary significantly with the organizational complexity of the society as measured by different forms of subsistence practice.
2. The number of dimensions of the social persona commonly given recognition in mortuary ritual varies significantly with the organizational complexity of the society, as measured by different forms of subsistence practice..
3. The forms, which differentiations in mortuary ritual take, vary significantly with the dimensions of the social persona symbolized (Binford 1971:23).

When investigating social organization through mortuary practices, it is of vital importance to distinguish as many components of the system as possible. It is necessary to include a number of variables and dimensions for, as Saxe points out, it is the components of mortuary behavior that "constitute the material correlates of social identities which in various combinations represent the social personae extant in the system's practices of disposal of the dead" (Saxe 1970:16). One serious shortcoming of some recent analyses of mortuary activity is the unidimensional focus in which artifacts alone are stressed (c.f., Clarke 1975; Larson 1971; Peebles 1971). Although Binford (1971) indicates that

the kind and quantity of goods contributed to the grave furniture are commonly indicative of status, he stresses that additional variables are critical to the interpretation of the social dimensions of mortuary practices. Saxe (1970) further suggests that the significance of any one variable or treatment can be understood only in the context of the other variables.

In order to examine the correlations between the characteristics of the social persona as recognized by differential mortuary treatment and the form of the ritual, there are four basic variables that should be considered. These have been outlined by Binford (1971) and Goldstein (1976) as follows:

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 individuals' 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 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 (Binford 1971:21; Goldstein 1976:30)

Some of the behavioral attributes of mortuary activity as distinguished by Binford (1971) are not reflected in the archeological record. It is obvious then, that the researcher is limited to those archeological expressions of behavior that are represented in the physical world.

The fourth variable, population profile and biological dimensions, is not usually considered in archeological analyses of mortuary activity other than the age and sex characteristics. While this variable is not formally a part of the disposal domain, it is appropriately pointed out by Goldstein (1976) that funerary behavior as to the treatment of these categories may be differentially controlled by the culture. Certain physical maladies, circumstances surrounding death, or disease states may have a bearing on the nature of treatment at death.

The Eva and Cherry site cemetery samples are ideally suited for the examination of mortuary activity through time and between locations. The adaptation during these Archaic culture periods was probably one of hunting and gathering with concomitant spatial and seasonal mobility. Ethnographic evidence suggests that hunting and gathering groups generally have an egalitarian type of social system. With this type of social system, any status differentiation is generally in terms of age, sex, or personal ability. Further, there are leveling mechanisms to prohibit the acquisition of wealth. If such a system is in operation for the Middle and Late Archaic groups represented at the Eva and Cherry

sites, then one would not expect much elaboration in the mortuary ritual. Further, any distinctions that may be evident should be explainable in terms of the age or sex of the individual. Mortuary activity at the Eva and Cherry sites is examined in order to test this hypothesis.

Selection of Variables for Analysis of Mortuary Practices

In mortuary studies, as discussed previously, it is important not to limit analysis to one dimension but to examine as many variables as possible. Since it is assumed that mortuary ritual is a reflection of social organizational principles, the goal is to elicit a series of distinctive components, combinations of which can account for variability in disposal treatment. Since many of the behavioral and attitudinal dimensions of mortuary ritual do not result in a material residue, the archeologist is at a distinct disadvantage for not having witnessed the event. It is quite obvious, then, that the archeological investigation is restricted to those dimensions that are represented in the physical realm.

Dimensions in the mortuary ritual have different meaning and take different forms since symbols do not necessarily have the same meaning from culture to culture. While the general dimensions of burial programs as outlined by Binford (1971) and Goldstein (1975) have been followed, the selection of variables within that general framework is specific to the archeological sample being considered. There is often a lack of agreement as to specific terminology used for burial description. For this study, the terminology outlined by Sprague (1968) is used. The dimensions to be considered are as follows:

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

The coding format is presented in Appendix C.

Previous studies have paid varying amounts of attention to the first three general dimensions of mortuary behavior presented here. It should be noted that the disposal container, in this case burial pit, or even the mere presence of a pit, was difficult or impossible to determine. This variable, therefore, could not be observed with any confidence and was thus excluded from consideration.

Form of disposal: Each individual was scored as to whether it was a primary inhumation or whether the body had been subject to some sort of processing prior to final placement in the ground.

Individuality: Individuality refers to whether the body was placed in the ground singly or with others, all of which may be in varying states of articulation.

Articulation: State of articulation can provide useful information concerning treatment of the body prior to final interment. Each individual was given a score as to its state of articulation.

Position: Position of the body can be indicative of relative status position within the social group. While it may be desirable to provide information concerning placement of both the arms and legs relative to the body, lack of detailed field records and an incomplete photographic record made this an impossibility. Position was determined only on the basis of the relationship of the legs to the body. An extended position is assigned when the legs are straight meaning a 180 degree angle to the spinal column. Semiflexed is the condition where the legs are between a 90 and 180 degree angle to the spinal column. The legs at a 90 to 45 degree angle with the spinal column were considered to be flexed. A tightly flexed position is when the legs were at an angle of 45 degrees or less to the torso.

Orientation of the body: The spinal column was used as the axis to determine orientation. Because compass readings were not available, one of the eight cardinal directions, N, S, SW, etc., were assigned on the basis of the direction in which the head was pointing.

Location of the body within the disposal area: Exact X and Y grid coordinates were determined for each skeleton. Measurements were taken using the pelvis as the center point of the body.

Grave goods: Only those items for which positive, direct association could be determined are considered as grave goods. These positive associations were coded as utilitarian or ceremonial/ornamental goods. Utilitarian goods are considered to be any items that might be used in the acquisition of food, manufacture of other tools, domestic activities, etc., and included such items as projectile points, atlatl hooks and weights, awls, drills, hammerstones and so on.

Ceremonial or ornamental objects, in essence, were those items which were not utilitarian. This category included ground stone, shell, or bone beads; ground stone pipes; bracelets; hair pins; whistles; pendants; or objects manufactured from "exotic" raw materials such as marine shell or copper. Each individual was coded as to quantity and specific type of burial good. This resulted in 37 artifact types. Since this was an unwieldy number of categories to work with for a small sample size, these were later collapsed into the following categories:

1. Hunting, fishing, and plant food acquisition tools including: projectile point, blade, hoe, atlatl hook, atlatl weight, shaft straightener, flaker or drift, bone projectile point, knife, preform blank, fish hook, hammerstone.
2. Domestic (woodworking, hideworking, weaving) to include: drill, adz, worked animal bone, unworked animal bone, indigenous unworked shell (spoons), bone awl, bone needle, bodkin (spatulate weaving? tool), scraper, turtle shell plastron (unworked).
3. Exotic trade goods including: worked trade shell (dippers and gorgets), copper beads.
4. Ornamental and entertainment to include: ground stone beads, worked bone beads, indigenous shell beads, bone hair pin, bone whistle, turtle shell bracelets, ochre, unworked bone necklace (vertebrae), turtle shell rattle, ground stone tubular pipe, crinoid bead, bone pendant.

The fourth dimension, demography and biology, cannot be changed in the ritual behavior. As suggested by Goldstein (1976), they are important because of differential treatment by the culture at the time of death. While age at death and sex are often considered, the disease state is most often ignored. The disease vector may be an important one for Saxe (1970) found that, for egalitarian societies, burial mode was controlled by the age and sex of the individual as well as normal versus

deviant distinctions. Deviance may be either criminal and intentional or medical and ascribed. Though it may be impossible to determine criminal behavior, it is possible to determine deviance due to medical factors if such a disease or malformation manifests itself in the bone. The methods used in the determination of age and sex as well as bone pathology will be discussed in detail in the following two sections. The demographic aspects of mortuary behavior are presented in Chapter IV.

Determination of Age and Sex of Skeletal Remains

In order to reconstruct the vital statistics of a prehistoric cemetery sample, the determination of age at death and sex is of critical importance. Because the reliability of inferences concerning mortuary activity for groups with a hunting and gathering adaptation is highly correlated with age and sex of the individual, it is vital to select those criteria that can produce the most accurate estimates.

Determination of sex. Sex determination of prepubescent skeletal remains is a highly inexact art. Although numerous workers have attempted to assess this parameter, previous studies have not provided satisfactory standards for estimating this character (c.f., Boucher 1957). Therefore, sexing of immature individuals was not attempted.

Following the onset of puberty, sexually distinguishing characteristics of the skeleton become more apparent. Although the pelvis provides the most accurate information, cranial morphology as well as the general rugosity and robusticity of the post cranial elements aid in the assessment of sex of adult skeletons. Many studies have been conducted concerning the sexing of skeletons and the related problems, results of

which are available in summary works (Bass 1971; Krogman 1962).

Pelvic morphology is the most reliable character for the estimation of sex. In general, female pelves are characterized by a smaller obturator foramen, small acetabulum, wide and shallow sciatic notch, broad sub-pubic arch, low and flaring ilium, a deeply grooved preauricular aulcus, smaller sacro-illiac articulation, and in general, more gracile (Bass 1971; Krogman 1962). The presence of parity scars, a result of childbirth are also diagnostic (Stewart 1957, 1970). Phenice (1960) developed a visual method of sexing the os pubis for which he claims a 95% accuracy. For this method, the medial aspect of the ischio-pubic ramus, the ventral arc, and the sub-pubic concavity are employed to determine sex. Pelvic morphology was the primary criterion used to determine sex for this study. Other aspects of skeletal morphology were relied on when pelvic morphology was not observable.

Sexual dimorphism, as evidenced in cranial morphology, has been outlined by Bass (1971) and Krogman (1962). Morphological characteristics helpful in sex determination include such things as size of the mastoid processes, the degree of muscle marking present on the occipital, size of the supraorbital ridges, the upper margins of the orbital borders, size and shape of the chin, and a consideration of the general size and rugosity of the entire skull. The use of subjective criteria to assess sex by bony development of the skull alone will produce accurate results in only 80-90% of the cases (Krogman 1962). Objective methods employing the use of cranio-metrics and statistics produce more accurate results (Giles and Elliot 1963; Giles 1964, 1970).

Less than perfect preservation and the fragmented condition of many of the crania of these series would have severely limited the number of usable specimens. Cranial metrics were not relied on to determine sex.

Long bone morphology is also a useful indicator of sex. The general size, robusticity, and degree of muscle marking can be indicative of sex. Although visual assessment of long bone morphology alone would produce results of a dubious nature, the use of this parameter in conjunction with the pelvic and cranial morphology can produce reliable results. Since the material for this study was generally fragmented or imperfectly preserved, visual assessment of skeletal morphology was relied on to determine sex of adult individuals.

Age determination. The determination of age is of primary importance in reconstructing the demographic profile of a cemetery sample. A number of techniques have been developed to determine the age of both immature and adult skeletons. Those criteria that produce the most accurate estimates are weighted most heavily but all parameters that are present for each individual were observed and compared.

There are three main methods most often used to determine subadult age. These are dental development, diaphyseal length of long bones, and stage of epiphyseal union. For younger individuals, the dentition supplies the most accurate information. Traditionally, researchers have relied on dental eruption sequences. The dental maturation chart prepared by Schour and Massler (1941, 1944) was based on a study conducted by Logan and Kronfeld (1933). Later, McCall and Schour (1960) compiled a chart, based on the study of Logan and Kronfeld, utilizing

enamel formation, tooth eruption, and root tip closure. More recently, Moorrees, Fanning, and Hunt (1963a, 1963b) supplied standards for aging immature skeletons based on dental calcification and root resorption for three deciduous teeth and 10 permanent teeth. Calcification standards generally produce slightly more accurate results than tooth eruption sequences. Teeth are often lost in archeological samples, especially the deciduous teeth. Since Moorrees, Fanning, and Hunt (1963a) supplied standards for only three deciduous teeth, it is not always possible to use these standards due to missing data.

The validity of using standards determined from studies of American Whites and applying these to prehistoric American Indian samples has been questioned. These are the only available standards for age determination by dental assessment and the use of these standards cannot be avoided. The relationship between chronological age and biological will vary from group to group. This is of no great consequence since chronological age cannot be known. For prehistoric skeletal series, then, dental age will always represent biological age. Caution must be exercised, however, in the comparison of prehistoric skeletal material with contemporary data (Armstrong and Medina 1977). For this study, the standards for dental eruption, enamel completion, and root tip closure supplied by McCall and Schour (1960) were generally more useful than the standards for dental calcification supplied by Moorrees, Fanning, and Hunt (1963a, 1963b). Comparison of aging standards of both methods were made whenever possible.

In cemetery samples, often times teeth are not recovered, especially if the fill dirt surrounding a skeleton is not screened.

Johnston (1962) examined diaphyseal length of the long bones in relation to dental maturation for the Indian Knoll Archaic series. Regression formulae were developed and standards provided for age estimation of immature skeletons from birth to 5.5 years of age. Since the series used in this study are temporally related and demonstrate reasonable spatial proximity to Indian Knoll, the use of the standards provided by Johnston are applicable. In cases where the dentition was lacking, diaphyseal length of long bones was relied on.

Epiphyseal union provides the basis of age estimation for later subadult years. Such elements as long bone epiphyses, epiphyses of the iliac crest and ischium, medial-clavicular epiphyses, basilar suture, and epiphyseal rings of the vertebral bodies were examined. Standards for ages above 17 years are presented by McKern and Stewart (1957) and McKern (1970). McKay (1961) compiled a chart based on studies conducted before 1961 and is comprised of age of appearance and fusion of epiphyses for both males and females. These standards were used to assess age of the adolescents and young adults.

The determination of age at death of adult skeletons is more problematic than for immature individuals. It is best to use as many criteria as possible for the entire skeleton. Changes in the symphyseal face of the os pubis provides the most accurate visual assessment. Ten phases of age-related changes in the symphyseal face were initially defined by Todd (1920, 1921), which allowed for the determination of age from 18 to 50+ years. This system tends to overestimate age (Brooks 1955), and the standards of McKern and Stewart (1957) are considered more accurate for males up to age 40.

The metamorphosis of the female symphseal face proceeds at a different rate and the location of changes is different than that of males (Gilbert and McKern 1973). The standards supplied by Gilbert and McKern allow for estimation of age of females greater than 40 years. For the Eva and Cherry series, the male standards up to the age of 40 supplied by McKern and Stewart (1957) were used. Todd's method (1920, 1921) was used for males older than 40 years. To determine the age of females based on changes in the symphseal face, the standards supplied by Gilbert and McKern (1973) were used.

Another aging criterion of much less reliability than the pubic symphysis is endocranial suture closure. The age related closure of sutures has been described by Todd and Lyon (1924, 1925) and summarized by Krogman (1962). The progression of endocranial suture closure is not regular enough for accurate age assessments. In the event that other, more reliable criteria were lacking, endocranial suture closure was employed to assess age.

Dental attrition has been used to evaluate age (Hrdlicka 1952). This criterion is highly subjective and depends greatly on aboriginal diet, varies greatly between individuals, and relies heavily on the observers familiarity with the population under study. Dental attrition was not used in the determination of age but did prove to be very helpful in distinguishing between young and old adults.

Bone Pathology

Osseous modification as a result of disease and trauma and its distribution within a skeletal series can be an important measure of the adaptive success of a group. It can also aid in the interpretation

of mortality and longevity. Further, physical disability or chronic or acute disease states, as reflected in bone pathology, undoubtedly have an effect on the ability of a person to participate in the normal range of activities within the group. Such maladies or disabilities may be sufficient cause for differential treatment at death and thus be reflected in the mortuary complex.

The Eva and Cherry skeletal series were examined for evidence of bone pathology. The intent was not to arrive at a clinical or differential diagnosis of each boney modification for every individual. Rather, pathology was observed and scored according to generalized categories in an attempt to measure the overall health status of each sample. In addition, disease states may demand differential treatment at death as was mentioned before. Six categories of bone pathology were defined after Neumann (1967:7-11) and Morse (1969). Each individual was scored as to the presence or absence of pathology according to each of the following categories.

1. Anomalies in Growth and Development--Hereditary or acquired characteristics may alter the normal growth or development of bone. This category does not include such minor skeletal variates as accessory sutural bones of the skull, septal apertures, or accessory foramina; traits which express themselves with varying degrees in any population without deleterious effects to the individual or the group. Instead, this refers to such anomalies as spina bifida, premature closure of cranial sutures, perforation of the sternum, congenital rib abnormalities, or fusion of joints either genetic or a result of trauma.

2. Regressive Changes--The principal regressive changes of

importance here are atrophy and osteoporosis. A decrease in bone density, osteoporosis may be the result of decreased production of bone matrix or increased resorption of bone matrix. The bone becomes porous, much lighter, and brittle because of decreased bone mass resulting in less calcium and phosphorus content. In addition to changes in bone density and plasticity, there may be a decrease in overall size of a bone, both in diameter and length. Causes of osteoporosis may be old age, disuse, malnutrition, anemias, endocrine imbalances, or chronic or debilitating diseases that may restrict an individual's activity (Morse 1969:3). It is realized that the normal ageing process results in varying degrees of osteoporosis. For this category, only those individuals demonstrating extreme cases of atrophy or osteoporosis were given a positive score.

3. Traumatic Injury--Traumatic lesions are, perhaps the most common bone pathology evident in prehistoric populations. Morse classifies six types of trauma:

1. Fractures
2. Crushing injuries
3. Bone wounds caused by sharp instruments
4. Osteosclerosis which can occur with or without fractures
5. Dislocations
6. Surgery (1969:5).

Each individual was given a score as to the presence or absence of traumatic injury regardless of the type or whether it healed properly if at all. Since the series was not subject to radiography, traumata as well as all other bone pathology categories were assessed visually.

4. Osteoarthritis--The classification of arthritis for archeological specimens poses certain problems. Although many arthritis

typologies have been developed within the field of medicine, these mainly depend upon etiology and/or clinical findings, neither of which are available to the researcher working with dry bone (Jurmain 1977; Morse 1969; Neumann 1967). For purposes of this study, osteoarthritis (degenerative joint disease), osteophytosis (degenerative joint disease of the vertebral column), traumatic arthritis, rheumatoid arthritis, or infectious arthritis are all classified under the general category of osteoarthritis. It is realized that the observable arthritic changes may be the result of a variety of disease processes. If, for example, trauma induced arthritis is recognizable, an individual would be scored for both trauma and osteoarthritis. It is the boney response and its possible debilitating effects on the individual that is of concern here and not necessarily the etiology or specific clinical diagnosis. Each skeleton was observed for arthritic remodeling and scored accordingly.

5. Infectious Disease or Diseases of Unknown Etiology--In essence, this category includes everything that could not be classified as to the previous four categories or dental pathology. It would include such things as periostitis, osteomyelitis, osteitis, granulomas, lesions secondary to hemolytic disorders or anemias, lesions resulting from chronic malnutrition, and any ideopathic or disease of unknown etiology (Morse 1969; Neumann 1967). Again, individuals were scored for the presence of this category to obtain a measure, albeit crude, of bone pathology responding to disease or nutritional stresses that could possibly affect the individual's ability to participate in normal group activity.

6. Dental Pathology--This category includes such things as carious lesions, apical abscesses, or antemortem tooth loss with resulting resorption of the alveolar bone. Such traits as Carabelli's cusp, other multiple cusps, crowding of the teeth or mandibular or palatine tori were not considered as dental pathology. These series demonstrated excessive wear on both the occlusal and interstitial tooth surfaces for nearly all individuals older than age 30 or 35. Excessive wear was not scored as dental pathology unless there was a resulting lesion on either the tooth or the surrounding bone tissue.

Data Manipulation

Before proceeding with analysis of any sort, it is important to be familiar with the data to be analyzed. It is necessary to know the frequency of occurrence of data classes, its variability, and the amount of co-variation among variables. From this information, it is possible to determine and understand patterns of variation. Complete frequency tabulations were performed on all variables using the SPSS program FREQUENCIES (Nie et al. 1975). Each variable was then cross tabulated with every other variable. The two-way CROSSTABS program was supplied by SPSS (Nie et al. 1975).

A problem with mortuary studies, as Brown points out, is a paucity of interpretative methodology and models which are not "completely dependent on the customary forms of analogy" (Brown 1971:92). This problem has been addressed by Tainter (1975). A number of mathematical models and statistical methods often used for mortuary studies were examined and discussed. Tainter explicitly states the problem: "Which classification algorithm is most useful for isolating

sets of burials which reflect the structure of a social system?"

(Tainter 1975:3). Tainter further suggests that two criteria must be met in order for a classification method to be useful for cemetery data. First, the procedure must not show a tendency to form small clusters of burials composed of idiosyncratic attributes. Thus, the method must demonstrate a sensitivity to the size of the burial clusters. Secondly, the method must be able to partition the sample into socially distinctive sets of burials. Applying various statistical techniques and mathematical models to burial data, Tainter found that both average- and complete-linkage cluster analysis produces totally inappropriate results. In addition, the use of chi-square tests also produced poor results. Both of these methods split and segregate some burials due to their idiosyncracies (Tainter 1975).

Factor analysis is one of the mathematical models that can produce acceptable results. This is a general scientific method which may be applied to any type of data. Rummel outlines three key concepts to understanding factor analysis. These are patterned variation, vector, and dimension (Rummel 1970:12). Patterned variation is the underlying regularity in the data. A vector is the value that each variable exhibits in a matrix. Dimension refers to the vector or clusters of vectors in space which define the variation. Rummel sums this up by:

What factor analysis does, then, is to determine the minimum number of independent coordinate axes necessary to plot (reproduce) the variation in vectors in the space.

. . . dimensions disclosed by a factor analysis can be interpreted as measures of the amount of ordered or patterned variation in data. The degree to which such regularity or interdependency exists can be gauged by the number and strength of the dimensions (Rummel 1970:15-16).

In short, factor analysis can delineate patterns of variation by uncovering the "basic source" of that variation (Nie et al. 1975).

Factor analysis is seldom used for statistical inference. In order to make statistical inference, two primary criteria must be met: (1) A representative sample needs to be utilized and (2) that a multivariate normal distribution exists among the data (Rummel 1970). In social science data, the first criterion often times is met but rarely is the second. Archeological cemetery samples rarely even meet the first criterion.

The use of factor analysis has been criticized on many grounds. The three main criticisms are summarized by Rummel (1970:17018). First, some feel that the data must have an underlying multinormal frequency distribution. This is necessary only when tests of significance are to be applied to the factors. The second criticism is that factor analysis assumes the relationships between variables to be additive and linear. Rummel (1970:17) feels that even if the dimensions involve complex functions that are nonadditive or nonlinear, these functions can be reduced to linear vector spaces. The author also feels that distinctions between models need not necessarily be based on which is closer to "reality" but which one is able to predict with greater ease and simplicity. A third and important criticism is that factor analysis is arbitrary. The most commonly used method is component factor analysis and this produces a unique mathematical result (Rummel 1970). The rotation of factors is where some of the ideas of arbitrariness have arisen. It has been argued that these adjustments are a result of an intuitive decision on the part of the

researcher. Rummel (1970) points out that mathematical solutions to the rotation problem and the use of high speed computers have eliminated much of this possible source of arbitrariness. Further, he feels that only the research design decisions and the substantive content given to the structure can be arbitrary.

