CURRENT ARCHAEOLOGICAL RESEARCH IN KENTUCKY: VOLUME FOUR

edited
by

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Pictured on the cover is a mud glyph from cave site 15Wa6, Warren County, Kentucky. Illustration is by Daniel B. Davis.

PREFACE

Since its creation in 1966, the Kentucky Heritage Council has taken the lead in preserving and protecting Kentucky's cultural resources. To accomplish its legislative charge, the Heritage Council maintains three program areas: Site Development, Site Identification, and Site Protection and Archaeology. Site Development administers the state and federal Main Street programs, providing technical assistance in downtown revitalization to communities throughout the state. It also runs the Certified Local Government, Investment Tax Credit, and Restoration Grants-in-Aid programs.

The Site Identification staff maintains the inventory of historic buildings and is responsible for working with a Review Board, composed of professional historians, historic architects, archaeologists, and others interested in historic preservation, to nominate sites to the National Register of Historic Places. This program also is actively working to promote rural preservation and to protect Civil War sites.

The Site Protection and Archaeology Program staff works with a variety of federal and state agencies, local governments, and individuals to assist in their compliance with Section 106 of the National Historic Preservation Act of 1966 and to ensure that potential impacts to significant cultural resources are adequately addressed prior to the implementation of federally funded or licensed projects. They also are responsible for administering the Heritage Council's archaeological programs, which include the agency's state and federal archaeological grants; organizing this conference, including the editing and publication of selected papers; the dissemination of educational materials, such as the Kentucky Before Boone poster and booklet; and the Kentucky Archaeological Registry, which is designed to provide information of site management and protection to the owners of Kentucky's most important archaeological sites. On occasion, the Site Protection and Archaeology Program staff undertakes field and research projects, such as emergency data recovery at the Shelby Lake Site (15Sh17) in Shelby County.

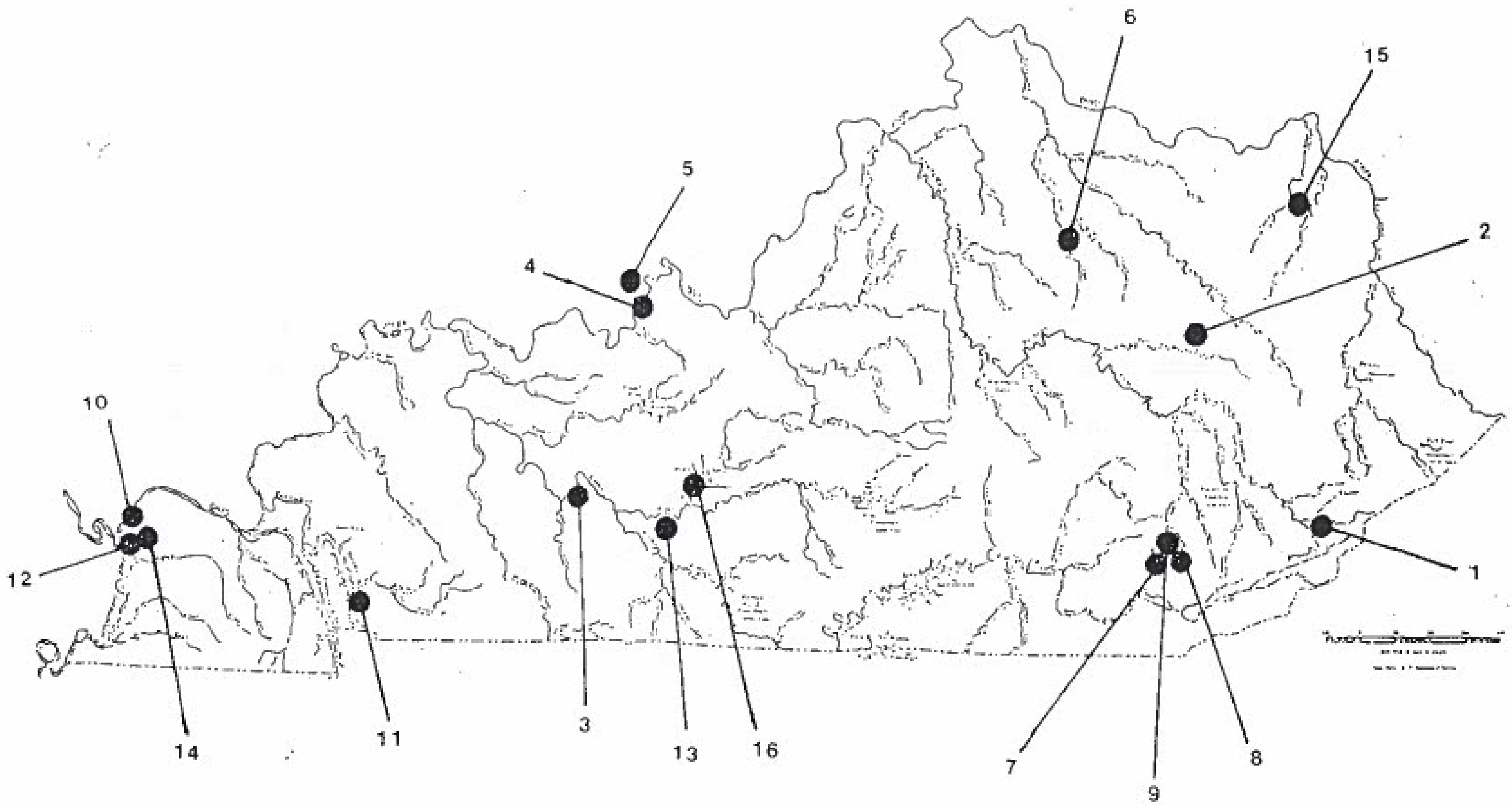
The Ninth Annual Kentucky Heritage Council Archaeological Conference was held at Murray State University in the spring of 1992. Due to staff reductions at the Kentucky Heritage Council, editing and publication of papers presented at the Ninth Conference was delayed for several years. A number of the papers were subsequently included in the publication for the Eleventh Annual Kentucky Heritage Council Archaeological Conference (Doershuk et al., 1995). However, papers by Miday (investigations at Cornett Woods Rockshelter in Letcher County), Jefferies (a preliminary survey of Mississippian sites in southeastern Kentucky), Davis (a description and discussion of mud glyphs from a cave in west Kentucky), and Carstens and Dowdy (a metal detector survey near Fort Jefferson in Ballard County) are included here.