Although factor analysis has been criticized, its usefulness as a model has long been realized. Mortuary data from the Middle and Late Archaic components at the Eva site and the Late Archaic Cherry site are subject to a factor analysis. The technique employed is the principle factoring type with iterations (PA2) and varimax orthogonal rotation. The program FACTOR is supplied by SPSS (Nie et al. 1975). Certain variables such as articulation, individuality, cremation, or dogs buried in direct association with human interments showed little or no variation or were such an infrequent occurrence that they were excluded from the factor analysis. Only those variables that demonstrated variation were included. These were age, sex, position, deposition, orientation, location within the cemetery, and the type of grave furniture.

Analysis of Mortuary Practices of the Eva and Cherry Cemetery Samples

Initially, the two-way crosstabulation tables for each of the variables with every other variable were examined to determine the amount of covariation between parameters. From this information it is then possible to determine the amount of variability and any patterns of variation that might exist. The variation exhibited in each of the three cemetery samples is discussed. The factor analysis can then be discussed in light of the variation of the parameters of mortuary activity.

Middle Archaic: the Eva I and II component. Examination of the parameters selected for the evaluation of mortuary behavior indicates that certain aspects of body treatment and preparation of the disposal facility showed much uniformity for the Eva I and II sample. Of the skeletons recovered from this component, all were articulated, primary inhumations. In addition, all were single interments with the exception of one double burial; a male and female, both aged 25-30. In terms of position of the body, only some infants were placed in the extended or semi-flexed position. The remaining 95% of the sample were placed in the flexed or tightly flexed position. Placement in the flexed or tightly flexed position appeared to be random with respect to age, sex, or any other variable.

Deposition and orientation indicate no demonstrable patterning with respect to age, sex, location within the cemetery area, disease states, or grave goods. Placement on the right or left side occurred with approximately equal frequency. Together, these constitute 74% of the sample. The remaining 26% were placed on the back or face. Orientation of the body with respect to the eight cardinal directions indicates no marked preference for facing any one particular direction. Attempts were made to reduce the eight cardinal directions to the four major ones: North, South, East, and West. Arbitrarily rotating each of the Northeast, Southeast, Northwest, Southwest directions counter-clockwise to the next major direction showed approximately equal distributions. Orientation was apparently random with respect to age, sex, position, deposition, location within the cemetery, or grave goods. A clockwise rotation of the intermediate directions produced the same results.

Differential treatment of individuals with disease states as evidenced in bone pathology could not be isolated. Diseased individuals were afforded the same treatment as those with no evident bone pathology in terms of location within the cemetery, deposition, orientation, position or grave goods.

There were four occurrences of dogs buried in direct association with human interments. One 10-15-year-old adolescent was accompanied by a dog. Two adult males and a female in the 30-40-year-age category were each afforded one of the remaining three dogs. The occurrence of this phenomena is not uncommon in Archaic cemeteries. The significance of this mortuary treatment is unknown. The infrequent occurrence of this in the Middle Archaic cemetery sample at Eva precludes speculation as to its relative importance.

Only 29% of the interments in the Middle Archaic cemetery were afforded grave offerings. Of those individuals with grave goods, 60% received utilitarian type goods while 40% were afforded items of a ceremonial/ornamental nature. Table 3-1 is a breakdown of these two categories by age. The upper number in each cell is the percent occurrence of each artifact category for a particular age group. The lower number in the cell refers to the percentage a particular age group contributes to each artifact category. For example, of those aged 0-5, 86.2% had no grave goods, 3.4% were afforded utilitarian type goods, and 10.3% received ceremonial/ornamental items. Looking at the lower numbers in each cell, of all those individuals with utilitarian items, 5.6% were afforded to infants age 0-5, 11.1% to those aged 20-25 and so on. Examination of Table 3-1 indicates that the occurrence of

Table 3-1. Distribution of utilitarian and ceremonial/ornamental grave goods by age: the Eva I and II component.^a

Age	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
0-5	86.2 31.3	3.4 5.6	10.3 33.3	----	100.0
5-10	100.0 5.0	----	----	----	100.0
10-15	57.1 5.0	14.3 5.6	14.3 11.1	14.3 25.0	100.0
15-20	77.8 8.8	22.2 11.1	----	----	100.0
20-25	33.3 1.3	66.7 11.1	----	----	100.0
25-30	80.0 5.0	----	20.0 11.1	----	100.0
30-35	64.3 11.3	14.3 11.1	14.3 22.2	7.1 25.0	100.0
35-40	63.6 8.8	27.3 16.7	9.1 11.1	----	100.0
40-45	66.7 10.0	25.0 16.7	----	8.3 15.0	100.0
45-50	57.1 5.0	28.6 11.1	----	14.3 25.0	100.0
50+	70.0 8.8	20.0 11.1	10.0 11.1	----	100.0
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	

^aThe upper number in each cell represents the percent occurrence of each artifact category by age. The lower number in the cell is the percentage contribution of each age to a particular artifact category.

utilitarian and ceremonial/ornamental grave furniture is distributed throughout the entire age range. A chi-square test of this table indicates that this distribution is not significantly different than what would be expected due to chance.

The distribution of these same artifact categories by sex is presented in Table 3-2. The numbers in each cell appear as they did in Table 3-1. It is apparent that proportionately more females were afforded grave goods than males. Nearly 45% of the females had associated grave furniture compared to only 25% of the males. Only 16% of the subadults had grave goods. Females possessed 50% of the utilitarian items and 54.5% of the ceremonial/ornamental goods.

Table 3-2. Distribution of utilitarian and ceremonial/ornamental grave goods by sex: Eva I and II component.^a

Sex	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
Male	75.6 37.3	17.1 38.9	4.9 18.2	2.4 25.0	100.0
Female	55.3 25.3	23.7 50.0	15.8 54.5	5.3 50.0	100.0
Subadult	83.8 <u>37.3</u>	5.4 <u>11.1</u>	8.1 <u>27.3</u>	2.7 <u>25.0</u>	100.0
Total	100.0	100.0	100.0	100.0	

^aThe upper number in each cell represents the percent occurrence in each artifact category by sex. The lower number in the cell is the percentage contribution of each sex to a particular artifact category.

Of the utilitarian items, males were afforded 38.9% and subadults 11.1%. Of the ceremonial/ornamental type grave goods, males and subadults were each afforded 25%. The results of the chi-square test indicate that the distribution of these artifact categories by sex is significant at the .016 level of probability. This suggests that females are afforded proportionately more grave goods at the time of death, especially goods of a ceremonial/ornamental nature than either males or subadults.

Collapsing the 37 types of grave foods into the four categories outlined in the previous section (p. 45) showed that exotic items were not included as grave offerings. Thus, only three categories were represented: hunting, fishing and plant food acquisition tools; domestic items; and ornamental and entertainment items. The distribution of these three artifact classes by sex is presented in Table 3-3.

Table 3-3. Distribution of hunting, domestic, and ornamental grave goods by sex for the Eva I and II component.

Sex	Hunting	Domestic	Ornamental
Male	8 42.1%	3 27.3%	2 14.3%
Female	8 42.1%	6 54.5%	8 57.1%
Subadult	3 15.8%	2 18.2%	4 28.6%

From the table it can be seen that males and females are afforded equal proportions of hunting and food acquisition tools while females had twice as many domestic items and four times as many ornamental/entertainment type grave goods as males. Subadults received proportionately fewer hunting, fishing, and food acquisition tools as well as domestic items compared to adults but more ornamental grave goods than did adult males.

The analysis of mortuary practices by means of contingency tables supports the hypothesis that the social system is essentially an egalitarian one. There is very little elaboration in treatment of the dead. Status or class positions could not be isolated on the basis of treatment of the body or preparation of the disposal facility. Those distinctions that could be made are explainable in terms of age and/or sex. All were fully articulated primary inhumations. All adults were placed in a flexed or tightly flexed position generally on the right or left side. Orientation with respect to the eight cardinal directions and location of the body within the cemetery was apparently random. Less than half of the interments were afforded grave goods. These occurred randomly with respect to age. Females were afforded the same proportion of hunting and fishing equipment as males but more domestic and ornamental type goods. This may suggest that there is not a clear division of labor as distinguished by artifact types. Although there is some crossover in artifact types between males and females, most of the variation is explainable in terms of age and sex.

A factor analysis was performed in an effort to determine whether there was any underlying patterned variation that could not be discerned

from the evaluation of frequency of occurrence of mortuary parameters. Since some variables demonstrated virtually no variation such as articulation, individuality, or form of disposal, only certain variables were selected for the factor analysis. These included age, sex, position, deposition, orientation, location within the cemetery area, and the occurrence of grave goods. The correlation coefficients for the eight variables are presented in Table 3-4.

In principle factoring with iterations, the main diagonals in the correlation matrix are replaced by the estimates of communality. These values represent the amount of variance that a given variable shares with the rest of the variables in the matrix. The estimates of communality are presented in Table 3-5. From these values it can be seen that age, sex and to a lesser degree position, share more variance than any other of the variables.

From the correlation matrix with communalities substituted in the diagonals, eight initial factors have been extracted. Each of these factors is independent of every other factor and is arranged in order of importance. The importance of a given factor is determined by the amount of total variance in the data that it accounts for. This variance is represented by an eigenvalue. The first unrotated factor accounts for 24.3% of the variance of all the variables. The second accounts for 18.6% and the third accounts for 14.6% of the variance. The first three unrotated factors combined account for 57.5% of the total variance.

Only those factors with eigenvalues of one or greater were subject to varimax orthogonal rotation. This method of rotation

Table 3-4. Correlation matrix for factor analysis of the Eva I and II component.

Variable	AGE	SEX	POSITION	DEPOSITION	ORIENTATION	X COORD	Y COORD	GRAVE GOODS
AGE	1.00000	-0.63535	0.38513	0.00447	0.10081	-0.01864	0.04333	0.12799
SEX	-0.63535	1.00000	-0.32794	-0.01752	-0.06447	0.06015	-0.06286	-0.00834
POSITION	0.38513	-0.32794	1.00000	-0.20730	-0.14165	0.00757	-0.06430	0.12160
DEPOSITION	0.00447	-0.01752	-0.20730	1.00000	0.21810	-0.13664	0.16235	0.12379
ORIENTATION	0.10081	-0.06447	-0.14165	0.21810	1.00000	-0.18127	-0.05337	-0.13954
X COORDINATE	-0.01864	0.06015	0.00757	-0.13664	-0.18127	1.00000	-0.11581	0.01594
Y COORDINATE	0.04333	-0.06286	-0.06430	0.16235	-0.05337	-0.11581	1.00000	0.03422
GRAVE GOODS	0.12799	-0.00834	0.12160	0.12379	-0.13954	0.01594	0.03422	1.00000

Table 3-5. Communality estimates, eigenvalues, and percent variation for the factor analysis of the Eva I and II component.

Variable	Estimate of Communality	Eigenvalue No.	Eigenvalue	Percent of Variation
AGE	0.46182	1	1.94548	24.3
SEX	0.42379	2	1.48816	18.6
POSITION	0.23693	3	1.16708	14.6
DEPOSITION	0.14379	4	0.96735	12.1
ORIENTATION	0.14271	5	0.88801	11.1
X COORDINATE	0.05958	6	0.62308	7.8
Y COORDINATE	0.05674	7	0.58083	7.3
GRAVE GOODS	0.08413	8	0.34199	4.3

maximizes the variation of each factor loading while keeping the factors uncorrelated. The rotated factor matrix is presented in Table 3-6. The values in this matrix represent the correlation coefficients between each variable and each factor. The values in a given row represent the regression coefficients, in this case also the correlation coefficients of the factors that describe a given variable.

Examination of Table 3-6 indicates that most of the variance for age is accounted for in the first factor. The same is true for sex and position. Deposition loads most heavily on factor three and orientation loads on factor two. Location within the cemetery and grave goods have relatively low factor scores in all three factors. These three variables contribute very little variance to the factor analysis. In factor two, orientation has the largest score while all other variables have relatively low scores. This suggests that the

Table 3-6. Varimax rotated factor matrix for the Eva I and II component.

Variable	FACTOR 1	FACTOR 2	FACTOR 3
AGE	0.85846	0.10716	0.10773
SEX	-0.71017	-0.11965	-0.06910
POSITION	0.50268	-0.23429	-0.08517
DEPOSITION	-0.11397	0.36885	0.63922
ORIENTATION	0.01813	0.69268	-0.07252
X COORDINATE	-0.02235	-0.23627	-0.10856
Y COORDINATE	0.01380	0.02449	0.26189
GRAVE GOODS	0.10523	-0.19257	0.28452

relationship of this variable with all others is so weak that it loads very heavily on itself. This same phenomena appears in factor three. Deposition has so little relationship with the other variables that it loads heavily on itself. Because only one variable has high loadings in both factor two and three, very little information is contained in either of these two factors. Thus most of the variation within the variables is accounted for in the first factor. The relatively high scores on age, sex, and position indicate that these are the most important determinates of this factor. Recall that the previous discussion of each variable and its covariation with every other indicated that position was random with respect to sex. Position is somewhat correlated with age in that only infants were placed in the extended or semi-flexed position and adults were always in a flexed or tightly flexed position. Results of the factor analysis support the hypothesis that an egalitarian system is in operation. Most of the variance can be accounted for by age and sex.

The Eva III component: Late Archaic. Nearly all of the Eva III component interments were fully articulated primary inhumations. Like the Eva I and II component, there was only one occurrence of a double burial: a 40-45-year-old female with an infant. Positioning of the body was slightly less variable than for the Eva I and II sample. Eighty-four percent of the interments of the Eva III component were placed in the tightly flexed position compared to 72% for the earlier series. As in the Middle Archaic Eva sample, the extended position was reserved for infants with one exception: a 25-30-year-old male. The flexed or tightly flexed position was the preferred body treatment for

both samples; 95% of the earlier sample and 93% of the Late Archaic Eva III sample. Treatment of the body in terms of individuality, articulation, form of disposal and body positioning appear not to change through time.

Deposition and orientation of the body showed no demonstrable variation with respect to age, sex, location within the cemetery area, disease states as evidenced in bone pathology, or grave goods. As for the earlier series, there was a tendency for placement on the right or left side. This combined sample comprised 79% of the Eva III component compared to 74% for the earlier series. Orientation as to the eight cardinal directions showed no marked co-variation with any other variable. The direction in which the body was facing was apparently random. As before, attempts were made to reduce the eight cardinal directions to the four major directions: North, South, East, and West. The four intermediate directions--Northeast, Northwest, Southeast, and Southwest--were arbitrarily rotated first counter-clockwise and then clockwise to the next major direction. Both rotations showed approximately equal distributions with respect to age, sex, or any other variable.

Differential treatment of individuals with diseases or maladies as evidenced in bone pathology could not be isolated. These individuals were afforded the same treatment as those with no evident bone pathology. There were no distinctions with respect to age, sex, location of the interment within the cemetery area, deposition, orientation of grave goods. Treatment of diseased individuals at death demonstrated no change through time.

There is a continuation of the practice of burying dogs in

association with human interments. In the Eva III component, however, there was only one dog burial associated with a 20-25-year-old male. Again, infrequent occurrence of this practice dictates a lack of speculation concerning the importance of this practice in relation to the entire mortuary ritual.

There is one demonstrable change in treatment of the body from Middle to Late Archaic. No cremated human remains were recovered from the earlier component. Three were recovered from the Eva III cemetery. All were within the plow zone and were quite scattered due to farming activity. The lack of burned soil or wood charcoal concentrations around any of these remains would suggest that conflagration occurred elsewhere. Evidence suggests that the bones had been collected and deposited within the cemetery area. General bone development, thickness, and robusticity would suggest that these were all adults. It is impossible to speculate as to the sex of these individuals. The amount of warping, cracking, splitting, and bone density would suggest that all were burned in the flesh (Baby 1954; Binford 1963; Gejvall 1963). The temperature of the fire was hot enough to sufficiently calcine as well as smoke the bones. Because of small sample size and the small number of recovered fragments from each individual, speculation as to the importance of this mortuary treatment with respect to the entire range of mortuary activity for the Eva III component would be of dubious value. It is not insignificant, however, that the practice of cremation was incorporated into the mortuary ritual during the Late Archaic culture period.

Thirty-seven percent of the interments in the Late Archaic Eva

component were afforded grave goods. This compares to 29% of the Middle Archaic sample. Of all the individuals with grave goods, 72.4% possessed grave furniture of a utilitarian nature and 27.6% had items of a ceremonial/ornamental nature. This compares respectively to 60% and 40% in the Eva I and II component. Table 3-7 represents the percent occurrence of utilitarian and ceremonial/ornamental artifacts by age. As before, the top number in each cell refers to the percent of artifacts in each category for that particular age group. The lower number in the cell refers to the percentage a particular age group contributes to each artifact category. Examination of Table 3-7 immediately points to the lack of grave goods afforded to individuals less than 20 years of age. In addition, ceremonial/ornamental items occurred only in the presence of utilitarian artifacts. This differs from the situation for the Middle Archaic sample where artifacts are distributed randomly with respect to age. Results of the chi-square test of the distribution of the Eva III burial goods indicate a significant difference at the .05 level of probability.

The distribution of these same artifact categories by sex appears in Table 3-8. The numbers in each cell are presented as they were before. The lack of grave goods afforded to subadults is again, readily apparent. Comparison of the Middle and Late Archaic series indicates that proportionately more males had grave goods in the Eva III component (67%) than the Eva I and II males (25%). The proportion of females afforded grave goods in each series was similar: 45% for Eva I and II and 41% for the Eva III sample. In the Late Archaic Eva component, 33.3% of the utilitarian items were associated with females

Table 3-7. Distribution of utilitarian and ceremonial/ornamental grave goods by age: the Eva III component.^a

Age	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
0-5	100.0 36.4	---- ----	--- ---	---- ----	100.0
5-10	100.0 4.5	---- ----	--- ---	---- ----	100.0
10-15	----	----	---	----	
15-20	100.0 4.5	---- ----	--- ---	---- ----	100.0
20-25	---- ----	---- ----	--- ---	100.0 28.6	100.0
25-30	50.0 4.5	50.0 9.1	--- ---	---- ----	100.0
30-35	---- ----	100.0 9.1	--- ---	---- ----	100.0
35-40	37.5 13.6	25.0 18.2	--- ---	37.5 42.9	100.0
40-45	40.0 9.1	60.0 27.3	--- ---	---- ----	100.0
45-50	50.0 4.5	30.0 9.1	--- ---	20.0 ----	100.0
50+	50.0 27.7	30.0 45.5	--- ---	20.0 28.6	100.0
Total	100.0	100.0	---	100.0	

^aThe upper number in each cell represents the percent occurrence of each artifact category by age. The lower number in the cell is the percentage a particular age group contributes to each artifact category.

Table 3-8. Distribution of utilitarian and ceremonial/ornamental grave goods by sex: the Eva III component.^a

Sex	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
Male	33.3 24.0	44.4 66.7	0 0	22.2 57.1	100.0
Female	58.8 40.0	23.5 33.3	0 0	17.6 42.9	100.0
Subadult	100.0 36.0	0 0	0 0	0 0	
Total	100.0	100.0	100.0	100.0	

^aThe upper number in each cell represents the percent occurrence in each category for each sex. The lower number in the cell is the percentage contribution of each sex to a particular artifact category.

and 66.7% with males. This compares to 56.3 and 43.8, respectively, for the Eva I and II sample. Results of the chi-square test of the distribution of these artifact categories by sex for the Eva III component is significant at the .02 level of probability. This is undoubtedly the result of the lack of grave goods afforded to subadults.

Reduction of all the types of grave goods into the four categories and their distribution by sex is presented in Table 3-9. While exotic trade items were not in the inventory of burial furniture for the Eva I and II sample, there was one occurrence of an exotic item with an adult male in the Eva III series. A sample size of one is hardly large enough to speculate about the significance of exotic items as grave goods in the Late Archaic Eva sample. By contrast to the earlier

Table 3-9. Distribution of hunting, domestic, exotic and ornamental grave goods by sex for the Eva III component.

Sex	Hunting	Domestic	Exotic	Ornamental
Male	8 66.7%	8 72.7%	1 100.0%	1 50.0%
Female	4 33.3%	3 27.3%	0	1 50.0%
Subadult	0	0	0	0
Total	100.0	100.0	100.0	100.0

series, males in the later sample at Eva had proportionately more domestic type grave goods; 72.7% compared to 27.3% in the Eva I and II sample. Females in the Middle Archaic sample received 67% of the domestic items compared to 27.3% in the Late Archaic sample. Hunting, fishing, and food procurement tools were equally divided between males and females in the Eva I and II sample. This same comparison of the Eva III sample males and females shows males with 67% of this item and females receiving only 33%. Ornamental/entertainment items were not well represented in the Eva III sample; there were only two occurrences. These were equally divided between males and females. In the earlier sample, females were afforded four times as many ornamental/entertainment type artifacts as compared to males. There are two apparent differences in the occurrence of grave goods with respect to treatment. There has been a slight increase in the proportion of interments afforded grave goods, and exotic goods have been included in the

artifact inventory although the occurrence is negligible. Only adults were afforded grave goods and these were predominately of a utilitarian nature. Both males and females were afforded hunting and domestic type artifacts yet males received proportionately more of each category. Although there is some crossover of artifacts indicative of male-female division of labor, most of the variation in grave goods and all other aspects of the mortuary ritual is explainable in terms of age or sex.

The factor analysis of the Late Archaic Eva sample included the same variables as for the earlier sample. These were age, sex, position, deposition, orientation, location within the cemetery area, and the occurrence of grave goods. The correlation coefficients are presented in Table 3-10. The estimates of communality of the variables are presented in Table 3-11. All variables have rather low estimates of communality suggesting that they all share small amounts of common variance.

The correlation matrix yielded eight initial factors, four of which had eigenvalues of one or greater. Combined, these four factors account for 74.4% of the total variance. The communalities, eigenvalues, and percent variance are presented in Table 3-11. Four factors were subject to varimax orthogonal rotation. The rotated factor matrix is presented in Table 3-12. Examination of the factor scores indicates that age loads heavily only in factor one and sex loads most heavily on factor two. Position has high scores on both factors one and four. Deposition has a moderate loading on factor two and orientation on factor three. Most of the variance of the X coordinate is accounted for in factor two while the variance of the Y coordinate is accounted for in

Table 3-10. Correlation coefficients for the factor analysis of the Eva III component.

Variable	AGE	SEX	POSITION	DEPOSITION	ORIENTATION	X COORD	Y COORD	GRAVE GOODS
AGE	1.00000	-0.09043	0.45896	-0.00108	0.05471	-0.09538	0.19310	0.17011
SEX	-0.09043	1.00000	-0.14121	-0.24784	-0.23189	-0.48130	0.02780	-0.22973
POSITION	0.45896	-0.14121	1.00000	-0.21479	0.06311	0.00007	-0.28027	0.12428
DEPOSITION	-0.00108	-0.24784	-0.21479	1.00000	0.07420	0.28488	0.03094	0.01108
ORIENTATION	0.05471	-0.23189	0.06311	0.07420	1.00000	0.28484	-0.00662	0.41895
X COORDINATE	-0.09538	-0.48130	0.00007	0.28484	0.28484	1.00000	-0.04711	0.15151
Y COORDINATE	0.19310	0.02780	-0.28027	0.03094	-0.00662	-0.04711	1.00000	0.20762
GRAVE GOODS	0.17011	-0.22973	0.12428	0.01108	0.41895	0.15151	0.20762	1.00000

Table 3-11. Communality estimates, eigenvalues, and percent of variation for the factor analysis of the Eva III component.

Variable	Estimate of Communality	Eigenvalue No.	Eigenvalue	Percent of Variation
AGE	0.35291	1	2.03894	25.5
SEX	0.29760	2	1.58955	19.9
POSITION	0.42118	3	1.29543	16.2
DEPOSITION	0.17677	4	1.02538	12.8
ORIENTATION	0.23424	5	0.71597	8.9
X COORDINATE	0.31305	6	0.55112	6.9
Y COORDINATE	0.26251	7	0.46834	5.9
GRAVE GOODS	0.26269	8	0.31524	3.9

Table 3-12. Varimax rotated factor matrix for the Eva III component.

Variable	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
AGE	0.76147	-0.00064	0.05541	0.20611
SEX	-0.13557	-0.60927	-0.23710	0.09038
POSITION	0.75193	-0.09774	0.15882	-0.62057
DEPOSITION	-0.06724	0.45493	-0.04050	0.14860
ORIENTATION	0.00443	0.21753	0.51292	-0.03324
X COORDINATE	-0.08396	0.69351	0.22140	-0.13147
Y COORDINATE	0.08667	-0.02428	0.10483	0.57998
GRAVE GOODS	0.13535	0.04096	0.79289	0.17434

factor four. The occurrence of grave goods loads most heavily on factor three. Age and position contribute the most information to factor one. Sex and the X coordinate account for most of the variation in factor two; orientation and grave goods to factor three; and position and the Y coordinate contribute the most to factor four. This situation is contrary to that of the Eva I and II sample where most of the variation was contained in factor one. From the discussion of the covariation of the Eva III mortuary parameters, recall that subadults were not afforded grave furniture. Most of the adults were placed in the tightly flexed position on their right or left side. No significant pattern of distribution could be discerned with location of the body within the cemetery area or orientation with respect to any other variable. It is possible that the contingency tables and the factor analysis are measuring different relationships and the factor analysis was successful at delineating important features of the disposal domain. It is perhaps more likely that the factor solution is a result of the

biased age structure of the Eva III series. The age structure of this sample will be discussed in detail in Chapter IV. It is sufficient to note here that the Eva III series is representative of a decidedly old age population where more than half of the sample is greater than 40 years of age at death. The extreme biases in the age structure are undoubtedly manifested in the expression of all other variables. This suggestion may be supported by the small range of variation in the values of the estimates of communality. Although the results of the factor analysis of the Eva III sample does not strongly support the hypothesis of an egalitarian type of social system neither does it strongly refute the hypothesis.

The Cherry site: Late Archaic. Nearly all of the interments at the Cherry site were fully articulated primary inhumations. There were two double burials and two multiple burials. One of the multiple burials was comprised of two adult males and an adult female. One of the adult males undoubtedly died from inflicted projectile point wounds as two points were still embedded in the arches of the seventh and tenth thoracic vertebrae. The female had projectile point fragments embedded in the top of the vault. There was no evidence in either case of bone repair around the wound. The other multiple burial contained the remains of two adult females and four subadults. Two double burials occurred--one of an adult male and female and the other consisted of two adult females. The remaining 76% of the sample were single interments. Like the Eva III component, the predominate body position was flexed and tightly flexed together comprising 95% of the sample. By

contrast, there was only one occurrence of an extended burial: a 25-30-year-old male. No infants were placed in this position. Comparison of the two Late Archaic samples indicates that treatment of the body in terms of articulation, form of disposal, and body position does not differ. It is not possible at this time to speculate as to the relative importance of the more frequent occurrence of double and multiple burials at the Cherry site.

Orientation of the body and deposition showed no marked covariation with age, sex, location within the cemetery or, disease states as evidenced in bone pathology, or grave goods. As was the case for the Eva III sample, there was a tendency to place the body on either the right or left side. These two positions comprised 70% of the Cherry sample compared to 79% of the Eva III sample. Orientation as to the eight cardinal directions was apparently random with respect to all other variables. Reduction of the eight directions to North, South, East, and West by counter-clockwise and clockwise rotation of the intermediate directions indicated approximately equal distributions with respect to age, sex, or any other variable.

There was no discernible difference in treatment of individuals with physical maladies or disease states as evidenced in bone pathology. These individuals were afforded the same treatment as those with no evident bone pathology. Similar to the situation in the Late Archaic Eva component, there was no distinction as to age, sex, location within the cemetery area, deposition, orientation, or the presence of grave furniture.

The practice of burying dogs with human interments continues at

the Cherry site. There were four occurrences of dogs buried in direct association with humans. One was placed with an adult male, two adult females were buried with dogs, and one indeterminate sex adult was afforded this same treatment. The importance of this practice in relation to the entire mortuary ritual is unknown.

The practice of cremation in the Late Archaic culture period is evidenced at the Cherry site. Similar to the Late Archaic Eva component, the remains of one cremated adult of indeterminate sex were recovered at the Cherry site. This individual was poorly represented and consisted of only a handful of fragments. There was a lack of evidence for in situ burning. It appears that this individual was burned elsewhere and later redeposited within the cemetery area. Evidence suggests that this individual was burned in the flesh. Burning occurred at a sufficiently high temperature to calcine and smoke the bone. Again, because of small sample size and scanty representation of this individual, it is impossible to speculate as to the importance of this aspect of mortuary behavior with respect to the entire range of mortuary activity in the Late Archaic culture period.

Forty percent of the individuals at the Cherry site were afforded grave goods at the time of death. This compares to 37% in the Eva III sample. Of all the individuals with grave goods, 48.1% had artifacts of a utilitarian nature and 51.9% had items of the ceremonial/ornamental type. This compares to 72.4% and 27.6%, respectively, for the Late Archaic Eva sample. Table 3-13 represents the percent occurrence of utilitarian and ceremonial/ornamental artifacts by age. As before, the top number in each cell represents the percent occurrence

Table 3-13. Distribution of utilitarian and ceremonial/ornamental grave goods by age: the Cherry site.^a

Age	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
0-5	44.4 13.8	11.1 14.3	22.2 25.0	22.2 33.3	100.0
5-10	100.0 6.9	----	----	----	100.0
10-15	20.0 3.4	20.0 14.3	40.0 25.0	20.0 16.7	100.0
15-20	60.0 10.3	----	20.0 12.5	20.0 16.7	100.0
20-25	100.0 6.9	----	----	----	100.0
25-30	57.1 13.8	42.9 42.9	----	----	100.0
30-35	100.0 17.2	----	----	----	100.0
35-40	20.0 3.4	40.0 28.6	40.0 25.0	----	100.0
40-45	----	----	50.0 12.5	50.0 16.7	100.0
45-50	75.0 10.3	----	----	25.0 16.7	100.0
50+	100.0 13.8	----	----	----	100.0
Total	100.0	100.0	100.0	100.0	

^aThe upper number in each cell represents the percent occurrence in each artifact category by age. The lower number in the cell is the percentage contribution of each age to a particular artifact category.

in each artifact category for a particular age group. The lower number in the cell is the percentage that each age group contributes to a particular artifact category. Examination of the table suggests a random distribution of artifact classes by age. The chi-square test indicates that this distribution is not significantly different than what would be expected due to chance. As discussed previously, no grave goods were afforded to individuals less than 20 years of age in the Late Archaic Eva sample. Further, ceremonial/ornamental items did not occur unless in the presence of utilitarian items. This is not the case for the Cherry cemetery sample.

The breakdown of these same artifact categories by sex appears in Table 3-14. Only 33.3% of the males at the Cherry site received grave

Table 3-14. Distribution of utilitarian and ceremonial/ornamental grave goods by sex: the Cherry site.^a

Sex	No Grave Goods	Utilitarian	Ceremonial/ Ornamental	Both	Total
Male	66.7 47.1	20.8 62.5	8.3 25.0	4.2 16.7	100.0
Female	73.3 32.4	6.7 12.5	13.3 25.0	6.7 16.7	100.0
Subadult	41.2 20.6	11.8 25.0	23.5 50.0	23.5 66.7	100.0
Total	100.0	100.0	100.0	100.0	

^aThe upper number in each cell represents the percent occurrence in each artifact category by sex. The lower number in the cell is the percentage contribution of each sex to a particular artifact category.

grave goods as compared to 67% of the Eva III sample. As was the case for the males, proportionately fewer females at the Cherry site were afforded grave goods (26.7%) than the females of the Late Archaic Eva sample (41%). At the Cherry site, males were afforded 62.5% of the utilitarian items and females only 12.5%. In the Eva III sample, 66.7% of the utilitarian items were associated with males and only 33.3% with the females. It would appear that males at both the Cherry site and the Eva III sample males received approximately equal proportions of the utilitarian items yet the females at Cherry had far fewer of these same items as compared to the Eva III females. At the Cherry site, males and females received equal proportions of the ceremonial/ornamental items. The Eva III males were afforded 57.1% of this category and females received 42.9%. While the Late Archaic Eva subadults were not afforded grave goods at the time of death, 58.8% of the Cherry site subadults did receive grave offerings. In addition, 50% of the occurrence of ceremonial/ornamental items were associated with subadults. Results of the Chi-square test of the distribution of the occurrence of these artifact categories by sex is not significantly different than what would be expected due to chance.

The distribution of the four artifact categories by sex is presented in Table 3-15. While the occurrence of exotic items as grave furnishings is slightly more prevalent in the Cherry sample as compared to the Eva III sample, no females at either site were afforded exotic items. Exotic items occurred 75% of the time with subadults. Ornamental items occurred 66.7% of the time with subadults as compared to 16.7% for both adult males and females. Domestic items occurred with equal

Table 3-15. Distribution of hunting, domestic, exotic, and ornamental grave goods by sex: the Cherry site.

Sex	Hunting	Domestic	Exotic	Ornamental
Male	3 37.5%	5 45.5%	1 25.0%	2 16.7%
Female	2 25.0%	1 9.1%	0	2 16.7%
Subadult	3 37.5%	5 45.5%	3 75.0%	8 66.7%
Total	100.0	100.0	100.0	100.0

frequency for adult males and subadults but only 9% of the occurrence of this item appeared with adult females. Comparison of only the adult sample at Cherry with the adult sample of the Eva III component indicates that the Cherry males were afforded domestic items in 80% of the cases as compared to 73% in the Eva III sample. Domestic items were associated with females in the Eva III component in 27% of the cases compared to 20% at the Cherry site. Hunting items occurred with nearly equal frequency for the Cherry site males, females, and subadults. Comparison of the adult males and females at the Cherry site with the adults of the Eva III component indicates that hunting items occurred with males 60% of the time and 30% of the time with females at Cherry as opposed to 67% and 33%, respectively, for the Eva III sample.

Comparison of the frequency of occurrence of exotic and ornamental/entertainment items as grave goods of the Cherry site sample and the Eva III sample would suggest that a change has occurred. At the Eva

site, there are only three occurrences of these types of grave goods. At the Cherry site, this occurs 16 times. It would appear that although approximately equal proportions of individuals at Eva and Cherry are afforded grave goods, the grave furniture is more lavish at the Cherry site. As discussed in Chapter II, it is possible that the Cherry site was occupied more intensively for longer periods of time. The only evidence to support this hypothesis is that of probable structures, storage pits, and the spatial separation of the habitation and cemetery areas. Decreased mobility, perhaps remaining at the Cherry site for longer periods of time could allow the accumulation of non-utilitarian artifacts. These would then have a greater chance of appearing in the artifact inventory of grave goods. Since detailed studies of the cultural chronology have not been conducted for Archaic sites in the Western Valley, it is entirely possible that the Cherry site represents a later occupation than the Eva III component. The beginning of trade cycles during the Late Archaic as hypothesized by Winters (1968) may be appearing at Cherry as evidenced by the elaboration of burial treatment in terms of exotic and ornamental/entertainment grave goods.

A factor analysis was performed on the selected parameters of mortuary activity for the Cherry cemetery sample. The correlation coefficients for age, sex, position, deposition, orientation, location within the cemetery area, and the presence of grave goods are presented in Table 3-16. As before, principle factoring with iterations substitutes communality estimates in the diagonals of the correlation matrix. The final communality estimates for the eight variables are presented in Table 3-17. Examination of these values indicates that age,

Table 3-16. Correlation coefficients for the factor analysis of the Cherry site.

Variable	AGE	SEX	POSITION	DEPOSITION	ORIENTATION	X COORD	Y COORD	GRAVE GOODS
AGE	1.00000	-0.49291	0.05623	0.21540	-0.15812	-0.05476	-0.24577	-0.25726
SEX	-0.49291	1.00000	0.18117	-0.26050	0.05832	0.01541	0.00282	0.23127
POSITION	0.05623	0.18117	1.00000	-0.29879	0.47741	0.13877	-0.04880	0.12933
DEPOSITION	0.21540	-0.26050	-0.29879	1.00000	-0.16216	-0.17278	0.00441	-0.09330
ORIENTATION	-0.15812	0.05832	0.47741	-0.16216	1.00000	-0.14859	0.01516	-0.05232
X COORDINATE	-0.05476	0.01541	0.13877	-0.17278	-0.14859	1.00000	-0.12330	0.03116
Y COORDINATE	-0.24577	0.00282	-0.04880	0.00441	0.01516	-0.12330	1.00000	0.21199
GRAVE GOODS	-0.25726	0.23127	0.12933	-0.09330	-0.05232	0.03116	0.21199	1.00000

Table 3-17. Community estimates, eigenvalues, and percent of variation for the factor analysis of the Cherry site.

Variable	Estimate of Communality	Eigenvalue No.	Eigenvalue	Percent of Variation
AGE	0.42230	1	2.03505	24.4
SEX	0.34455	2	1.47943	18.5
POSITION	0.41642	3	1.21913	15.2
DEPOSITION	0.17073	4	0.94947	11.9
ORIENTATION	0.36531	5	0.81110	10.1
X COORDINATE	0.14083	6	0.69332	8.7
Y COORDINATE	0.13044	7	0.54104	6.8
GRAVE GOODS	0.15476	8	0.27141	3.4

sex, position, and orientation share most of the common variance with the other variables. The other four variables have rather low estimates of communality.

Eight initial factors were extracted from the correlation matrix. These are presented in their order of importance with their corresponding eigenvalues in Table 3-17. Three factors, accounting for 59.2% of the variation, had eigenvalues of one or greater, and were subject to varimax rotation. The rotated factor matrix is presented in Table 3-18. Age, sex, the Y coordinate, and grave goods load most heavily in factor one. Position and orientation load most heavily in factor two; deposition and the X coordinate have the largest scores in factor three. In the first factor, age and sex account for most of the variation. Position and orientation explain most of the variance in factor two. Position, deposition, and orientation all have moderate loadings in the third factor. These moderate loadings may suggest that the third factor has little explanative value. Results of this factor

Table 3-18. Varimax rotated factor matrix for the Cherry site.

Variable	FACTOR 1	FACTOR 2	FACTOR 3
AGE	-0.90699	-0.04722	0.09126
SEX	0.53998	0.11954	0.22218
POSITION	-0.00951	0.67808	0.42588
DEPOSITION	-0.25515	-0.25750	-0.34784
ORIENTATION	0.06634	0.86683	-0.27262
X COORDINATE	0.02877	-0.04260	0.39150
Y COORDINATE	0.25130	-0.02583	-0.17402
GRAVE GOODS	0.33752	0.00508	0.12973

analysis suggest that age, sex, position and orientation contribute the most to the variation in the mortuary complex. Position is highly correlated with age; all adults, with one exception, are buried in a flexed or tightly flexed position. There appeared to be no significant co-variation of this variable with sex or orientation. Orientation appeared to be random with respect to age and sex yet the factor analysis indicates that this is a significant parameter in mortuary behavior. Results of the factor analysis do tend to support the hypothesis, however, that an egalitarian type of social system is in operation.

Summary

Evaluation of the mortuary practices at the Eva and Cherry sites supports the hypothesis that these hunting and gathering groups had an essentially egalitarian type of social system. Examination of the parameters selected failed to isolate differential treatment of individuals that could be indicative of status positions. There was little differentiation as to body treatment, preparation of the disposal facility, or disease states with respect to age or sex. With the exception of the Late Archaic Eva subadults, grave goods were distributed randomly with respect to age.

There is a continuation through time of the essential attributes of mortuary behavior. Comparison of the Middle and Late Archaic cemetery samples at Eva indicate that there is very little elaboration in treatment of the dead. Articulated, primary inhumation in a flexed or tightly flexed position was the primary mode of body treatment. Most

interments were buried singly. In both samples, diseased individuals were afforded the same treatment as those with no evident bone pathology or physical malady. Orientation and location of the body within the cemetery area appeared to be random for both the Middle and Late Archaic Eva samples. There is one demonstrable change through time in terms of body treatment. The practice of cremation was incorporated into the mortuary ritual during the Late Archaic culture period. Because of small sample size and poor representation of these cremated individuals, it is difficult to determine the significance of this form of body treatment in relation to the entire mortuary complex of the Late Archaic in the western Tennessee Valley.

A slightly greater proportion of the Eva III interments were afforded grave goods compared to the Middle Archaic sample. In the Eva I and II component, the distribution of grave goods with respect to age was apparently random. Both adult males and females were afforded hunting and domestic equipment. Females received the greatest proportion of domestic as well as ornamental artifacts. By contrast to the Middle Archaic sample, the Eva III subadults did not receive any grave goods. Males were afforded proportionately more grave goods than females. While both males and females received hunting and domestic equipment, males were afforded greater proportions of these types of goods than females. More ornamental/entertainment type artifacts appeared in the Middle Archaic grave good inventory yet exotic items do not appear until the Late Archaic at Eva. The analysis suggests that there is a continuation through time of the basic features of mortuary practices as evidenced at the Eva site. The evidence supports the

hypothesis that an egalitarian type of social system is in operation.

Treatment of the body in the Eva III component and the Cherry site sample is essentially the same. Most of the interments were primary inhumations. There were more double and multiple burials at the Cherry site compared to the Eva III sample but the significance of this is unknown. The occurrence of a cremation at the Cherry site lends support to the suggestion that this type of body treatment was incorporated into the mortuary ritual during the Late Archaic culture period. One important difference between the Late Archaic Eva sample and the Cherry sample is the spatial discreteness of the cemetery area at the Cherry site. Evidence suggests that the basic living activities were conducted at the west end of the site while burial of the dead was concentrated at the eastern end of the area. At the Eva site, the cemetery area was apparently not distinct from the habitation area.

Approximately equal proportions of the interments at the Cherry site and Late Archaic Eva sample were afforded grave goods. The grave furniture at Cherry, however, was more lavish. The majority of the grave goods at the Eva site was of a utilitarian nature and ornamental objects did not occur unless in the presence of utilitarian items. Far more ornamental and exotic grave offerings appeared at the Cherry site, the majority of which were placed with subadults or adult males. It was suggested that the more frequent occurrence of ornamental and exotic items at the Cherry site may be the result of a more intensive occupation for longer periods of time at that site. Alternatively, this may indicate that the Cherry site represents a slightly later time period than the Late Archaic Eva component. Although the grave

offerings at Cherry were more elaborate, it is not possible to isolate treatment of individuals that might be indicative of status positions. Evaluation of the mortuary parameters at the Cherry site also support the hypothesis that an egalitarian social system is operating.

CHAPTER IV

DEMOGRAPHY

Demography of Small-Scale Societies

Anthropologists are becoming increasingly aware of the importance of demographic variables in the interpretation of the ecology, mode of subsistence and settlement, and social processes of small-scale societies. The relatively simple level of technology and intimate contact with the physical environment form a dynamic relationship with social organization, political, economic, and religious structure of the population. All of these, in turn, have a profound effect on the demographic processes of a small-scale society. Spatial mobility, a characteristic of hunters and gatherers, is a response to a number of factors, both ecological and social. Seasonal variation and availability of food resources necessitates the redistribution of groups within a territory. Other economic, political, or religious activities affect spatial mobility as well as social interaction, selection of mates, and the need to resolve conflict situations between groups.

There is often a great deal of social mobility between groups in addition to varying amounts of total group movement. Fluctuation in group size and structure is an essential demographic process. As economic, environmental, political, and social factors influence movement of an entire group, these same factors will initiate spontaneous movement of individuals or families between groups. Flexibility in social organization of hunters and gatherers is also

vital for the maintenance of the demographic structure of a population. Turnbull (1972) suggests that the age structure of a group is of prime importance in the proper maintenance of social, economic, religious, or political functioning. Additionally, Turnbull (1972) suggests that in small-scale societies, age and residence are of at least equal or greater importance than kinship as the major factors in social organization.

Although ethnographic reports contain some demographic information, cultural anthropologists generally show a lack of interest in demography. Those studies that have been conducted mainly concentrate on such population parameters as size, density, and distribution in relationship to environment and social organization. Detailed studies of the vital statistics such as fertility, mortality, or age and sex parameters are rare. Perhaps one of the greatest problems in the study of the demographic structure of "anthropological" populations is the crucial information pertaining to all births and deaths. Informants are often reluctant to provide the necessary information. Age of an individual is a critical character, but non-literate groups usually have no notion of their exact age. Estimation of age poses very obvious problems. In addition to the problem of age estimation, Howell (1976) points out that these types of demographic data, while highly accurate, are of limited usefulness because of small population size and the time period observed is very short. Further, Howell (1976) indicates that the effect that the presence of the anthropologist has on the vital rates--mortality, migration, or fertility--is impossible to determine.

Paleodemography

The study of the vital statistics of past populations, or paleodemography, makes use of a different data base than studies of extant groups. Analysis of skeletal remains allows for the direct observation of only certain vital rates, specifically mortality. Demographic reconstruction from cemetery samples offers an advantage over observations of living groups in that greater time depth is represented. Further, social organizational parameters are incorporated in the mortuary ritual and potentially can be recovered from cemetery excavation and thus facilitates the examination of such things as social status in direct relationship to mortality.

It was not until the development of standardized techniques for the assessment of age of skeletal remains that mortality or longevity of prehistoric populations could be evaluated with any confidence. As one of the pioneers in the development of aging standards, Todd (1920, 1921) realized the potential for the study of prehistoric demography from skeletal remains. Despite the observations of Todd, few American researchers followed his lead. It was in Europe that the main advances in analytical techniques have been developed. In fact, significantly more paleodemographic research has been carried out in Europe than in North America. This is undoubtedly due, in part, to extensive documentation of Old World skeletal series and greater antiquity of historical records, often available to add support to the skeletal data (Ubelaker 1974).

Paleodemographic reconstructions for North American skeletal series are few. This may be partly a result of inadequate cemetery

samples, but numerous cultural variables, both known and unknown, place serious limits on the use of New World samples (Howells 1960; Ubelaker 1974; Vallois 1960). Although there are many limitations on New World samples, a few demographic reconstructions have been attempted. Deserving of mention is the well known study of the Pecos Pueblo cemetery sample (Hooten 1930). Evidence from the skeletons, historical documents and archeological context were used to reconstruct population size for the various time periods represented in the pueblo. Although Hooton's estimates were reworked by Howells (1960), inability to assign a great many skeletons to the appropriate culture period and potential inaccuracies in the assessment of age make Hooton's conclusions somewhat suspect.

Mortality profiles have usually been employed as the means of characterizing demographic structure of North American skeletal series (e.g., Blakely 1971; Blakely and Walker 1968; Snow 1948; Johnston and Snow 1961). A mortality profile is calculated as the percent of people dying in each age category. Although this method provides a standardized means of comparison between samples, the potential for more detailed information is available through the means of life table construction. In spite of certain limitations to the use of life tables, the researcher is afforded a more clear, concise and accurate picture of the demographic processes of a prehistoric population. Assuming that the age distribution at death is an accurate reflection of the mortality rate of the group, it is possible to determine mortality and survivorship curves. In turn, these can be examined in light of a cultural and/or ecological framework to add insight to the dynamic processes

acting on a particular group. Furthermore, life tables allow for a quick and accurate comparison between two or more populations.