In 1993, the University of Kentucky was host for the Kentucky Heritage Council's Tenth Annual Archaeological Conference. Of the twenty nine papers presented, twelve were accepted for publication in this volume, five were published in a recent volume on historic archaeology (McBride et al., 1995), and one was included among the papers published from the Eleventh Annual Archaeological Conference (Doershuk et al., 1995). Included here are papers by Gremillion (a general description of the Rock Bridge Shelter), Applegate (an analysis of lithic materials from Rock Bridge Shelter), Herrmann (paleodemography of the Read shell mound), Bader (Early Woodland site variation along certain portions of the Ohio River Valley bottomlands), Jefferies and Flood (survey and testing of Mississippian sites along the Cumberland River in southeastern Kentucky), Henderson and Pollack (a discussion of the New Field Site, an Early Madisonville Horizon site in Bourbon County), Burks and Stout (discussion of a controlled surface collection and archaeological salvage at the Twin

Mounds Site in Ballard County), Stout, Walz, and Burks (investigations at the Canton Site in Trigg County), Wesler (new thoughts on the Mississippian landscape at Wickliffe Mounds in Ballard County), Matternes (Late Prehistoric mortuary behavior in the Jackson Purchase), Powell (possible medical properties of seeds found with the cave mummy, Fawn Hoof), and Carter (an investigation of a lithic scatter site as a case study in research design development). The map on page v shows the locations of major sites mentioned in this volume.

Murray State University and the University of Kentucky were both gracious hosts for the Ninth and Tenth conferences. Especially helpful with conference details and local arrangements was Kenneth Carstens at Murray State University, and Richard Jefferies at the University of Kentucky. Kentucky Heritage Council staff assisting with conference proceedings included Site Protection Program Manager Thomas N. Sanders, and Staff Archaeologists Charles D. Hockensmith, David Pollack, and Valerie Haskins. Finally, editors for this volume, Sara Sanders, Thomas Sanders, and Charles Stout, are to be commended for their many long hours preparing this manuscript. The papers published here reflect the great diversity in current archaeological research in Kentucky.

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer



Location of Sites Discussed in this Volume: 1) Corrnett Woods Rockshelter; 2) Rock Bridge Shelter; 3) Read Shell Midden; 4) Rockmaker Site; 5) Mogan Site; 6) New Field Site; 7) Croley-Evans Site; 8) Open Site 15Kx25; 9) Bennett Site; 10) Twin Mounds; 11) Canton Site; 12) Wickliffe Mounds; 13) Cave Site 15Wa6; 14) Fort Jefferson; 15) Fontana Site; 16) Short Cave.

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The Homesick Heart

(Variations nostalgiques)

by

Edna St. Vincent Milieu

Where is the county the most highly favored?
Where are the foodstuffs most tastily flavored?
Where is the bird's song, most delicate, quavered?
    And where is the heart light at close of the day?
    In Butler's incomparable miliay!

Where are the countryfolk most good and honest?
Where are the lily maids most pure and wanest?
Where is the nickel when spent the most gonest?
    And where are the spring's roads unsullied by goo?
    In Butler's incomparable milioo!

Where are the bathtubs, per capita, highest?
Where are the citizens devoutest and driest?
Where is the outlook broadminded, unbiased?
    Of what does memory cause eye to blur?
    Why, Butler's incomparable milyer!

Where is produced the most corn on least acres?
Where is Elysium for candlestick makers?
Where do the latest books find the most takers?
    In some fabled land a great distance from here?
    Why, NO! I just toldja -
        In Butler's incomparable MEALY-EAR!!

Fap!
As I said before,
I give up.