The theoretical foundation for life table construction is stable population theory. The mathematical formulations of stable populations and life table construction were originally developed by Lotka (1907). It has been demonstrated mathematically that a closed population (i.e., no net migration) with fixed birth and death rates will produce a constant age distribution and a constant growth rate either positive or negative (Keyfitz 1968). A stationary population is a special case of stable population. Like stable populations, it assumes a closed population with fixed birth and death rates, constant age distribution, but zero growth; thus birth and death rates are equal and the age-specific mortality rate is constant.

It has been argued that the concept of stationary population with zero growth is invalid, especially in view of the rapidly expanding populations today. It appears that the population explosion was facilitated by the industrial revolution and advances in medical science (DeJong 1972). It is believed that the concept of stationary population can safely be applied to past populations since the rate of growth was so slow that zero growth was approximated (Acsadi and Nemerski 1970; Weiss 1975). Thus, the reconstruction of the demographic profile by means of the life table under the assumptions of stable population theory can be an effective means of modeling mortality of past populations.

The Life Table

There are three types of life tables used in demographic analysis. The one which is selected depends on the data source which is used (Lallo 1973). The first is a Generation Life Table. This type of table is constructed by analyzing a single cohort for the entire life cycle, recording all births to the death of the last individual. To use this method, the researcher must have at his disposal, complete and accurate census records for a single cohort. The Generation Life Table is obviously not suitable for archeological samples.

Current Life Tables are used most often by demographers. This cross-sectional technique utilizes date of birth, date of death, and exact age distribution of a living population at one point in time. Construction of these tables is based on the assumption that the mortality rates will remain constant for that cohort. Since, in most cases, census records are lacking for cemetery samples, Current Life Tables are also not suited for archeological use.

The third type, a Composite Life Table, was developed specifically for demographic reconstructions based on age at death information only. The development of this method is based on stationary population theory, and has been used extensively by animal ecologists (e.g., Quick 1963; Deevey 1947). This method offers an advantage for paleodemographic reconstruction since it is based on age at death, not year of birth or death. Essentially, this technique neutralizes the effect of a cohort and avoids the criticism of being cross-sectional since usually more than one generation is represented in a prehistoric cemetery (Lallo 1973:126). Even though successive generations may be

represented in an archeological sample, it is assumed that the age-specific mortality rate remains unchanged. Composite Life Tables are well suited for archeological cemetery populations for the following reasons:

1. Archeological populations (particularly prehistoric ones) did not experience the rapid nutritional and medical improvements common in present-day human populations; therefore, their environmental relationships, in regard to ageing and mortality, can be considered more constant than today, and of less influence on their mortality rates through time.
2. Composite life tables have been satisfactorily constructed for natural animal populations using the same types of techniques available to the physical anthropologist, . . .
3. Archeological sites provide a unique situation in which controls on such things as dating, sampling, and areal considerations are superior to those available for non-human populations. . . .
4. The archeological site, being a micro-geographic unit, insures homogeneity of stresses on morbidity and mortality, as well as of genetic factors.
5. The fact that individual skeletons cannot be aged to the exact year does not invalidate the life table. Age classes, other than exact years, are frequently used in abridged forms of all types of life tables (Swedlund and Armelagos 1969:1291-1292).

The use of life tables in paleodemographic research has been criticized by many people. An ardent critic is Angel (1969). He believes that life table values, especially life expectancy, are biologically unrealistic, and rests on three false assumptions.

These are:

1. That the cemetery represents a single generation cohort.
2. That death rates are even at all ages after infancy and hence directly reflected in cemetery age frequencies.

3. That the population is virtually stable biologically and socially over the period of cemetery use (Angel 1969:428).

Although Angel's criticisms are valid, these problems are not insurmountable. It has been suggested that Angel's first criticism (that the sample represents a single generational cohort) applies only if one constructs a Generational Life Table (Bennett 1973). As was discussed previously, generational tables are not generally used by demographers. Because of constantly improving conditions in health and living circumstances, with resulting changes in mortality rates, this type of table would become obsolete before its completion. Although Angel's second and third criticisms are justifiable, they can be answered by stable population theory since constant fertility and mortality rates and constant age distribution are assumed (Bennett 1973).

Model life tables have been developed to aid in demographic analysis of under developed nations with incomplete census records (U. N. Population Studies No. 39 1968). Anthropologists faced with the problem of small and/or incomplete samples have attempted to evaluate prehistoric skeletal series on the basis of comparison with these Model Life Tables (e.g., Buikstra 1972; Bennett 1973). In order to use these models, one must assume that the vital rates of the actual population roughly correspond to those of a model life table (Bennett 1973). These life tables are averages of national censuses existing from 1920 to 1956 and undoubtedly reflect the influence of disease control through modern medicine. The use of these models for archeological samples is cautioned against by Acsadi and Nemerski (1970:50) as well as Bennett

(1973). Bennett further suggests that "there is no obvious reason why mortality curves on any of these models would correspond exactly to analogous curves on prehistoric populations" (Bennett 1973:230).

There are other potential biases inherent in archeological samples. As Bennett (1973) pointed out, it must be assumed that the age and sex determinations of the skeletal sample are accurate. This is a problem in all skeletal biology research but fortunately remains an area of active research (e.g., Gilbert and McKern 1973; Gilbert 1973; Kerley 1965, 1969, 1970; Phenice 1969). Faced with the problem of incomplete skeletal samples, Lovejoy (1971) suggests that the series be divided into core and peripheral populations. The core sample would consist of those skeletons which are best preserved and possess the most extensive morphological characters for age and sex. From this sample, the most reliable secondary features of age and sex may be determined. These features may then be applied to the peripheral population and enhance the reliability of the vital statistics.

Mortuary practices and problems of preservation can seriously affect a cemetery sample. Especially susceptible to differential destruction are the bones of infants. Cultural practices may dictate which individuals or segment of the group are afforded cemetery burial. In addition, it is important to know whether the cemetery sample is an accurate reflection of the total paleopopulation (Brothwell 1972). A careful evaluation of mortuary practices can reveal some of the discrepancies that may be the result of cultural biases in treatment of the dead.

Recent Developments in Analytical Techniques in Paleodemography

Analytical techniques for the study of paleodemography are not in keeping with the recent developments and sophistication of methods and techniques by demographers who study living populations that number in the millions (Peterson 1975). Demographers, often ignorant of the problems confronting anthropologists, have criticized the lack of data and the weak results. Recently, anthropologists trained in demography have focused attention on the specific data problems of small extant and archeological populations. Methods and techniques have been advanced through the use of computer simulations and the development of model life tables, specifically for anthropological data.

Based on the assumptions of stationary population theory, Weiss (1973) developed a series of model life tables employing anthropological data. Fertility and mortality data from non-western extant populations and archeological samples are utilized. Since small fragmented samples often produce spurious life table values, a variety of smoothing techniques are presented in order to make the interpretation of vital rates more meaningful. Later, through the use of computer simulation, Weiss (1975) demonstrated that the underlying vital rates can be approximated even if a population has been subject to major demographic disturbances. It is necessary to use correction techniques, however, to derive those rates (Weiss 1975; Weiss and Smouse 1976).

The problems of infant under-enumeration, population growth and sampling error have been examined to aid in the interpretation of vital rates (Moore, Swedlund, and Armelagos 1975). It has been criticized that enumeration errors, especially of infants, will distort the values

of a life table (e.g., Angel 1969). A series of model life tables were constructed by Moore, Swedlund, and Armelagos (1975) systematically varying the number of infants in the sample. The authors demonstrated that only the survivorship values for the entire age curve and infant mortality rates were affected, not all life table values. Probability of dying and life expectancy values for the entire age curve remained unaffected. Attempts to estimate the rate of population increase have met with limited success (e.g., Bennett 1973). Simulation was used to examine the effects of population growth. It was concluded that:

Population growth does lead to directional shifts in life table values, but limiting estimates of growth rate can be used to establish the range of acceptable life tables (Moore, Swedlund and Armelagos 1975:69).

It was cautioned, however, that any significant differences in life tables with subjectively determined growth rates may not necessarily mean that mortality experiences are different. Finally, the effects of stochastic fluctuations on life table values were examined. The authors suggest that analysis of variance may aid in the delineation of deviations but that standard errors should be calculated as a "reminder that the interpretation of the life table should be used within a probabilistic framework" (Moore, Swedlund and Armelagos 1975: 69).

Results of this study are rather discouraging yet the authors have isolated three of the methodological and theoretical problem areas in paleodemographic research. They conclude that the life table has great value, not as a means of testing hypotheses but rather as a means of generating hypotheses. When incorporated in a cultural and

ecological framework, the life table has great interpretative value.

Demographic Analysis of Archaic Skeletal Series

It would appear that the temporally sequential skeletal series from the Eva site would be well suited for the examination of changes in population structure through time. Variation in life table values between locations could be observed by comparison of the Late Archaic component at Eva with the Cherry site skeletal sample. Before any reliable inferences can be made, however, knowledge of two important archeological parameters is essential. First, the nature of the habitation pattern of the site must be known. Secondly, one needs to know whether the skeletal sample is an accurate reflection of the paleopopulation which occupied the area (Swedlund and Armelagos 1969). It has been proposed:

That the accuracy of results is proportional to: (a) the degree of sedentism of the population, (b) the size of the site, and (c) the number of skeletons excavated. As (a), (b), and (c) increase, the accuracy of analysis will increase (Swedlund and Armelagos 1969:1288).

The meaning of life table values is often ambiguous. As pointed out by Moore, Swedlund, and Armelagos, "stable population theory has provided the interpretive frame of reference for most paleodemographers, yet it is easily recognized that this leads to a system closed to the interests of most anthropologists" (Moore, Swedlund and Armelagos 1975:69). The constraints of this closed system do not allow the incorporation of cultural dynamics or ecological factors. The methods and techniques for dealing with population dynamics in a cultural and ecological framework have yet to be developed. Thus the anthropologist

must at least attempt to delineate those factors--cultural, or ecological--that may produce spurious life table values.

Characterizing skeletal series of the Archaic culture period by means of a life table must be approached with caution. Because of continually shifting settlement and subsistence, the nature of a site and the role it plays in the settlement system must be realized. Economic or social factors may necessitate splitting a group along certain age classes or sex categories. For example, adult males of one or more sub-groups may come together and leave the rest of the living unit for hunting activity. Either one of these demographically biased groups can potentially be recovered in the archeological record. Life tables calculated by the age at death information obtained from the skeletal remains from any one site could produce spurious life table values. Thus, the inclusive nature of the skeletal sample must be demonstrated before reliable inferences can be made about the mortality experience of Archaic hunters and gatherers.

Studies of contemporary hunters and gatherers can potentially provide a sound basis for modeling the population dynamics of such groups. Increased interest in extant hunter-gatherer groups has created a tremendous amount of descriptive and analytical works in recent years (e.g., Damas 1969a, Damas 1969b; Lee and DeVore 1968, 1976; Williams 1974). Despite the abundance of available works, there is little information that is of direct use or applicability for paleodemographic studies or prehistoric studies in general. To compound the problem, contemporary hunting and gathering groups inhabit "marginal" ecological areas. This further limits the extent to which

models can be developed and tested on archeological samples, especially those from biotically richer areas. However, there are some salient features of hunter-gatherer social and spatial organization that will be examined because of their impact on the demography of small-scale societies.

Many of the studies of contemporary hunters and gatherers have been directed toward the delineation of social organization. Since these bands of people tend to be highly mobile, spatial organizational principles had to be incorporated into the models as well as social organizational features. Steward (1955) formalized the concept of the patrilineal band. Although modified slightly by Service (1962, 1971), the patrilineal band is characterized by patrilineality, patrilocality, exogamous lineages, and territoriality (Steward 1955). The organizational features of the patrilineal band remain an important construct in ethnographic research because it is a very neat, compact typology (Lee 1972, 1976). Set rules for residency, marriage and distinct territorial boundaries is a very simple and attractive model. Yet, evidence for the patrilineal band is difficult to demonstrate empirically.

Recent field work has shown that the various band level organization typologies do not hold up. Rather than the ideal patrilineal band as outlined by Steward (1955) and Service (1971), social organization is highly fluid (Lee 1972, 1976; Turnbull 1968; Yellen and Harpending 1972). A band is generally comprised of a few small family groups that function as a social and subsistence unit within a territory (although not generally having exclusive rights to a particular territory)

(Damas 1969a, 1969b). These small groups are highly mobile and move campsites a number of times each year. Group size, internal structure, and membership change throughout the course of a year or even week to week depending on season, social, subsistence, or other environmental factors (Bicchieri 1969; Damas 1969a, 1969b; Helm 1968; Hiatt 1968; Lee 1972, 1976; Woodburn 1968, 1972). This would suggest an apparently chaotic model in which people move whenever and wherever they desire or live with any number of different people. As Lee (1976) appropriately points out:

. . . the problem is that a society based on these rules [exagomy, territoriality, and patrilocality] would find itself in severe adaptive difficulties. The partilocal band makes scant provision for a number of basic features of hunter-gatherer life, such as the necessity to even out demographic variation in sex ratios and family size to resources, and the desirability of resolving conflict by fission (Lee 1976:76).

The chaotic organizational model of contemporary hunters and gatherers that has been presented obviates the need for caution in the interpretation of the vital statistics of the Eva and Cherry skeletal series. It cannot safely be assumed that the cemetery samples at either site are representative of a total population. Biases in the age and/or sex composition of the skeletal series may be the result of spatial mobility of an entire group or particularly of individuals between groups.

A proposed partial settlement-subsistence model for the Late Archaic period in the Western Valley (Bowen 1975) was presented in Chapter II. That model remains to be tested. There is a lack of evidence for particular season of occupation at either the Eva or

Cherry site. It is possible that the Cherry site may represent a longer, more intense occupation than the Eva site. Evidence for storage pits and probable shelters at the Cherry site lends support to this suggestion. The lack of evidence for such features in the components at Eva could indicate that the site was occupied sporadically and/or for shorter periods of time during both the Middle and Late Archaic occupations.

The two sites were situated in different resource areas. The Eva site was located on the broad floodplain of the Tennessee River. The Cherry site was situated near a small, unnamed tributary stream to the Big Sandy River. The proximity of the Eva site to the Tennessee River and the abundance of mussel shells would suggest that subsistence activity at the site focused on the exploitation of riverine resources but undoubtedly plant food collection and hunting activities were conducted. The presence of small quantities of mussel shells in the midden at the Cherry site attest to the fact that this resource was not totally ignored but that it probably was much less important than either plant food collecting or hunting.

It is assumed then, that the economic focus, specifically subsistence, differed at the two sites. If the Cherry site was occupied for longer periods of time, perhaps social functions at the two sites differed. Turnbull (1972) suggests that either of these activities, social or economic, or even religious or political functions, are significant factors, each and of itself, to bring about age class phenomena. It would not be unreasonable to expect that demographically biased age structures may be represented in a cemetery sample as a

reflection of differing activity at a particular site. The hypothesis to be tested is that the demographic reconstructions of the cemetery samples will reflect that portion of a population that habited a particular site.

Life Table Construction

An abridged life table constructed from a cemetery sample is the analytical tool that is used in this study to examine population structure. From age at death it is possible to determine age-specific mortality, longevity, and life expectancy. The formulae for life table construction are presented in Acsadi and Nemerski (1970:60-65) and are summarized below.

The first column of the life table is D_x . This is the number of individuals that died between the ages of x and $x + n$. Because of the inability to determine exact age at death for skeletal material, the interval represented by D_x is five years, thus forming an abridged life table.

The second column of the life table is dx , the age specific mortality rate. This value, derived from D_x , is the frequency, or percentage, of the population dying in each age category such that:

$$\sum_{x=0}^w dx = 100.0 \quad \text{or} \quad dx = \frac{D_x}{\sum_{x=0}^w D_x}$$

where w equals the maximum age attainable, in this case 50+ years and x equals the initial age category or 0-1 years.

Survivorship, l_x , is presented in column 4. This value represents

the percentage of survivors in each age category. The initial value of l_x is 100.00 such that $l_0 = \sum_{x=0}^w dx$. The remaining survivorship values are computed by subtracting dx (the percentage dying in each age category) from the values of l_x so that:

$$l_{0-1} = 100.00 \text{ and } l_{1-5} = l_{0-1} - d_{0-1} \text{ and } l_{5-10} = l_{1-5} - d_{1-5} \text{ and so on.}$$

The probability of dying, q_x , is computed by dividing dx (the percentage dying) by l_x (the percentage of survivors entering each age group). Each value of q_x is an expression of the chance of dying before reaching the next age category. Thus:

$$q_x = \frac{dx}{l_x} \text{ or for the first age category } q_{0-1} = \frac{d_{0-1}}{l_{0-1}}. \text{ For the second age category } q_{1-5} = \frac{d_{1-5}}{l_{1-5}}.$$

The fifth column of the life table, L_x , represents the number of years that are lived by the survivors between ages x and $x + 5$. The value of L_x is a useful measure of the age structure of the stationary population. It is computed by $L_x = \frac{5(l_x + l_{x+n})}{2}$.

$$\text{For the first age category, } L_{0-5} = \frac{5(l_{0-1} + l_{1-5})}{2}$$

$$\text{and for the second age category } L_{1-5} = \frac{5(l_{1-5} + l_{5-10})}{2}.$$

The value of T_x , column six, is only of technical value and is used for the computation of life expectancy values. T_x represents the total number of years that the entire population can live after birth. The initial value of T_x is found by summing all values of L_x or:

$$T_x = \sum_{x=0}^{w-1} L_x$$

The value of T_x for specific age categories is computed by:

$$T_{1-5} = T_{0-1} - L_{1-5} \text{ and } T_{5-10} = T_{1-5} - L_{5-10} \text{ such that } T_{50+} = L_{50+}.$$

The final column of the life table, life expectancy (e_x^0), can be calculated from the values of T_x and l_x . This value represents the average of the number of years expected to live by the survivors in each age interval.

Life expectancy at birth is

$$e_0^0 = \frac{T_0}{l_0}$$

and for the first age category, $e_{0-1}^0 = \frac{T_{0-1}}{l_{0-1}}$ and for the second age

$$\text{interval } e_{1-5}^0 = \frac{T_{1-5}}{l_{1-5}}.$$

It is often customary to calculate separate life tables for males and females. Due to the small samples recovered from Eva and Cherry, it was not reasonable to do this. Therefore, the life tables which are presented are values for sexes combined. As discussed previously, small sample size may result in spurious life table values. Weiss (1973) suggests that it may be necessary to smooth the data in order to obtain meaningful results. A "running averages" smoothing procedure is applied to "three adjacent age classes to produce a size for the central class" (Weiss 1973:15). Both raw data and smoothed life tables for the Eva and Cherry series are presented.

Analysis of the Eva and Cherry Skeletal Series Based on the Life Table

Life tables were computed on the basis of both unsmoothed and smoothed age interval data. This procedure was carried out for each of the three series--the Middle Archaic Eva I and II component, the Late Archaic Eva III component, and the Late Archaic Cherry site. The unsmoothed and smoothed life tables for each series are presented in Tables 4-1 through 4-6. The four basic life table values, mortality (dx), survivorship (lx) probability of dying (qx), and life expectancy (e^0_x) for unsmoothed and smoothed data are graphically represented in Figures 4-1 through 4-8. Each of the graphs are discussed in detail. Temporal comparisons are made between the Eva I and II series and the Eva III series. Intra-site comparison of the mortality data for Late Archaic series is accommodated by the examination of the Eva III and the Cherry series.

Mortality curves (dx values) of the unsmoothed data are graphically represented in Figure 4-1. Considering first the Eva I and II component, a relatively high percentage of deaths occur in the first five years of life. Mortality decreases during childhood but increases again during late adolescence and very early adulthood. The lowest mortality occurs at age 20-25 and increases after that to maximum adult mortality at age 30-35. There is a decrease in mortality to age 45-50 with a slight increase occurring for adults over 50 years of age.

The Late Archaic Eva III skeletal series, like the Middle Archaic series, shows a relatively high infant mortality that decreases to the lowest mortality at age 10-15. By contrast to Eva I and II, the Eva III sample indicates an increased mortality at age 20-25. While the

Table 4-1. Abridged life table for the Middle Archaic Eva I and Eva II component for combined sex: unsmoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	16	14.4	100.0	.1440	92.80	2579.55	25.80
1-4.9	13	11.7	85.6	.1367	398.75	2486.75	29.05
5-9.9	4	3.6	73.9	.0487	360.50	2088.00	28.25
10-14.9	5	4.5	70.3	.0640	340.25	1727.50	24.57
15-19.9	11	9.9	65.8	.1505	304.25	1387.25	21.08
20-24.9	3	2.7	55.9	.0483	272.75	1083.00	19.37
25-29.9	5	4.5	53.2	.0846	254.75	810.25	15.23
30-34.9	14	12.6	48.7	.2587	212.00	555.50	11.41
35-39.9	11	9.9	36.1	.2742	155.75	343.50	9.52
40-44.9	12	10.8	26.2	.4122	104.00	187.75	7.17
45-49.9	7	6.3	15.4	.4091	61.25	83.75	5.44
50+	10	9.0	9.1	1.0000	22.50	22.50	2.47
Total	111	100.0	0.0		0.0	0.0	0.0

Table 4-2. Abridged life table for the Middle Archaic Eva I and Eva II component for combined sex: smoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	16.00	14.16	100.00	.1416	92.92	2586.73	25.87
1-4.9	11.00	9.73	85.84	.1134	404.88	2493.81	29.05
5-9.9	7.33	6.49	76.11	.0853	364.33	2088.93	27.45
10-14.9	6.67	5.90	69.62	.0847	333.35	1724.60	24.77
15-19.9	6.33	5.60	63.72	.0879	304.60	1391.25	21.83
20-24.9	6.33	5.60	58.12	.0964	276.60	1086.65	18.70
25-29.9	7.33	6.49	52.52	.1236	246.38	810.05	15.42
30-34.9	10.00	8.85	46.03	.1923	208.03	563.67	12.25
35-39.9	12.33	10.91	37.18	.2934	158.63	355.64	9.57
40-44.9	10.00	8.85	26.27	.3369	109.23	197.01	7.50
45-49.9	9.67	8.56	17.42	.4914	65.65	87.78	5.04
50+	10.00	8.85	8.85	1.0000	22.13	22.13	2.50
Total	113	100.0	0		0	0	0

Table 4-3. Abridged life table for the Late Archaic Eva III component for combined sex: unsmoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	5	12.5	100.0	.1250	93.75	3337.25	33.37
1-4.9	3	7.5	87.5	.0857	418.75	3243.50	37.07
5-9.9	1	2.5	80.0	.0313	393.75	2824.75	35.31
10-14.9	0	0.0	77.5	0	387.50	2431.00	31.37
15-19.9	1	2.5	77.5	.0323	381.25	2043.75	26.37
20-24.9	2	5.0	75.0	.0667	362.50	1662.50	22.17
25-29.9	2	5.0	70.0	.0714	337.50	1300.00	18.57
30-34.9	1	2.5	65.0	.0385	318.75	962.50	14.81
35-39.9	8	20.0	62.5	.3200	262.50	643.75	10.30
40-44.9	5	12.5	42.5	.2941	181.25	381.25	8.97
45-49.9	2	5.0	30.0	.1667	137.50	200.00	6.67
50+	10	25.0	25.0	1.0000	62.50	62.50	2.50
Total	40	100.0	0.0		0.0	0.0	0.0

Table 4-4. Abridged life table for the Late Archaic Eva III component for combined sex: smoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	5	11.53	100.00	.1153	94.24	3388.56	33.89
1-4.9	3	6.92	88.47	.0782	425.05	3294.32	37.24
5-9.9	1.33	3.07	81.55	.0367	400.08	2869.27	35.18
10-14.9	.67	1.55	78.48	.0198	388.53	2469.19	31.46
15-19.9	1.00	2.31	76.93	.0300	378.88	2080.66	27.05
20-24.9	1.67	3.85	74.62	.0516	363.48	1701.78	22.81
25-29.9	1.67	3.85	70.77	.0544	344.23	1338.30	18.91
30-34.9	3.67	8.47	66.92	.1266	313.43	994.07	14.85
35-39.9	4.67	10.77	58.45	.1843	265.33	680.64	11.64
40-44.9	5.00	11.53	47.68	.2418	209.58	415.31	8.71
45-49.9	5.67	13.08	36.15	.3618	148.05	205.73	5.69
50% +	10.00	23.07	23.07	1.0000	57.68	57.68	2.5
Total	43.35	100.00	0		0	0	0

Table 4-5. Abridged life table for the Late Archaic Cherry site for combined sex: unsmoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	4	8.0	100.0	.0800	96.0	2596	25.96
1-4.9	5	10.0	92.0	.1087	435.0	2500	27.17
5-9.9	2	4.0	82.0	.0488	400.0	2065	25.18
10-14.9	5	10.0	78.0	.1282	365.0	1665	21.35
15-19.9	5	10.0	68.0	.1471	315.0	1300	19.12
20-24.9	2	4.0	58.0	.0690	280.0	985	16.98
25-29.9	7	14.0	54.0	.2593	235.0	705	13.06
30-34.9	5	10.0	40.0	.2500	175.0	470	11.75
35-39.9	5	10.0	30.0	.3333	125.0	295	9.83
40-44.9	2	4.0	20.0	.2000	90.0	170	8.50
45-49.9	4	8.0	16.0	.5000	60.0	80	5.00
50+	4	8.0	8.0	1.0000	20.0	20	2.50
Total	50	100	0		0	0	0

Table 4-6. Abridged life table for the Late Archaic Cherry site for combined sex: smoothed values.

x	D _x	d _x	l _x	q _x	L _x	T _x	e _x ⁰
0-1	4.00	8.05	100.00	.0805	95.98	2614.47	26.14
1-4.9	3.67	7.39	91.95	.0804	441.28	2518.49	27.40
5-9.9	4.00	8.05	84.56	.0952	402.68	2077.21	24.56
10-14.9	4.00	8.05	76.51	.1052	362.43	1674.53	21.89
15-19.9	4.00	8.05	68.46	.1176	322.18	1312.10	19.17
20-24.9	4.67	9.40	60.41	.1556	278.55	989.92	16.39
25-29.9	4.67	9.40	51.01	.1843	231.55	711.37	13.95
30-34.9	5.67	11.41	41.61	.2742	179.53	479.82	11.53
35-39.9	4.00	8.05	30.20	.2666	130.88	300.29	9.94
40-44.9	3.67	7.39	22.15	.3336	92.28	169.41	7.65
45-49.9	3.33	6.70	14.76	.4539	57.00	77.13	5.23
50+	4.00	8.05	8.05	1.0000	20.13	20.13	2.50
Total	49.68	100.0	0		0	0	0

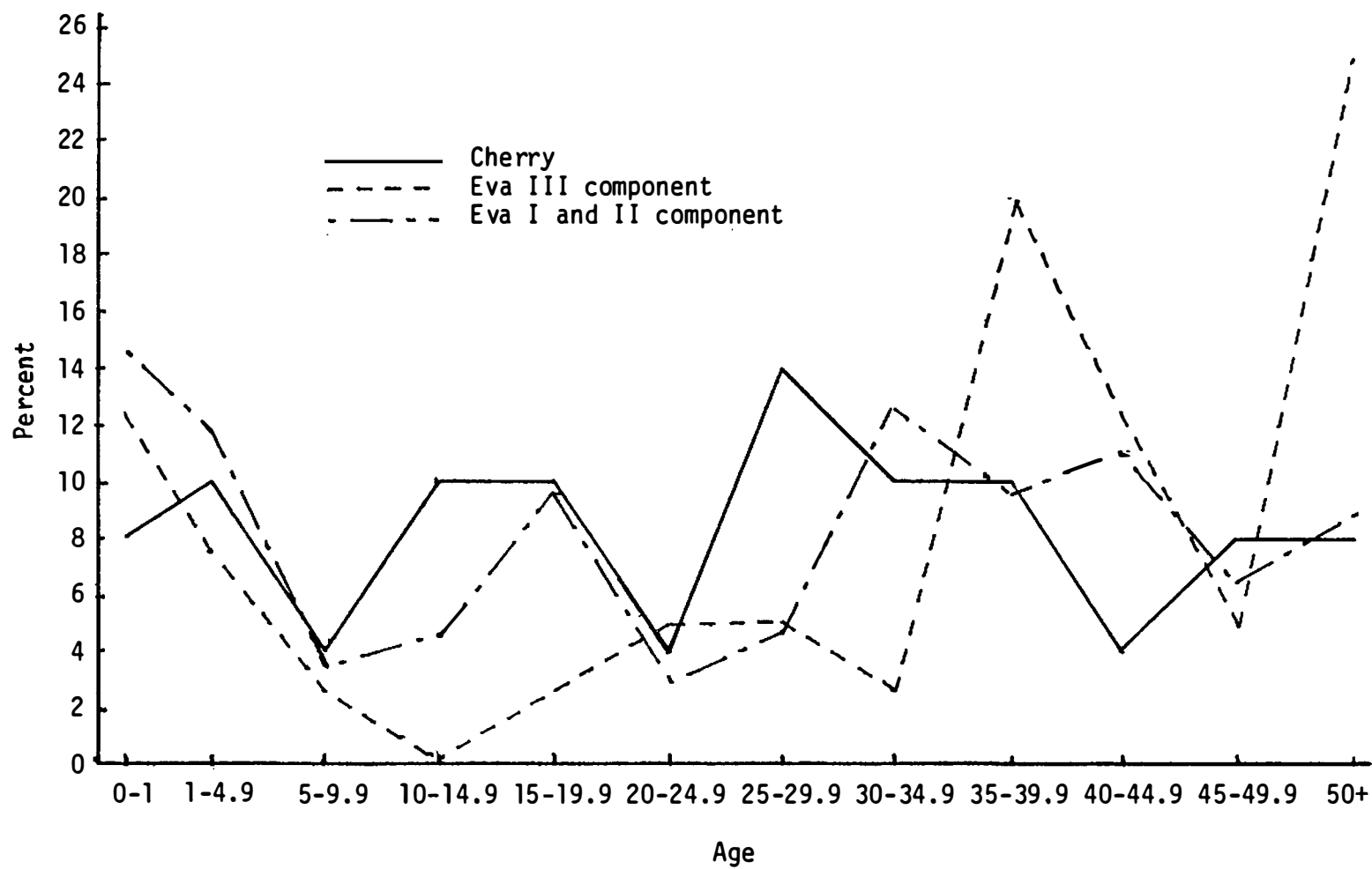


Figure 4-1. Mortality curves (d_x) for combined sex: unsmoothed values.

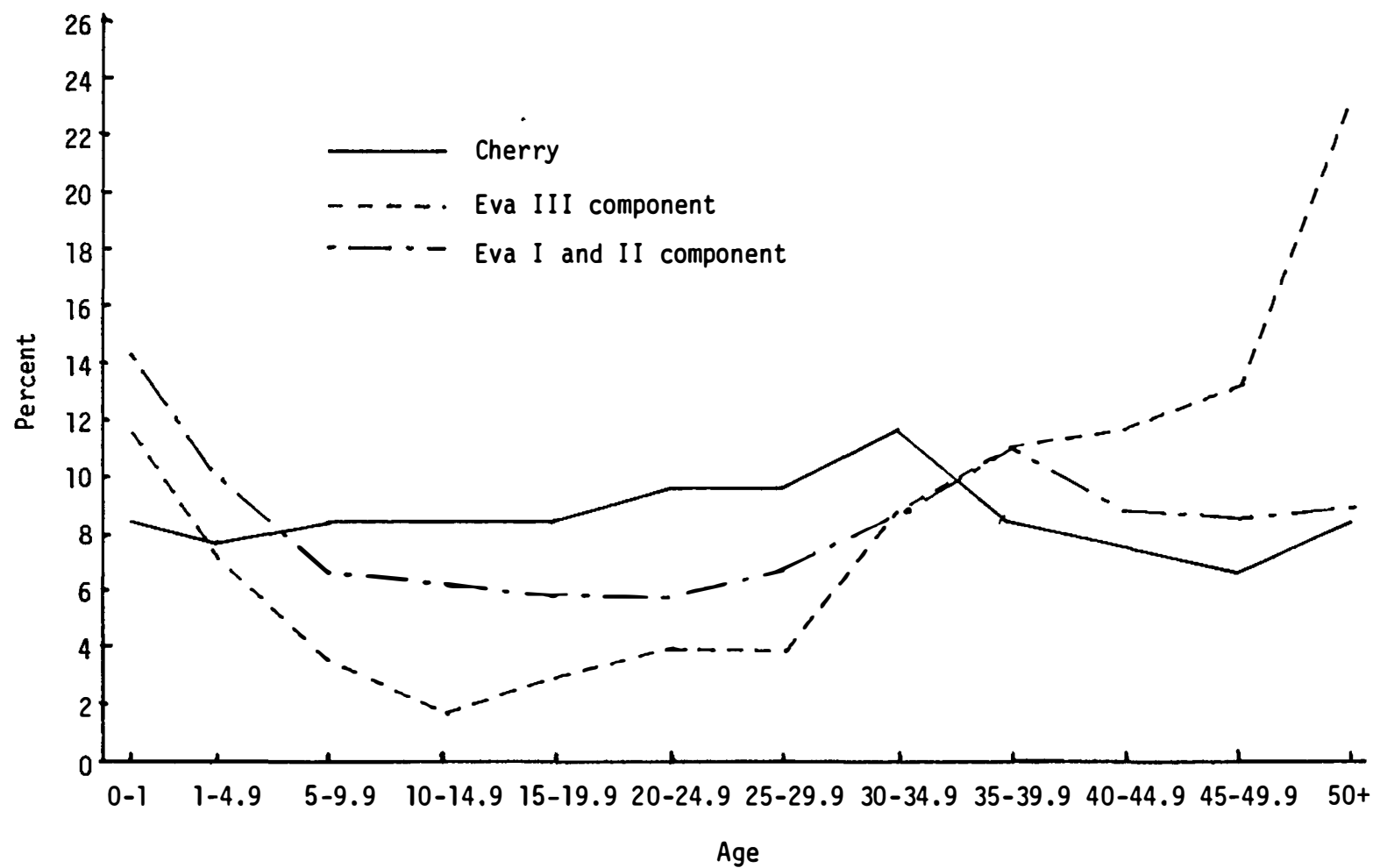


Figure 4-2. Mortality curves (d_x) for Combined Sex: Smoothed Values.

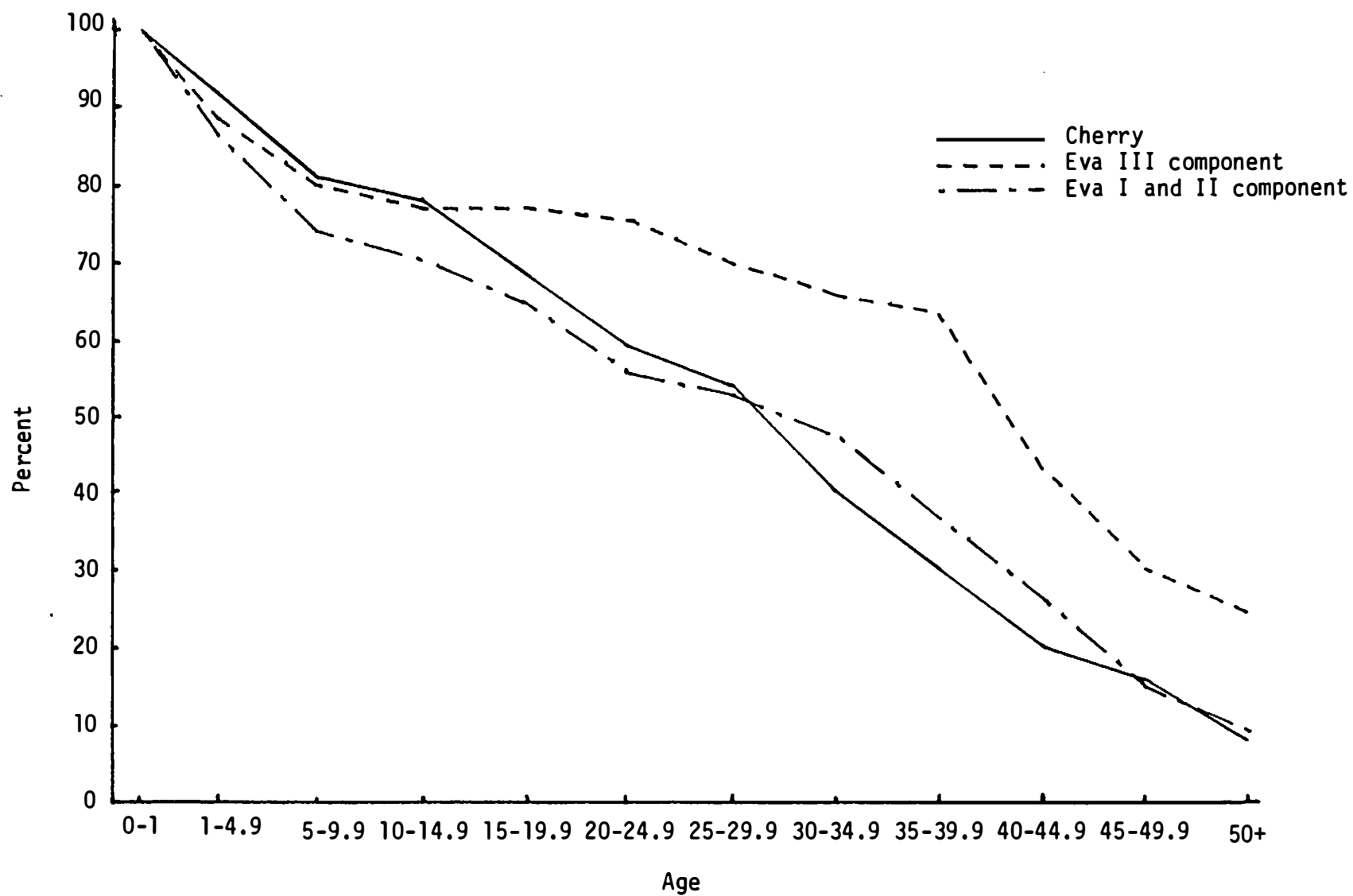


Figure 4-3. Survivorship curves (l_x) for combined sex: unsmoothed values.

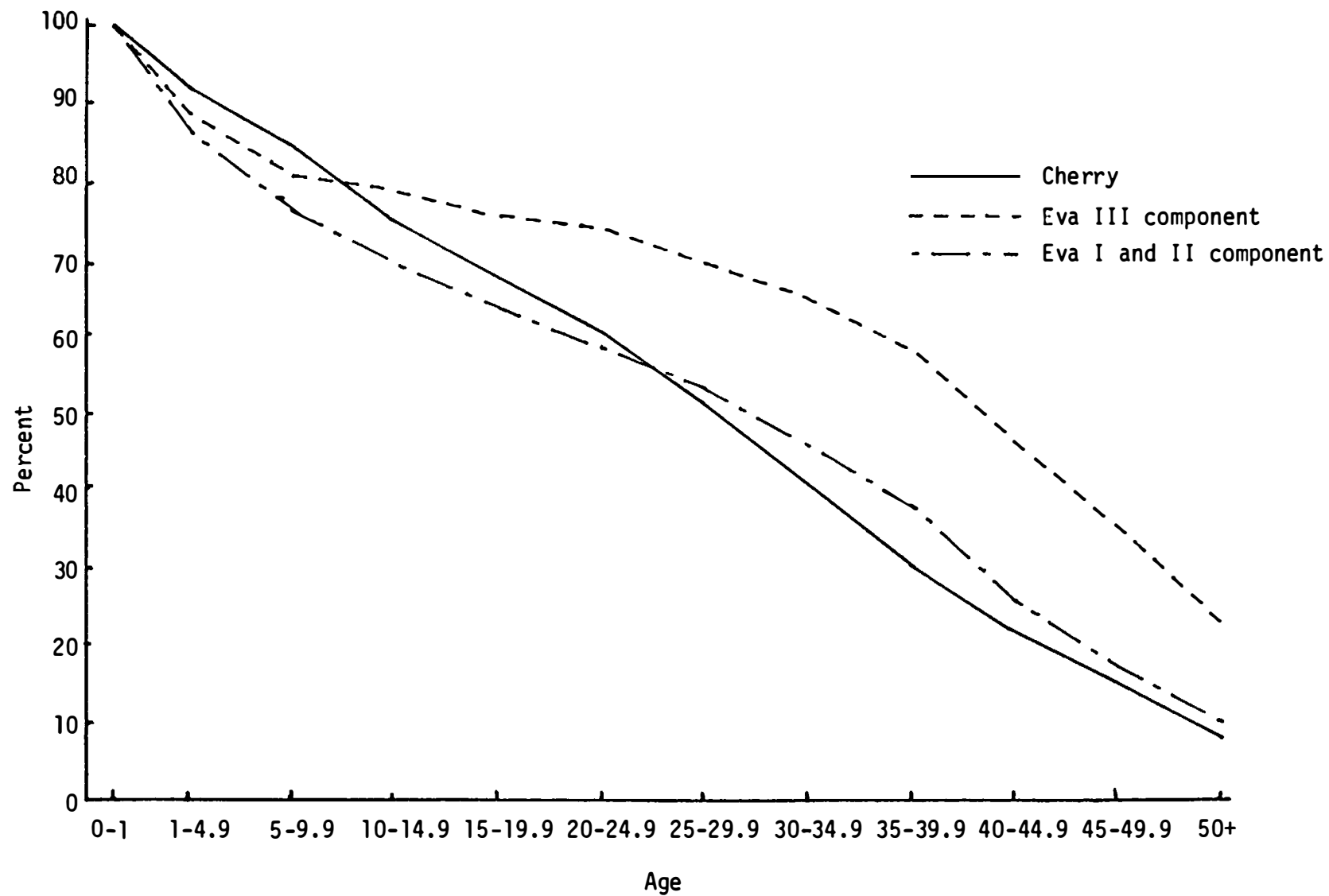


Figure 4-4. Survivorship curves (l_x) for combined sex: smoothed values.

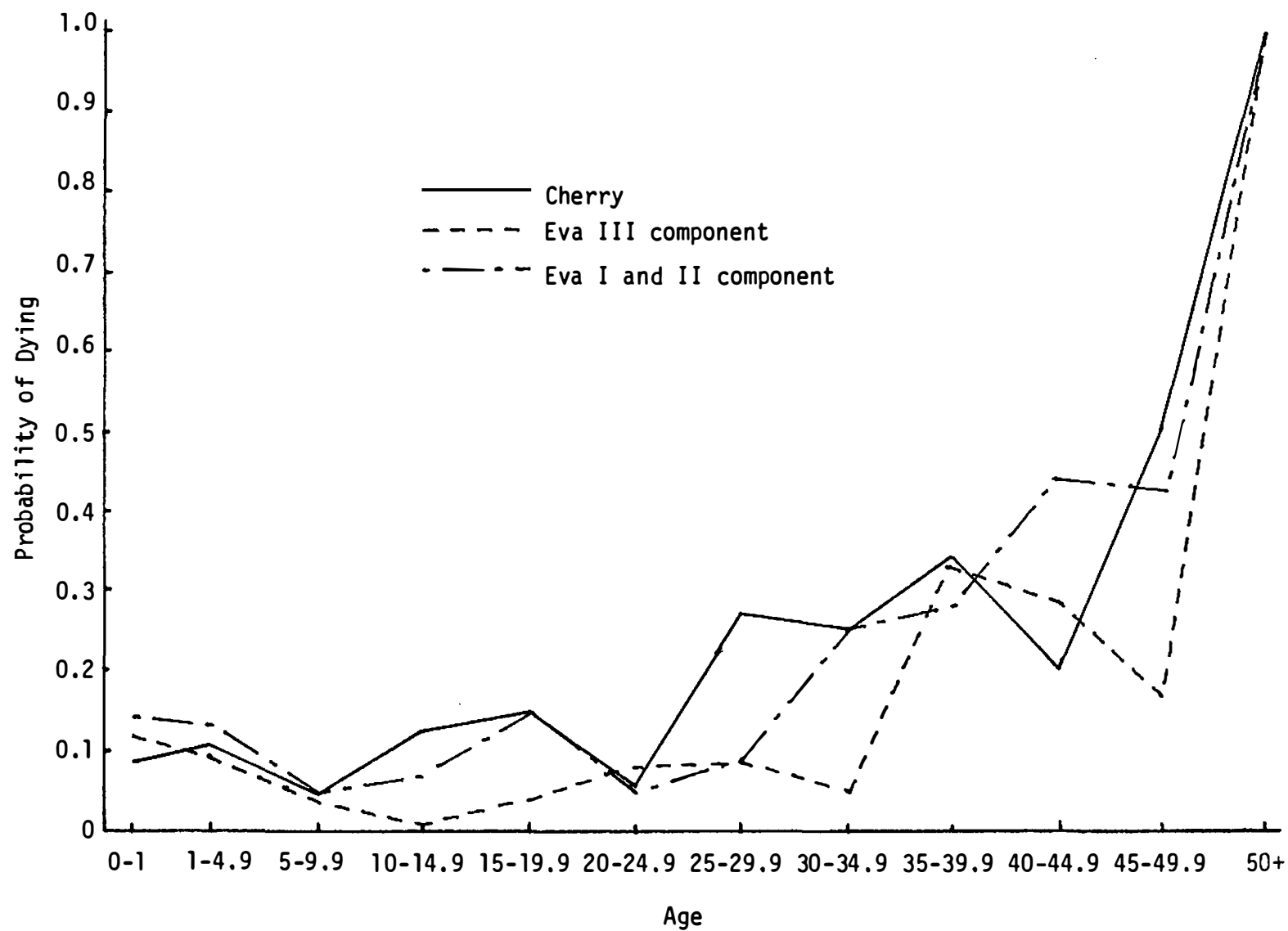


Figure 4-5. Probability of death (q_x) for combined sex: unsmoothed values.

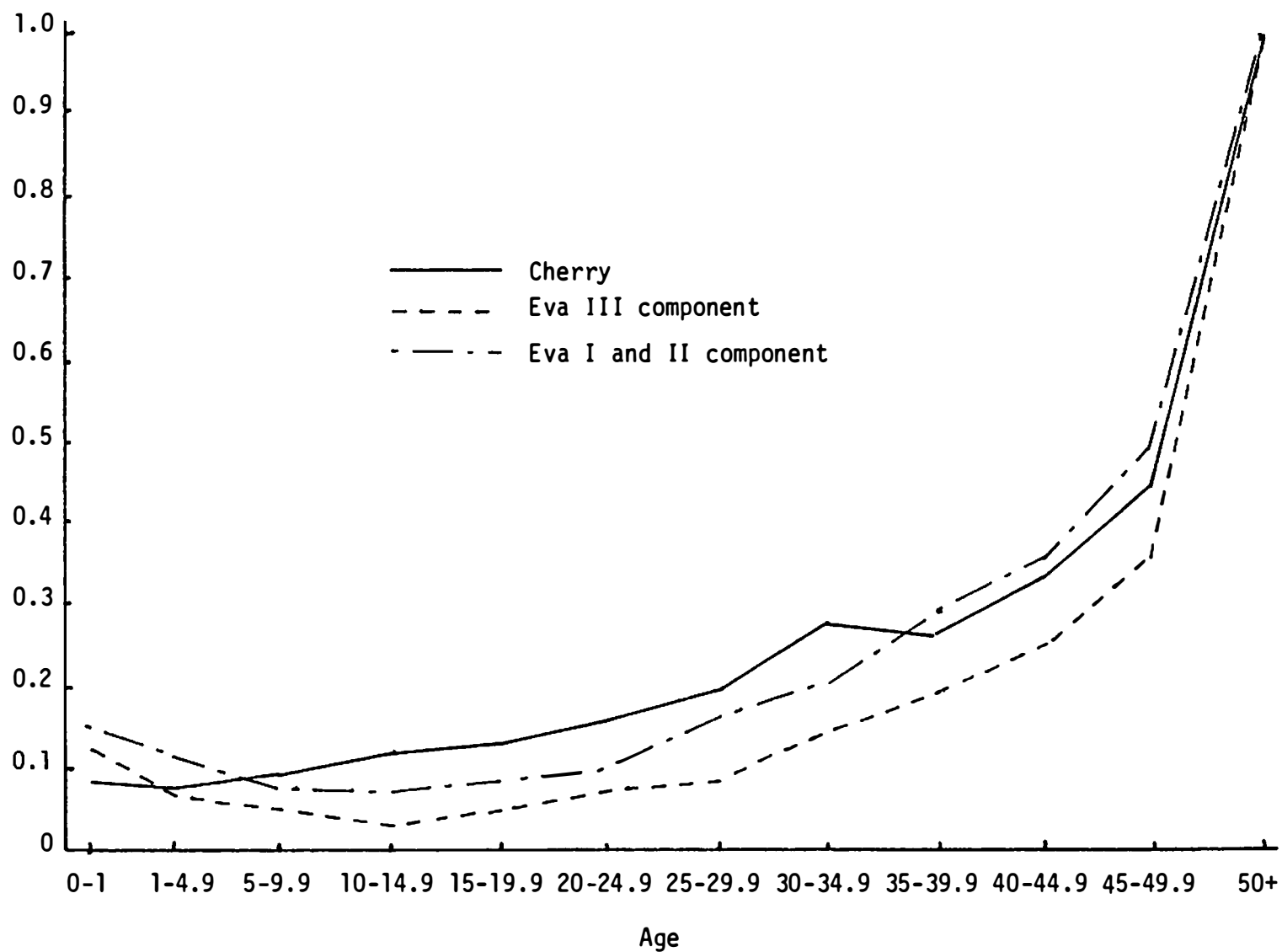


Figure 4-6. Probability of death (q_x) for combined sex: smoothed values.

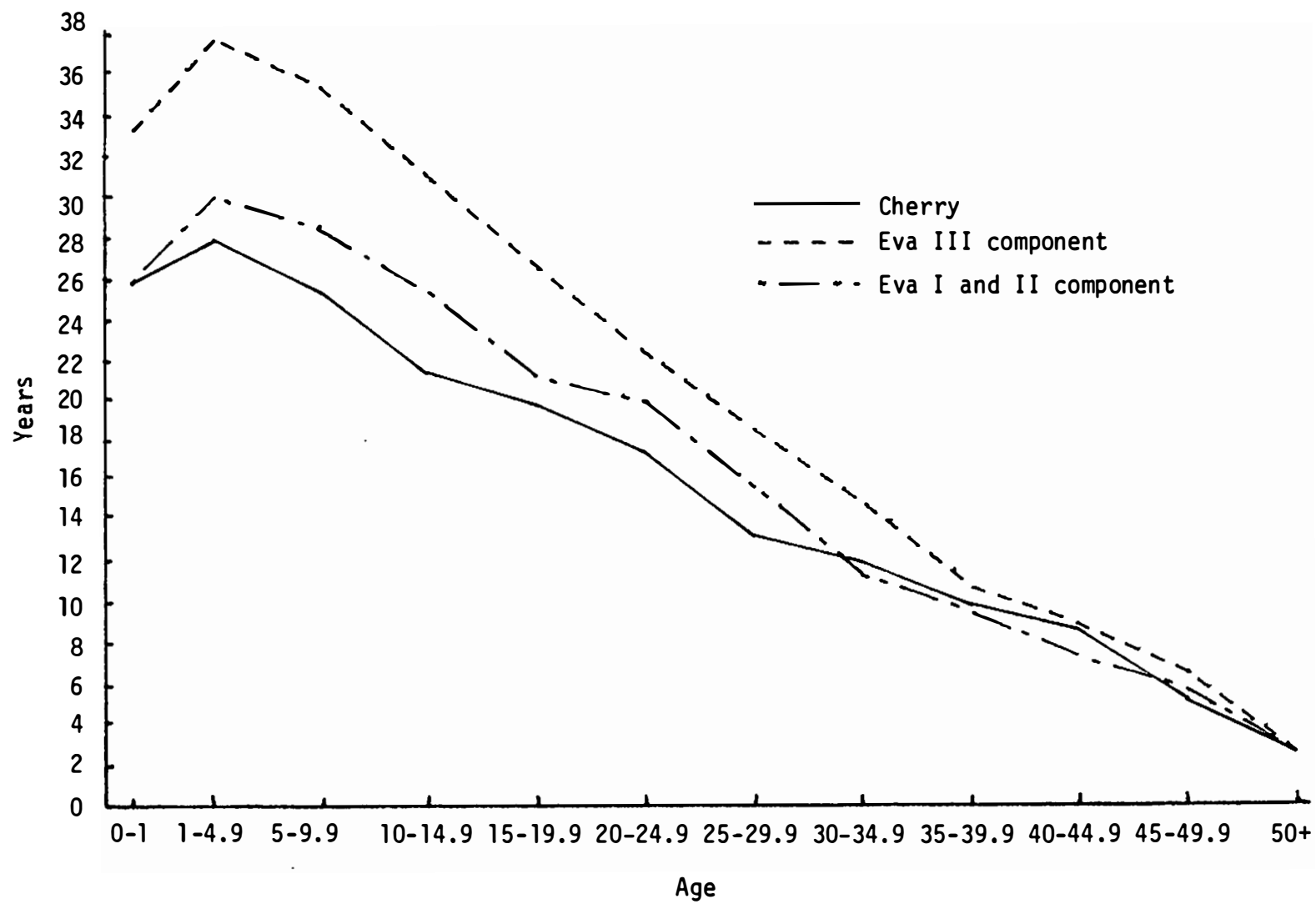


Figure 4-7. Life expectancy (e_x^0) for combined sex: unsmoothed values.

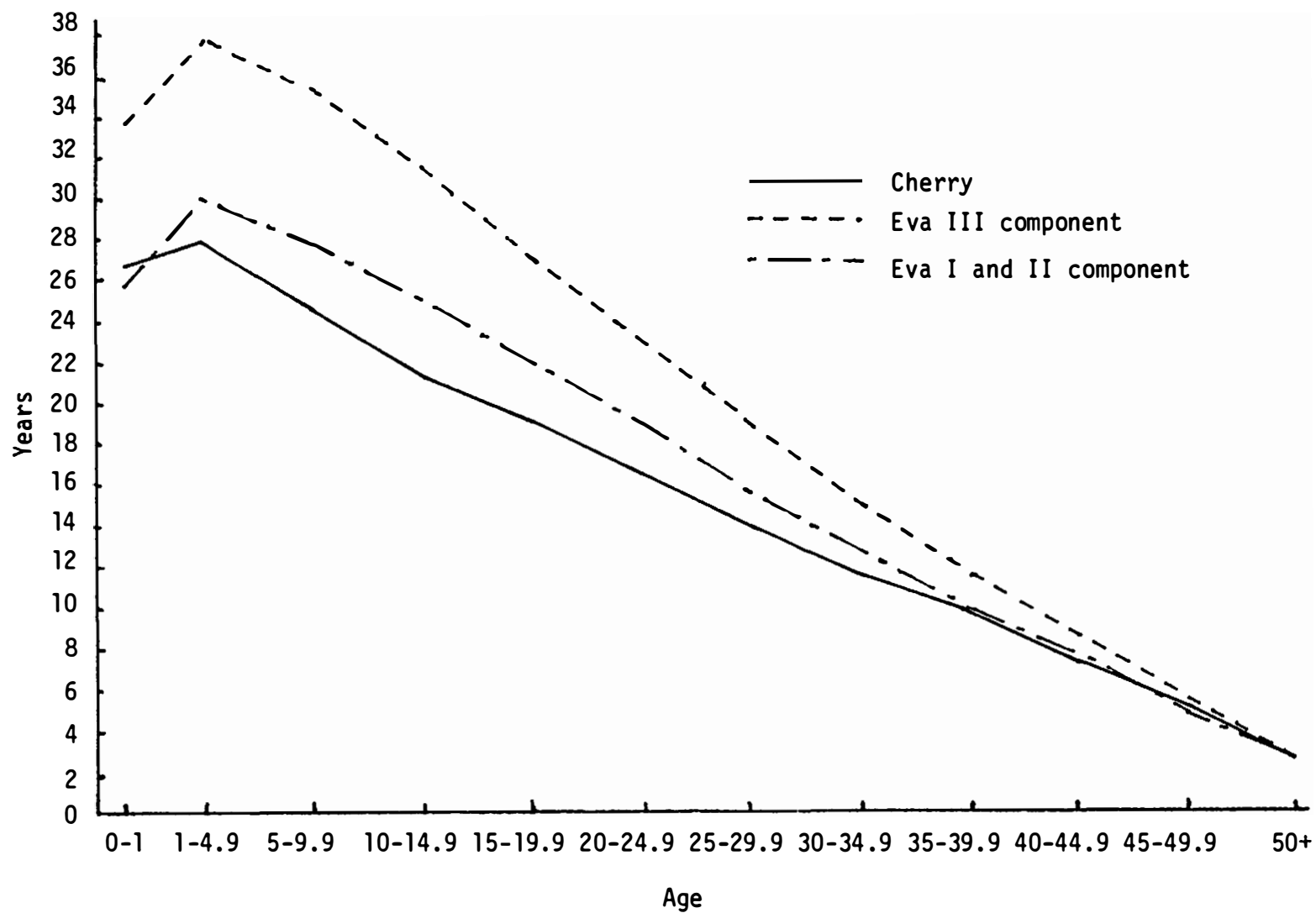


Figure 4-8. Life expectancy (e_x^0) for combined sex: smoothed values.

greatest adult mortality for the Middle Archaic Eva series occurs at age 30-35, Eva III shows a decrease at this same age. There is a marked increase in the percent of individuals dying at age 35-40, a sharp decline to the age of 45-50, with a radical increase culminating in the greatest frequency of mortality at age 50+. In the Middle Archaic component, 51.4% died before the age of 30 while in the Late Archaic series, only 35% of the sample died before the age of 30. This would suggest that the Eva III series is representative of an "old age" population.

The preceding discussion and mere visual inspection of these two mortality curves indicates that the mortality experience differs between the Middle and Late Archaic series. A Kolomogorov-Smirnov test was applied to these data to determine whether, in fact the mortality profiles are significantly different. This test is ideally suited for small samples and has a high power efficiency (Siegel 1956). The two sample test is used to determine whether two independent samples are drawn from larger populations with the same distribution. The test is concerned with the greatest observed difference between two cumulative frequency distributions and information loss due to tied data is minimized (Blalock 1972; Siegel 1956). The two-tailed test was used since direction has not been predicted.

Results of the Smirnov test show that the mortality curves are different at the .001 level of probability. This indicates that the Middle and Late Archaic samples represent different age distributions in their respective populations. This interpretation can be accepted only with reservation, however, for as Moore, Swedlund, and Armelagos

(1976) pointed out, enumeration errors will greatly affect the mortality curve.

Mortality curves of the smoothed data are presented in Figure 4-2, page 116. Both the Eva I and II component and the Eva III component show a relatively high infant mortality. This declined during childhood and early adolescence. In the Middle Archaic sample, the frequency of mortality begins to increase after the age of 25 and reaches a peak adult mortality at age 35-40. As opposed to the Middle Archaic series, the frequency of death in the Eva III series begins to increase slowly after the age of 15 to the age of 25-30 where a sharp increase in mortality occurs. The highest mortality for the entire age curve is at age 50+. Similar to the unsmoothed curves, 54% of the Middle Archaic Eva I and II sample died before the age of 30 while only 33.1% of the same age categories died in the Eva III series. Like the unsmoothed mortality curves for these samples, results of the Smirnov test showed a significant difference, this time at the .025 level of probability. Examination of the mortality curves of these two samples might suggest an increase in the frequency of adult mortality through time. This is a dubious conclusion since the highest frequency of mortality in the Late Archaic series occurs at age 50+, not in the first five years of life as might be expected. This would indicate instead, that there is an under-representation of infants and/or an over-representation of old aged adults in the Eva III series.

Examination of differences in mortality experience between locations is accommodated by comparison of the Eva III series with the Cherry site sample. The mortality curve for the Cherry site is

depicted in Figure 4-1, page 115. This series shows a lower infant mortality than Eva III (8% compared to 12.5%) but shows an increase in the frequency of death in the 1-5 age range. Like the Eva III sample, a decrease in mortality during childhood is seen at Cherry, but there is a greater increase in adolescent and young adult mortality. The greatest percentage of adult deaths at Cherry occurs at age 25-30 (14%) with a general decline thereafter. The Eva III sample demonstrates fewer deaths at age 25-30, declines slightly to age 35 and climbs rapidly to a peak at age 35-40. There is a marked decline in frequency of death to age 45-50 and increases sharply to greatest mortality at age 50+. Fully 60% of the Cherry population died before the age of 30 by contrast to only 35% at Eva. Again, it would appear that the Eva III series is representative of an old age population. Results of the Smirnov test indicate that these mortality curves differ significantly at the .001 level of probability.

The smoothed data mortality curves are presented in Figure 4-2, page 116. For the Cherry series, greatest frequency of death is in the 0-1 age range. Mortality decreases to age 5, and increases slightly thereafter to greatest frequency of adult death at age 30-35. Mortality declines to the age of 45-50 with a slight increase at age 50+. The Eva III series shows a higher infant mortality. This declines steadily to a low point at age 10-15. There is a slight increase in mortality rate until the age of 25-30 at which point frequency of death increases rapidly to age 50+. The Smirnov test of the smoothed curves indicates a difference at the .001 level of significance.

Survivorship curves (l_x) are depicted in Figure 4-3, page 117. This graph is essentially the inverse of the mortality curve (d_x). For the Eva I and II sample, the slope of the curve descends rather rapidly in the first five years of life. At age five, 85.6% of the cohort remained alive. The slope of the line continues a gradual descent to the age of 30-35. Thirty-six percent of the population was still living at this age. The curve drops rapidly to age 50+ yet at this age 9.1% of the population were surviving. The Eva III series curve depicts a similar downward slope to the age of 5. At this age, the lines begin to diverge noticeably. At age 30, 53.2% of the Eva I and II population was living while 70% of the Eva III population attained that age. Thirty-six percent of the Eva I and II population attained age 40 compared to 62.5% for Eva III. Twenty-five percent of the population lived to greater than 50 years. The survivorship curves appear to be significantly different, and in fact this is the case. Results of the Smirnov test showed a significant difference at the .001 level of probability.

The smoothed survivorship curves of the Middle and Late Archaic Eva series (Figure 4-4, page 118) indicate the same pattern as the unsmoothed curves. The slope of the curve of the Eva I and II population shows the sharpest decline from birth to age five with a gradual negative slope thereafter to age 50+. The slope of the Eva III curve deviates from the Eva I and II curve beginning at age 15. Nearly 67% of the Eva III population survived to age 35 while only 46% of the Eva I and II series attained that same age. Survivorship of the Eva III series shows a marked decline after the age of 35, yet 23% of the

population lived to be at least 50 while only 8.9% of the Middle Archaic population survived to that age. Differences in the unsmoothed survivorship curves were significant at the .001 level of probability. The smoothed curves were significantly different only at the .01 level of probability.

The survivorship curve of the Cherry series (Figure 4-3, page 117) is roughly a straight line with a negative slope. The decline of the slope for Cherry of ages 0-5 is not as extreme as that of the Eva III population. The Cherry and Eva III curves diverge markedly beginning at age 15. At this point, 77.5% of the Eva III population is still living and 78% of the Cherry population has survived. The greatest difference in survivorship between these two series occurs at age 35-40. Sixty-two and one-half percent of the Eva III cohort survived to this age while only 30% of the Cherry site series was living. Only 8% of the individuals from the Cherry site survived past the age of 50 while 25% from the Eva III population was alive past the age of 50.

The smoothed survivorship curves show the same basic pattern as the unsmoothed profiles. The Eva III and Cherry site curves, as before, begin to diverge at age 10-15. The greatest distance between these two curves occurs at age 35-40 where 30.2% of the Cherry population survived to that age as compared to 58.5% for Eva III. The 23.1% survivorship at age 50+ for the Eva III series attests to the old age representation of that series by contrast to the 8.1% survivors at age 50+ at Cherry. Smirnov tests of both the unsmoothed and smoothed survivorship curves of the Cherry site and Eva III series do differ

significantly at the .001 level of probability.

The probability of dying (q_x) is much less affected by random fluctuations in age distribution than are either mortality or survivorship. These life table values, as well as life expectancy, are less subject to biases resulting from enumeration errors and are, therefore, better suited for comparison of populations than are mortality or survivorship. Figure 4-5, page 119, illustrates the probability of death. The period of best health is enjoyed by the Middle Archaic population at ages 5-10 and 20-25 while for the Late Archaic period, this occurs at age 10-15. For the Eva III series, 32% of those individuals ages 30-35 die before the age of 40. At this same age in the Eva I and II series, probability of death is 27.4%. Of those individuals age 45-50, 41% of the Eva I and II individuals died whereas only 16.7% of the Eva III series individuals failed to survive to an age greater than 50.

The smoothed data probability of dying curves are presented in Figure 4-6, page 120. The shape of the Middle Archaic and Late Archaic Eva series roughly parallels one another. The probability of dying for the Eva I and II series is greater at all ages (other than at the end of the life span) than it is for the Eva III sample. Results of the Smirnov test indicated that there is no significant difference, for either smoothed or unsmoothed q_x values, between the Middle Archaic Eva I and II component and the Late Archaic Eva III component.

Comparison of the probability of dying of the Eva III component with the Cherry site sample shows that the best period of health experienced by the Cherry site inhabitants occurred at ages 5-10 and

20-25. At Eva, this occurs at age 10-15. The greatest contrast between these two samples is at age 45-50. At Cherry, fully 50% of those individuals surviving to age 45-50, die before reaching the age of 50+. Only 16.7% of the Eva III individuals in this age category failed to survive to an age of greater than 50 years.

The smoothed values for probability of dying (Figure 4-6, page 120) present similarly shaped curves. Except for the beginning and end of the life span, the Cherry site series exhibited higher values for the probability of dying at all ages as compared to the Eva III sample. The results of the Smirnov test failed to indicate that these differences were significant for either smoothed or unsmoothed probability of dying values.

Life expectancy is graphically illustrated in Figure 4-7, page 121. These life table values show a rather high life expectancy at birth for Eva I and II (25.8 years) and Eva III (33.37 years). The greatest life expectancy is at age 1-5 for both series. Life expectancy at this age for the earlier component is 29.1 years and 37.1 years for the Late Archaic Eva series. Both samples demonstrate a gradual decrease in life expectancy yet these values are greater at all ages for the Eva III component sample. Graphs of the smoothed life expectancy values are presented in Figure 4-8, page 122. The smoothed curves are very similar to the raw data curves and demonstrate the same characteristics throughout. As for the probability of death, the Smirnov test failed to indicate that these series were drawn from larger samples that had differing distributions.

Shape of the curve of life expectancy values for the Cherry series

roughly parallels that of the Eva III sample. As was the case for the Middle Archaic Eva series, all life expectancy values for the Cherry sample were less than those of the Eva III component. Life expectancy at birth for the Cherry site is 25.96 years as compared to 33.37 at Eva. At 1-5 years, this value at Cherry is only 27.17 years but 37.07 years for the Late Archaic Eva component. Since infant enumeration errors affect life expectancy at those ages, it would be more valuable to compare values of an older age. Life expectancy at the Cherry site is still far lower than at Eva, especially until the age of 25 at which point the absolute differences in life expectancy become less. The smoothed data curve presents the same general picture. Life expectancy values for the Eva III component are absolutely higher at all ages as compared to the Cherry site sample. The Smirnov test suggests that these distributions, smoothed and unsmoothed, are not significantly different.

Some salient features of the life table values for all three samples become evident upon close examination. Life expectancy at birth seems very high for a prehistoric skeletal series; 25.8 years for the Eva I and II component, 33.37 years for Eva III component, and Cherry indicates a life expectancy of 25.96 years. At age 1-5, life expectancy increases to 29.05, 37.07, 27.17 for the Eva I and II component, Eva II component, and the Cherry site sample, respectively. Infant under-enumeration should only affect life expectancy for that age category yet it appears that a greater number of adult interments, especially at the older end of the age range, have caused inflated life expectancy values.

Only 22.5% of the Eva III sample was under 15 years of age. This same category comprised 34.2% of the Eva I and II series and 32% of the Cherry site sample. Fully 65% of the Eva III series was over 30 years of age. Forty percent of the Cherry series and 48.6% of the Eva I and II sample were older than 30. Of the entire age range of the Eva III series, 25% attained an age of at least 50. This constitutes 33% of the adult sample. For the Eva I and II series, 35.8% of the adults were at least 40 years of age and 12.3% of the adults were greater than 50 years of age. Of the adult sample at the Cherry site, 34.5% were greater than 40 years of age; 13.8% of the adults were older than 50 years. Twenty percent of the entire age range of the Cherry series was over 40 years of age. For the Eva I and II sample, this same age range comprised 26.1% of the sample and 42.5% of the Eva III series. These data would suggest that a decidedly old age population is represented in all three series but especially the Eva III cemetery sample. Smoothing the life table values did not successfully remove the fluctuation biases. Essentially, the same age distribution is represented.

In an effort to determine just how biased these samples were, each of the life tables, unsmoothed and smoothed, were compared to the series of model life tables developed by Weiss (1973). Absolutely no close correspondence could be found between any of Weiss' tables and the Late Archaic Eva III sample. This strongly supports the suggestion that the Eva III series is not representative of a true biological population. Comparison of the Middle Archaic Eva I and II life tables with the model life tables suggests a very rough correspondence with

MT:15-55, MT:20-70, MT:22.5-65, or MT:22.5-70. All four of these tables are ones which Weiss (1973) suggests fit the rejection criteria and are considered "unlikely to model real stationary conditions" (Weiss 1973:47). It appears that the Middle Archaic Eva I and II series is not representative of a true biological population either. The Late Archaic Cherry site life table values roughly approximated model tables MT:20-60, MT:20-65, and MT:20-70. These three model life tables are also not representative of stationary population conditions. Like the Eva cemetery samples, this series is not representative of a biological population.

There are two main factors that can potentially explain the observed biases in population structure of these three skeletal series. Archeological sampling errors cannot be absolutely ruled out. Undoubtedly, differential destruction and recovery mishaps resulted in the under representation of infant skeletons. As discussed previously, however, infant under-enumeration should not affect all life table values, especially life expectancy outside of this age category. Inflated life expectancy values appear to be the result of a proportionately large sample of adults at the older end of the age range. Large portions of both the Eva and Cherry sites were tested. It is unlikely that the demographic biases are strictly a result of archeological sampling error.

Sampling errors as a result of the aboriginal inhabitants themselves is perhaps a better explanation for the demographic biases seen in the life table values of all three cemetery samples. Continually shifting settlement and economic focus may have resulted in changing

group composition and structure as a response to the effective maintenance of that activity. The movement of individuals between groups for economic, religious, political or social purposes can provide the necessary impetus to bring about differing age classes in a group at any one point in time. The results of the analysis of the demographic structure of the Eva and Cherry series tend to support the hypothesis that Archaic cemetery samples are a reflection of that portion of the group that habited a particular site.

CHAPTER V

SUMMARY

The research objectives of this study as outlined in Chapter I have been met. The burial mode at the Eva and Cherry sites has been described and analyzed. Spatial and temporal comparisons of the social organization by means of the analysis of mortuary activity have been made. The demographic structure of the prehistoric groups has been evaluated in light of shifting settlement and subsistence. There are limits to the conclusions that may be drawn from these Archaic cemetery samples because of the lack of comparative material, the incomplete cultural chronology of the Western Tennessee Valley Archaic, and the lack of detailed information pertaining to the settlement and subsistence patterns of this region. This research has provided a base-line study for Archaic populations in Western Tennessee and the analytical and interpretative potential of such materials has been demonstrated.

The evaluation of temporal changes in mortuary activity was facilitated by the comparison of the Middle and Late Archaic cemetery samples at the Eva site. There is a continuation through time of the essential attributes of mortuary behavior. Articulated, primary inhumation in a flexed or tightly flexed position was the preferred form of body treatment. Most interments were buried singly. Diseased individuals and those with physical maladies were afforded the same treatment as those with no evident bone pathology. Orientation of the body and location within the cemetery was apparently random. There has

been one demonstrable change through time in terms of body treatment. Cremation has been incorporated into the mortuary ritual during the Late Archaic culture period.

There is little elaboration in the mortuary ritual. Most of the grave goods are of a utilitarian nature. Less than half the interments of both the Middle and Late Archaic samples at Eva were afforded grave furniture. In the Middle Archaic component at Eva, the distribution of grave goods was random with respect to age. Both males and females were afforded hunting and domestic equipment but females received proportionately more domestic and ornamental items than adult males. Although there is some cross over between males and females in terms of labor related artifact categories, most of the variation can be explained in terms of sex. By contrast to the Middle Archaic component at Eva, the Eva III subadults were not afforded grave goods. While both males and females were afforded hunting and domestic equipment, males received proportionately more of both of these types of artifacts than females. More ornamental/entertainment items appeared in the grave good inventory in the Middle Archaic Eva component compared to the Late Archaic component yet exotic items do not appear until the later culture period. The analysis of the frequency of occurrence of the mortuary parameters and the results of the factor analysis support the hypothesis that an egalitarian type of social system is in operation for both the Middle and Late Archaic periods at Eva.

Comparison of the mortuary behavior between locations was facilitated by the examination of the Late Archaic sample at Eva and the Cherry site. Evidence suggests that the essential attributes of

mortuary behavior are the same. Most of the burials were articulated primary inhumations. There are more double and multiple burials at the Cherry site but the significance of this is unknown. The occurrence of cremation at the Cherry site lends support to the suggestion that cremation has been incorporated in the mortuary ritual during the Late Archaic culture period. One important difference between the Eva III component and the Cherry site is the spatial discreteness of the cemetery area at the Cherry site. The midden and cemetery area were concentrated in the east end of the site and the habitation area was to the west. The cemetery area at the Eva site was apparently not distinct from the habitation area.

Approximately equal proportions of the Eva and Cherry site interments were afforded grave goods. The grave furniture at the Cherry site, however, was more lavish. The majority of the grave goods at Eva was of a utilitarian nature and ornamental goods did not appear unless in the presence of utilitarian artifacts. Far more ornamental/entertainment and exotic artifacts were in the inventory of grave goods at the Cherry site compared to the Eva III cemetery sample. It has been suggested that a more intensive occupation for longer periods of time at the Cherry site might explain this phenomenon. Alternatively, the Cherry site may represent a slightly later time period than the Late Archaic component at Eva. Although the grave furniture at Cherry was more elaborate, it was not possible to isolate the treatment of individuals that might be indicative of status positions. Examination of the frequency of occurrence of the mortuary parameters and the covariation with all other variables and the results of the factor

analysis support the hypothesis that an egalitarian social system is operating.

Social and spatial organizational principles of contemporary hunters and gatherers are used to model the dynamic interaction between social organization and the demographic processes of these prehistoric hunters and gatherers. The relatively simple level of technology and the close contact with the physical environment of small scale societies form a dynamic interaction between subsistence, social organization and religious and political structure of these groups. These factors have a profound effect on the demographic processes of small scale societies. The movement of groups within a territory is a response to the seasonal availability of resources, as well as social, religious, or political factors. Fluctuation in the size and internal age composition of hunting and gathering groups is an essential demographic process. As economic, environmental, political, and social factors influence the movement of entire groups, these same factors will initiate the spontaneous movement of individuals between groups. Further, the age composition of a group is essential for the proper maintenance of social, economic, and political functioning.

The vital statistics of these Archaic cemeteries were reconstructed in order to determine the nature of each skeletal series. Results of this analysis suggest that these samples are not representative of true biological populations. Infants are under represented in each of the cemetery samples. This may be due to problems in preservation or cultural choice. It has been suggested that the observed biases in the population structure of these Archaic cemeteries are the

result of the over representation of older adults. Archeological sampling biases cannot account for all the variation. Continually shifting settlement and subsistence is a more logical explanation for the demographic biases. Evidence suggests that the Eva I and II, the Eva III and the Cherry skeletal series do not represent total paleo-populations. Instead, they represent that portion of the group that inhabited a particular site.

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1972 Hunter-Gatherer Populations and Archaeological Inference.
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APPENDICES

APPENDIX A

BURIAL MAPS OF THE EVA AND CHERRY SITES

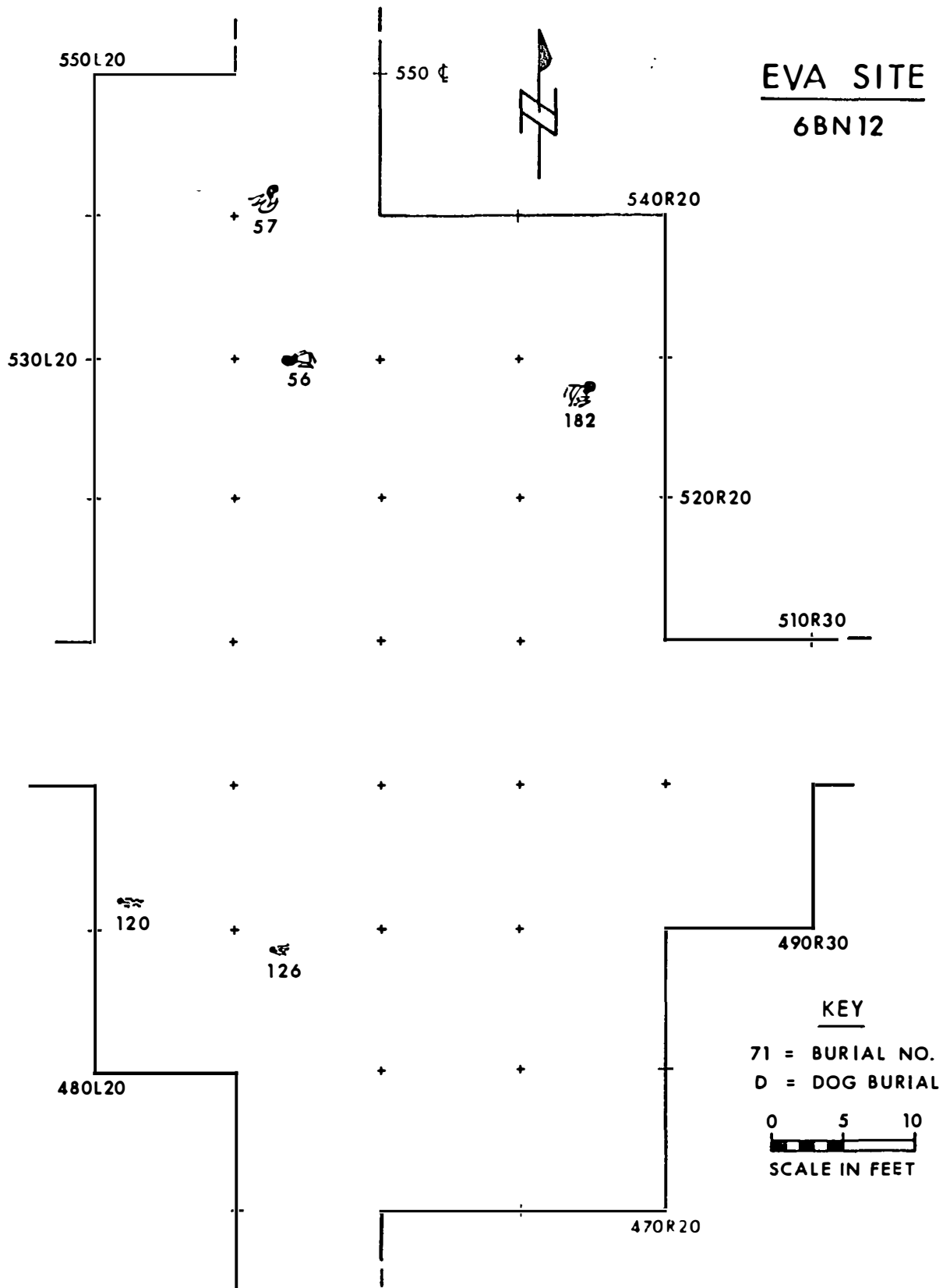


Figure A-1. Burial map of stratum IV bottom of the Eva I component (after Lewis and Lewis 1961).

EVA SITE

68N12

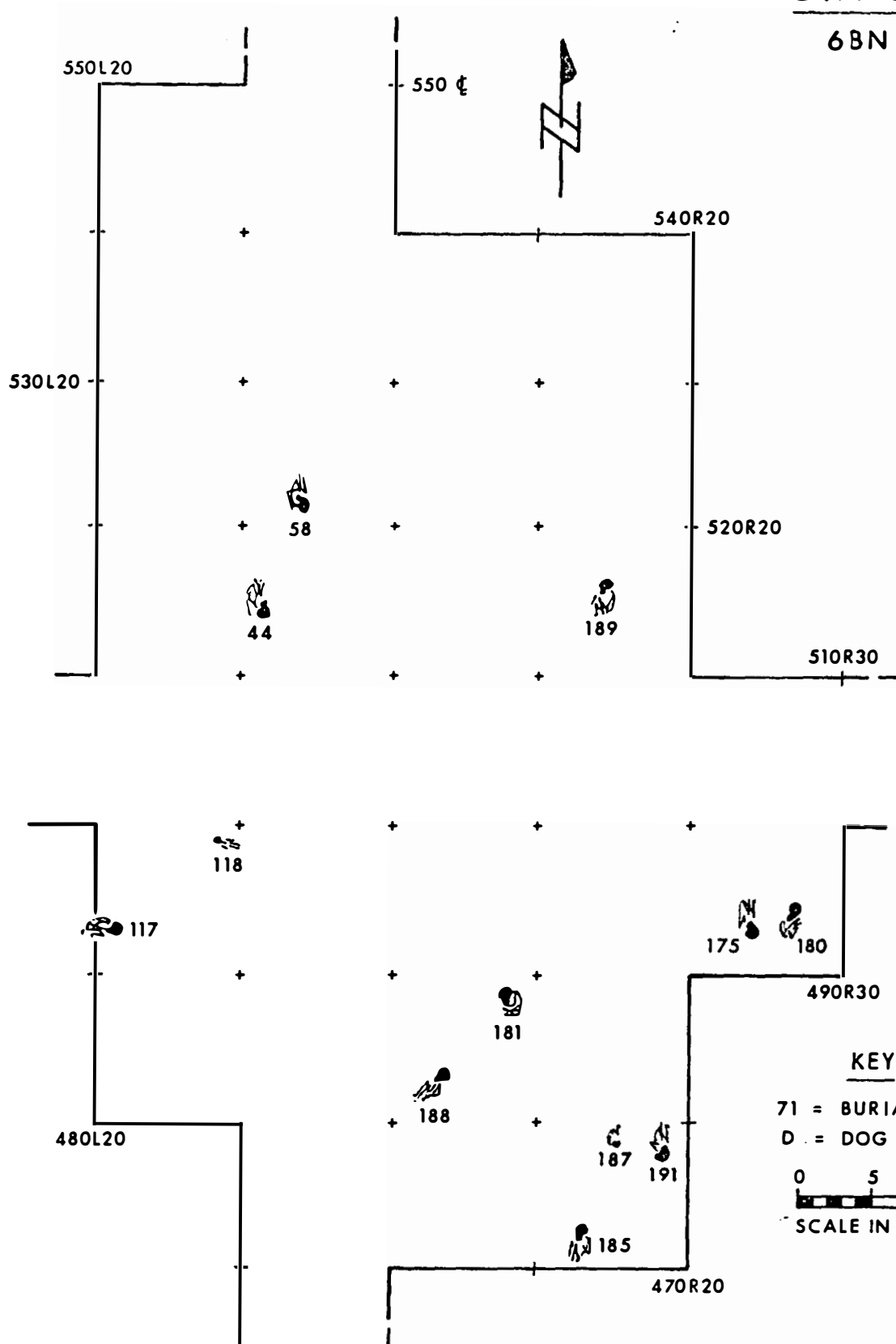


Figure A-2. Burial map of stratum IV top of the Eva I component (after Lewis and Lewis 1961).

EVA SITE

6BN12

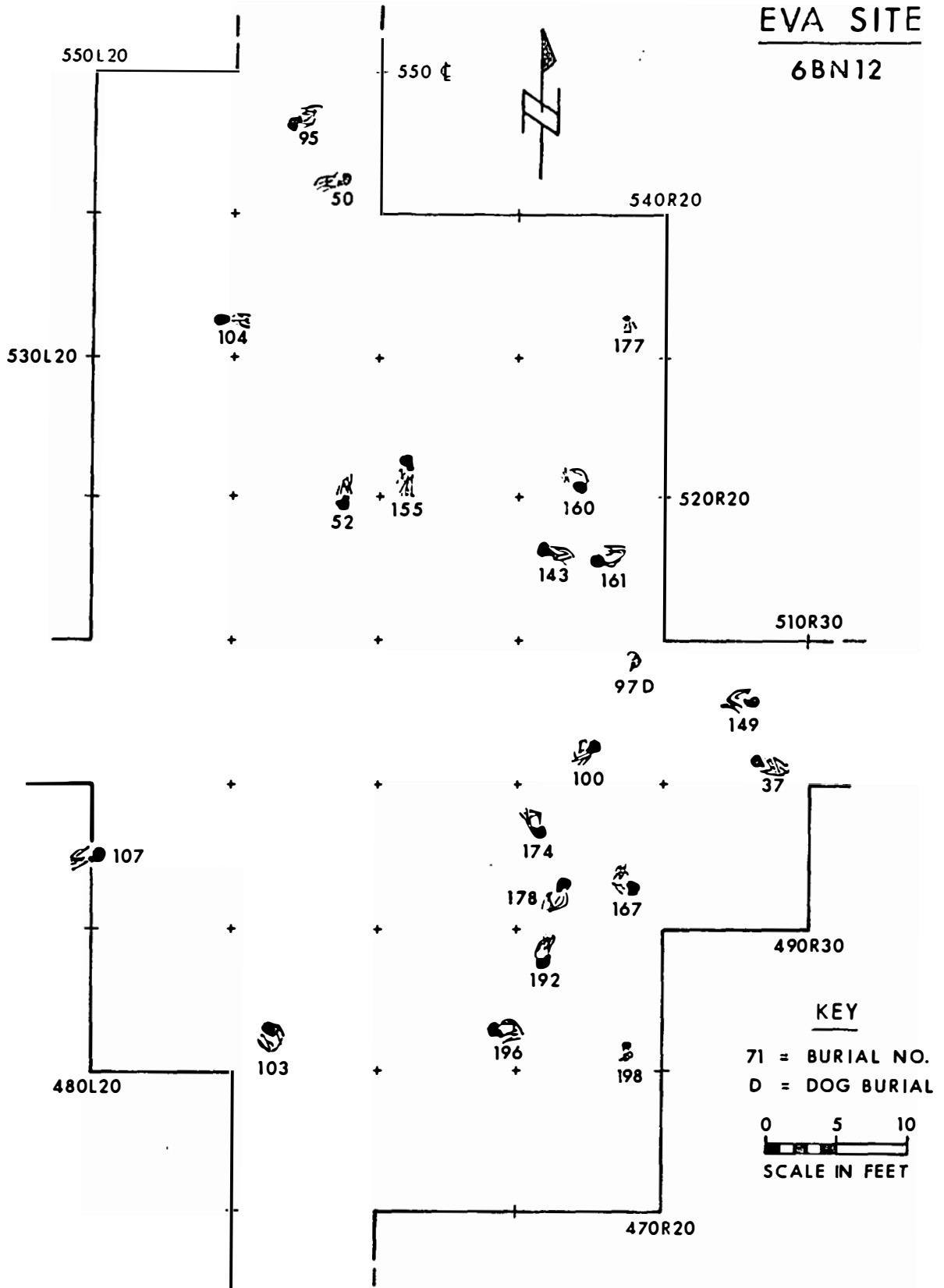


Figure A-3. Burial map of stratum II bottom of the Eva II component (after Lewis and Lewis 1961).

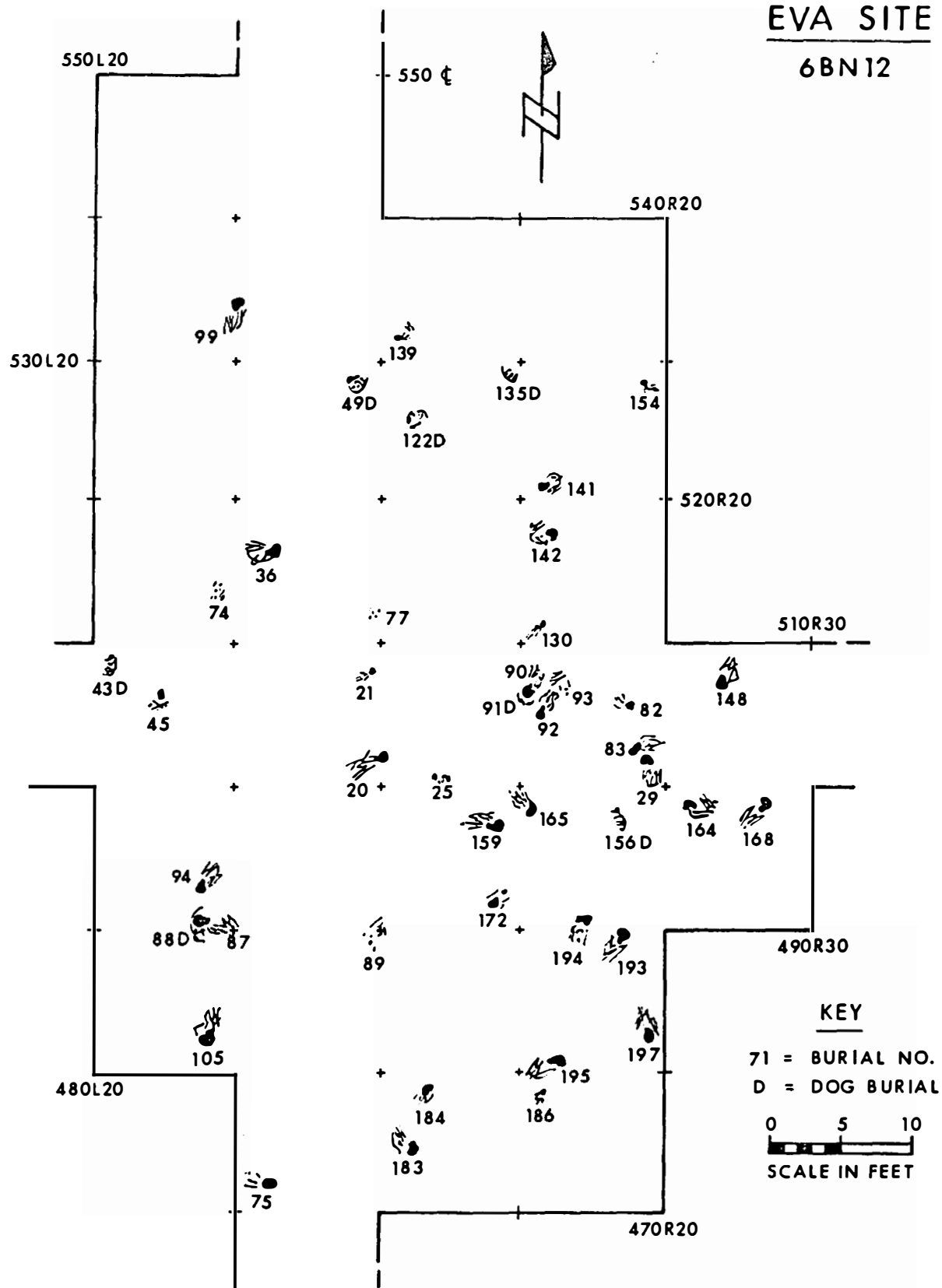


Figure A-4. Burial map of stratum II middle of the Eva II component (after Lewis and Lewis 1961).

EVA SITE

6BN12

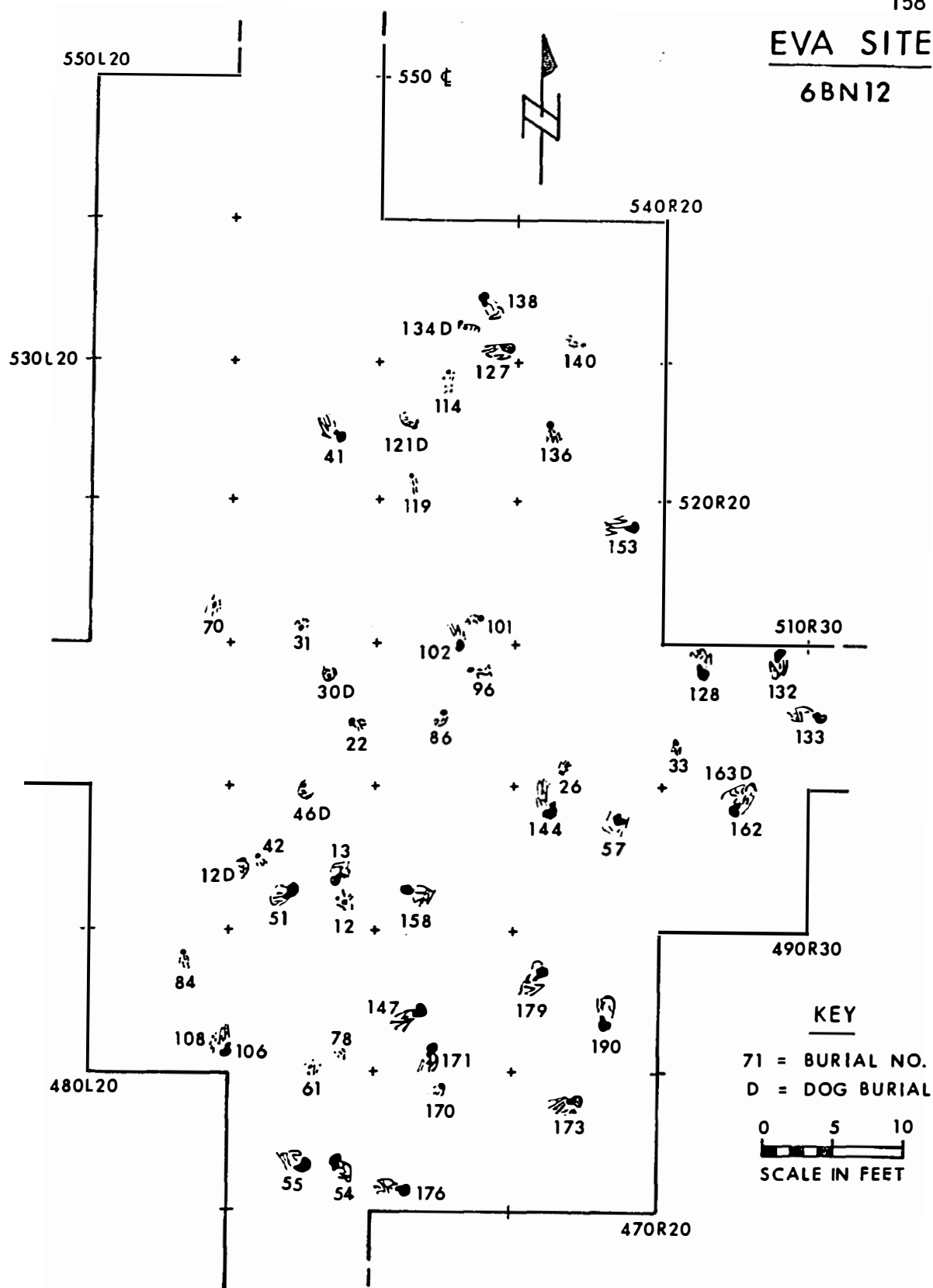


Figure A-5. Burial map of stratum II top of the Eva II component (after Lewis and Lewis 1961).

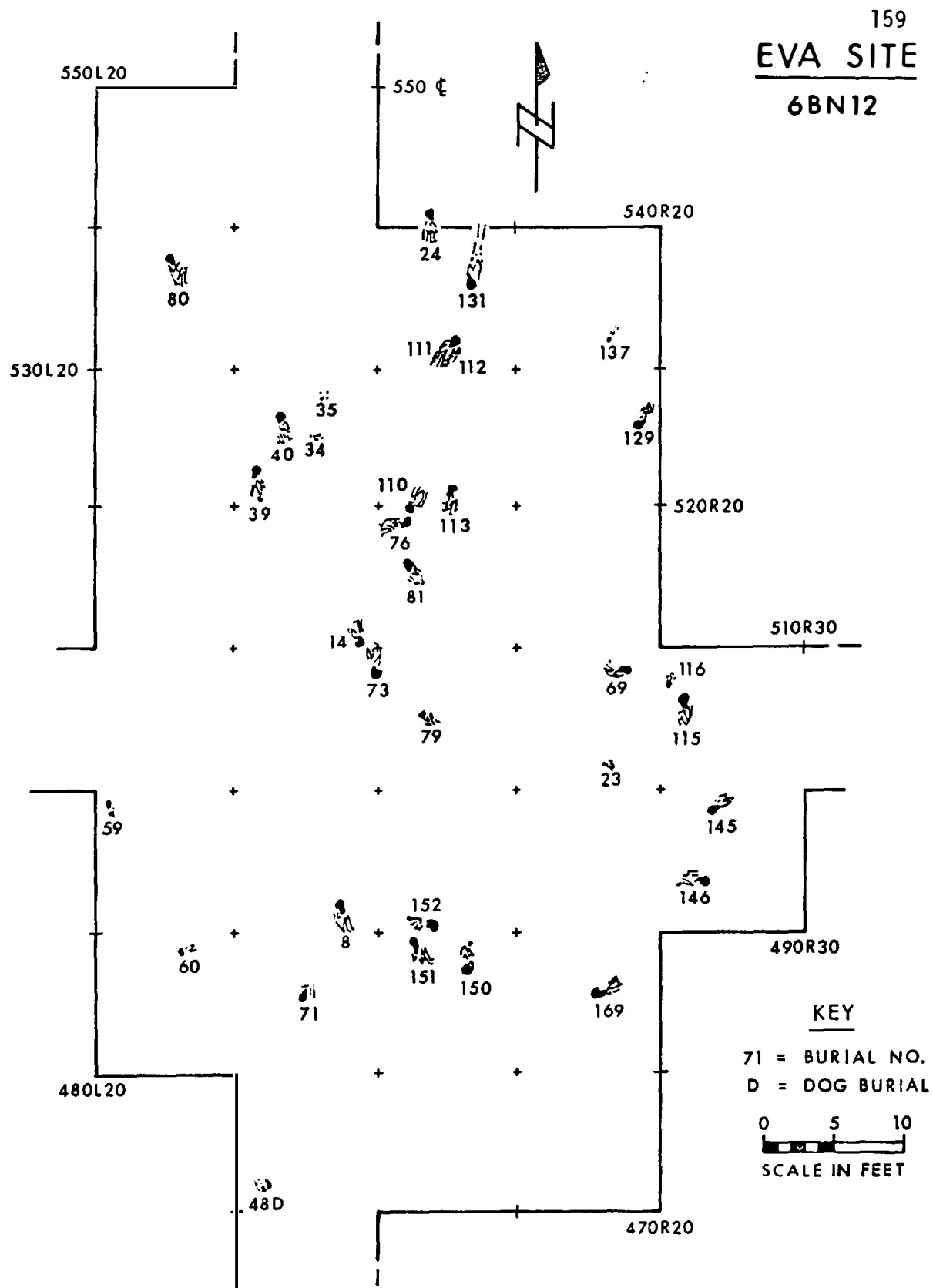


Figure A-6. Burial map of stratum I of the Eva III component (after Lewis and Lewis 1961).

EVA SITE

6BN12

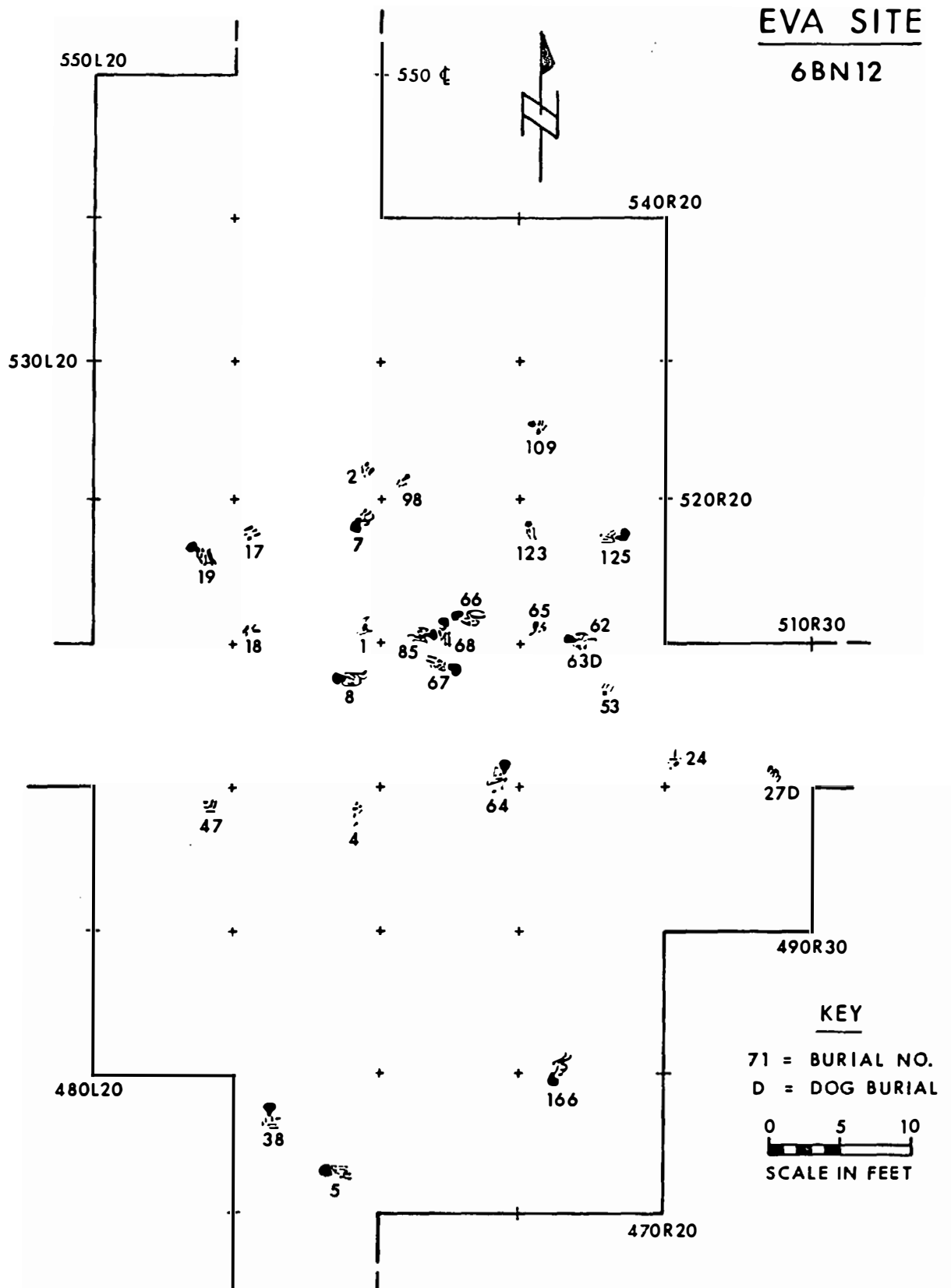


Figure A-7. Burial map of the plowzone of the Eva III component (after Lewis and Lewis 1961).

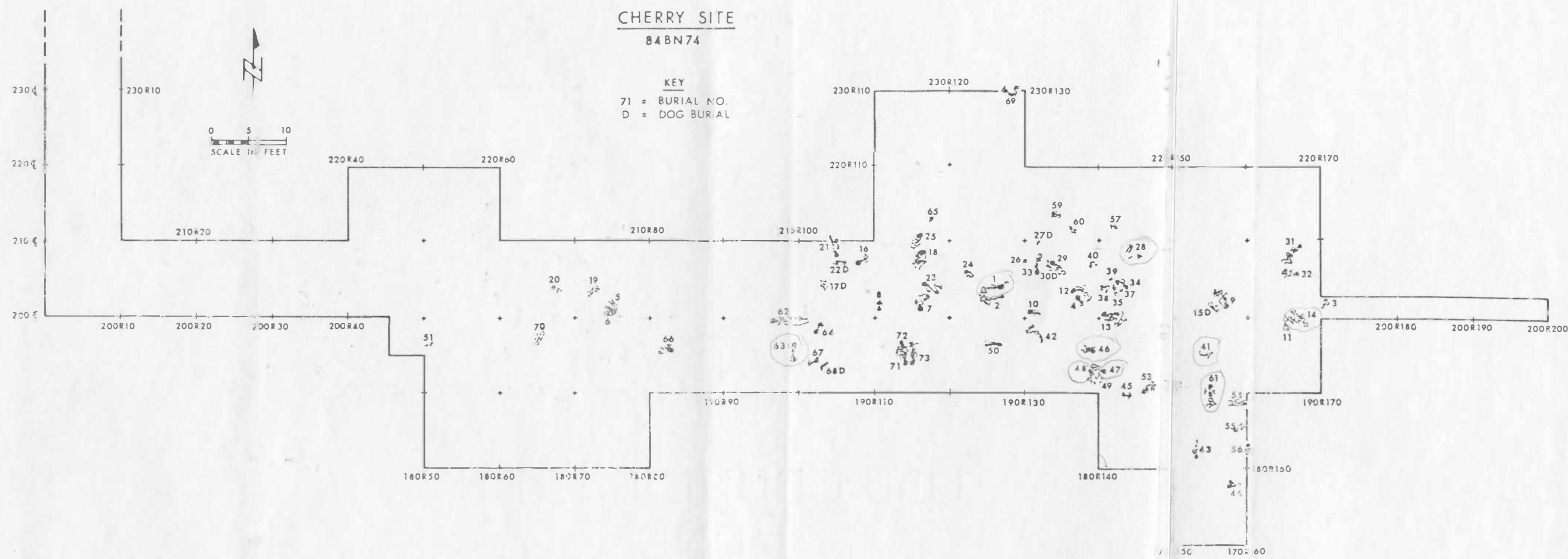


Figure A-8. Burial map of the Cherry site.

APPENDIX B

SKELETAL INVENTORY: AGE AND SEX

Criteria for the determination of age and sex is
presented in Chapter III.

Table A-1. Skeletal inventory of Eva site (6BN12) and Cherry site (84BN74).

Burial #	Stratum	Age	Sex
Eva I Component			
44	IV	25-30	M
56	IV B	20-25	M
57	IV	50+	M
58	IV T	25-30	M
117	IV B	35-40	M
118	IV B	2 yrs.	?
120	IV B	newborn	?
126	V	9-10 mo.	?
175	IV T	18-20	F
180	IV B	14-16	F
181	IV T	50+	M
182	IV B	30-35	F
185	IV B	Adult	F
187	IV B	2.5-3 yrs.	?
188	IV	35+	F
189	IV B	18-20	F
191	IV B	40-45	F
Eva II Component			
11	III	30-35	M
12	II T	1-1.5 yr.	?
13	II T	40-45	M
15	II M	19-21	M
20	II M	25-30	M
21	II M	0-1 yr.	?
22	II T	1-1.5 yr.	?
25	II M	fetus or newborn	?
26	II T	11 mo.-1 yr.	?
29	II M	16-17	F
31	II T	1-1.5 yr.	?
33	II B	fetus or newborn	?
36	II B	40-45	M
37	III	18-19	M
41	II B	50+	M
42	II T	newborn	?
45	II B	45-50	F
50	III	45-50	M

Table A-1. (continued)

Burial #	Stratum	Age	Sex
51	II T	35-40	M
52	III	9-10	?
54	II	20-25	M
55	II	50+	F
61	I T	Adult	M
70	II	Adult	?
74	II B	20-25	M
75	II	15-16	F
77	II	newborn	?
78	II	0-6 mo.	?
82	II B	9-10	?
83	II B	Adult	M
84	II	newborn-1.5 mo.	?
86	II	2-2.5	?
87	II	35-40	M
89	II B	30-35	F
90	II B	30-35	F
92	II B	30-35	M
93	II	45-50	M
94	II B	50+	M
95	III	50+	M
96	II B	.5-1 yr.	?
99	II B	50+	F
100	II B	17-18	F
101	II	1.5 yr.	?
102	II	45-50	F
103	III	25-30	M
104	III	35-40	F
105	III	30-35	M
106	II B	40-45	F
107	III	30-35	F
114	I	.5-1 yr.	?
119	II T	3-5 mo.	?
127	II B	30-35	F
128	II	45-50	F
130	II B	fetus	?
132	II B	40-45	F
133	II B	40-45	F
136	II	1-1.5 yr.	?
138	II B	50+	M
139	II B	6 mo.	?
140	II M	2-2.5 mo.	?
141	III	40-45	F

Table A-1. (continued)

Burial #	Stratum	Age	Sex
142	III	30-35	M
143	III	15-16	M
144	II	35-40	M
147	II	17-18	M
148	II B	50+	M
149	II B	30-35	F
153	II	30-35	F
154	II B	newborn	?
155	III	40-45	F
157	II	40-45	M
158	II B	30-35	F
159	II B	35-40	F
160	II B	40-45	F
161	III	40-45	F
162	IV T	11-12	?
164	II B	35-40	F
165	II B	40-45	M
167	II B	30-35	F
168	II B	40-45	F
170	II T	9 mo.-1 yr.	?
171	II T	50+	M
172	II	6-7	?
173	II	12-14	?
174	II B	35-40	M
176	II T	12-14	?
177	IV T	fetus	?
178	II B	18-20	F
179	II T	30-35	M
183	II B	Adult	?
184	II	11-12 mo.	?
186	II B	newborn - .5 yr.	?
190	II M	35+	F
192	II B	17-18	M
193	II B	25-30	F
194	II B	35-40	M
195	II B	45-50	M
196	IV B	14-15	?
197	II B	35-40	M
198	II B	6-7	?
Eva III Component			
1	PZ	Adult	?
2	PZ	Adult	F

Table A-1. (continued)

Burial #	Stratum	Age	Sex
3	PZ	Adult	?
4	PZ	Adult	M
5	PZ	Adult	?
6	PZ	25-30	M
7	PZ	50+	F
8	I	50+	M
9	PZ	50+	F
10	--	newborn	?
14	I	Adult	M
17	PZ	Adult	?
18	PZ	Adult	?
19	PZ	Adult	M
23	I	birth-6 mo.	?
28	I	18-20	M
34	I	Adult	?
35	I	Adult	?
39	II	50+	F
40	II	40-45	M
47	I	Adult	?
59	II T	1-1.5 yr.	?
60	II T	10 mo.-1 yr.	?
62	I	20-25	M
64	I	35-40	M
65	I	20-25	M
66	I	Adult	F
67	I	50+	M
68	I	Adult	?
69	I	35-40	M
71	II T	Adult	M
73	I	50+	M
76	II	50+	M
79	I	5	?
80	I	Adult	?
81	II	35-40	M
85	I	35-40	F
98	I	Adult	?
110	I	40-45	M
111	II T	40-45	F
112	II T	1.5 yr.	?
113	II T	45-50	F
115	II T	30-35	F
116	II T	newborn	?
123	I	6 mo.	?
124	I	50+	M

Table A-1. (continued)

Burial #	Stratum	Age	Sex
125	I	35-40	F
129	I	50+	F
131	I	25-30	M
137	II T	infant	?
145	II B	35-40	M
146	II B	35-40	F
150	II	50+	F
151	II	40-45	F
152	II	45-50	F
166	I	35-40	M
169	II T	45-50	M

Cherry Site

1	Adult	M
2	Adult	F
3	Adult	?
4	11 mo.-1 yr.	?
5	Adult	M
6	30-35	M
7	45-50	M
8	2.5-3 yr.	?
9	25-30	M
10	9 mo.	?
11	Adult	?
12	30-35	M
13	20-25	M
14	35-40	M
16	4-5 yr.	?
18	18-19	F
19	2 yr.	?
20	12-16	?
21	30-35	M
23	50+	F
24	11-12 mo.	?
25	40-45	M
26	50+	F
28	25-30	M
29	25-30	M
31	14-15	?
32	50+	F
33	35-40	M
34	11-13	?
35	10-11	?

Table A-1. (continued)

Burial #	Stratum	Age	Sex
36		1.5 yr.	?
37		25-30	M
38		17-18	F
39		9 yr.	?
40		Adult	M
41		17-20	?
42		35-40	M
43		Adult	?
44		Adult	F
45		8-9	?
46		45-50	M
47		30-35	F
48		17-18	F
50		45-50	F
51		Adult	?
52		Adult	?
53		40-45	M
54		Adult	M
55		11-13	?
56		50+	M
57		Adult	F
58		fetus or newborn	?
59		35-40	M
60		Adult	?
61		45-50	F
62		25-30	M
63		35-40	F
64		Adult	?
65		2-2.5 yr.	?
66		30-35	M
67		Adult	?
69		25-30	F
71		19-20	M
72		25-30	M
73		20-25	F

APPENDIX C

CODE FORMAT

VAR # COL #

- | | | | |
|---|-----|---|--------------------|
| 1 | 1 | Site Number | |
| | | 1. 6BN 12 | |
| | | 2. 84BN74 | |
| 2 | 2-4 | Burial Number | |
| 3 | 5-6 | Stratum | |
| | | 1. plowzone | 8. IV bottom |
| | | 2. I | 9. V |
| | | 3. II top | 10. II |
| | | 4. II middle | 11. IV |
| | | 5. II bottom | 12. general midden |
| | | 6. III | 99. indeterminate |
| | | 7. IV top | |
| 4 | 7 | Phase Designation | |
| | | 1. Eva | |
| | | 2. Three Mile | |
| | | 3. Big Sandy | |
| 5 | 8-9 | Age | |
| | | 1. 0-5 | 8. 35-40 |
| | | 2. 5-10 | 9. 40-45 |
| | | 3. 10-15 | 10. 45-50 |
| | | 4. 15-20 | 11. 50+ |
| | | 5. 20-25 | 12. adult |
| | | 6. 25-30 | 13. subadult |
| | | 7. 30-35 | 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 | |
| | | 9. indeterminate | |
| 8 | 12 | Individuality | |
| | | 1. single | 4. mass |
| | | 2. double | 5. fragmentary |
| | | 3. multiple | 6. partial |
| | | | 9. indeterminate |

VAR #	COL #	
9	13	Articulation 1. articulated 2. semi-articulated 3. disarticulated 4. rearticulated 9. indeterminate
10	14	Position 1. extended 2. semi-flexed, legs at greater than right angle to trunk 3. flexed-legs at less than right angle to trunk 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-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	Anomolies 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

VAR #	COL #	
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
33	68	Associated Dog Burial 1. no 2. yes
34A	69-72	X coordinate for burial location
34B	73-76	Y coordinate for burial location
	card 2	
35	1	Site Number 1. 6BN12 2. 84BN74
36	2-4	Burial Number
37	5	Grave goods 1. utilitarian 2. ceremonial or ornamental 3. both 1 and 2 9. 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

VAR # COL #

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 bracelets
61	29	Ochre
62	30	Unworked bone necklace--such as vertebrae
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
75		Hunting, fishing, and plant food acquisition tools includes variable #'s 38,39,42,43,44,45,46,65,70, 71,72,73
76		Domestic (woodworking, hideworking, weaving) includes variable #'s 40,41,47,48,49,55,56,58,66,68
77		Exotic trade goods includes variable #'s 50,54
78		Ornamental and entertainment includes variable #'s 51,52,53,57,59,60,61,62,63, 64,67,74

VITA

Ann L. Magennis was born in Grand Rapids, Michigan on February 13, 1951. She attended primary and secondary schools in that city and was graduated from Creston High School in June 1969. The following September she entered Michigan State University, and in June 1973 she received a Bachelor of Arts degree in Anthropology. In the fall of 1974 she began study toward a Master's degree in Anthropology at The University of Tennessee, Knoxville. This degree was awarded in August 1977.