R.D. Brown

PREHISTORIC PLANT USE IN THE EASTERN MOUNTAINS: A VIEW FROM CORNETT WOODS ROCKSHELTER, LETCHER COUNTY, KENTUCKY

By

Charles Miday
Department of Anthropology
University of Kentucky
Lexington, Kentucky

ABSTRACT

Data relating to the occupation of Cornett Woods Rockshelter in Letcher County, Kentucky is presented. These data were accumulated from collections made at the site (15Lr23) in 1989 and 1990. They suggest at least occasional occupation of the site from the Archaic period through the Late Prehistoric. Emphasis is placed on the botanical remains, which suggest that the site may have been the location of a farmstead centered around Phalaris caroliniana *(Maygrass), during the Late Woodland period.*

INTRODUCTION

Cornett Woods Rockshelter (15Lr23) is located in west-central Letcher County, along the western boundary of Lilley Cornett Woods, an old growth forest owned by the Commonwealth of Kentucky and managed as an Appalachian Ecological Research Station by Eastern Kentucky University in Richmond, Kentucky. The rockshelter is formed out of a sandstone outcrop of the Breathitt Formation (Maughan 1976) along the top of a ridge approximately 550 m above mean sea level. Facing southeast, it is located in the headwaters of an unnamed, permanent stream, a tributary of Line Fork Creek, which itself is a tributary of the North Fork of the Kentucky River.

The shelter measures 20.2 m wide by 5.7 m deep, with a 5-6 m high ceiling. The floor is mainly dry, though some moisture seepage occurs along the back wall. There is little in the way of roof fall (Henderson 1989:2). A bench of varying depth stretches along the back wall of the shelter about 1.5 m above the floor with an opening less than 0.5 m. The crest of the ridge rises about 5 m above the shelter, forming a protective barrier from northwest winds.

Due to its isolated location and protected status until a coal haul road was built about 100 m west of the shelter in 1987 (personal communication with Mike Broetzke, Cornett Woods Supervisor), the Cornett Woods Rockshelter had escaped disturbance from looters, which plagues many rockshelter sites in eastern Kentucky (Ison 1988:205). The coal haul road has since allowed easy access to the site out of view of the Woods' personnel. The site was initially looted between 1987 and 1989. In February of 1989 a surface reconnaissance was made of the shelter. A small artifact collection was made at that time, and a Kentucky Archaeological Site Survey Form completed. Further looting occurred in the summer of 1989 and again before February of 1990. These last incidents prompted a more extensive investigation of the site.

The field investigations were conducted by Gwynn Henderson and Theresa Tune of the Program for Cultural Resource Assessment (PCRA) at the University of Kentucky and David Pollack of the Kentucky Heritage Council. They were accompanied to the site by Mike Broetzke, the Superintendent of the Woods.

The site was mapped using a plane table, alidade, and tape. The location and extent of looters' disturbances were plotted on a site map (Figure 1). A surface collection was made of the shelter floor and the looters' back dirt piles. An undisturbed area near the center of the back wall was selected for a 1 x 1 m test unit (Test Unit 1). Soil was screened through mesh hardware cloth and flotation and radiocarbon samples were retrieved. The materials collected from the site (Table 1) were taken to the laboratory at the PCRA where they were washed, cataloged and analyzed.

RESULTS OF INVESTIGATION

Midden ranges from 8 to 34 cm were determined from the looters' holes, which were scattered throughout the shelter floor. The thinnest midden appeared in the western third of the shelter. During the mapping of the shelter and the documentation of the looters' holes, it was observed that one of these holes had disturbed a prehistoric feature. Test Unit 1 was placed adjacent to this disturbance to document the feature.

Test Unit 1 contained two zones (Figure 2). Zone 1 was a 12 to 20 cm deep midden above Zone 2 subsoil. Zone 1 was a dark brown surface material 2 to 4 cm deep above a light gray brown midden. The subsoil was a light brown to a yellow brown rocky soil. A looters' hole intruded into the west wall of the unit, reaching 26 cm into the unit.

Feature 1, a small pit of dark brown soil lined with rocks, extended into the unit from the looters' hole 40 cm from the west wall and 30 to 70 cm from the north wall. The pit was 20 cm deep and partially lined with rocks. A medium gray soil was encountered in the northwest corner of the unit at 20 cm of depth. This was a pit extending 36 cm deep, designated Feature 2.

LITHICS

Chert, a fine grained quartz with unusually conchoidal fracture patterns (Stein 1978:157; Thatcher 1980:141), is the raw material used in tool making at this site. The closest chert source is the lower member of Newman Limestone on Pine Mountain (Maughan 1976), which is 11.1 km southeast and 125 m higher elevation above the site. The chert also may have been available as gravels in nearby stream beds.

Projectile points recovered from the surface of the site included a Late Prehistoric Madison point (Justice 1987:224-227) and an Early Archaic Kirk Corner Notched point (Justice 1987:71-77). Also recovered were hafted, biface and uniface tools, along with much debitage.

CERAMICS

Ceramics recovered from Cornett Woods Rockshelter included limestone, sandstone, siltstone and shell tempered sherds. These occurred with plain or cordmarked surfaces, except for the shell tempered sherds which only had plain surfaces. In Feature 2, limestone tempered pottery with a checkstamped surface was recovered.

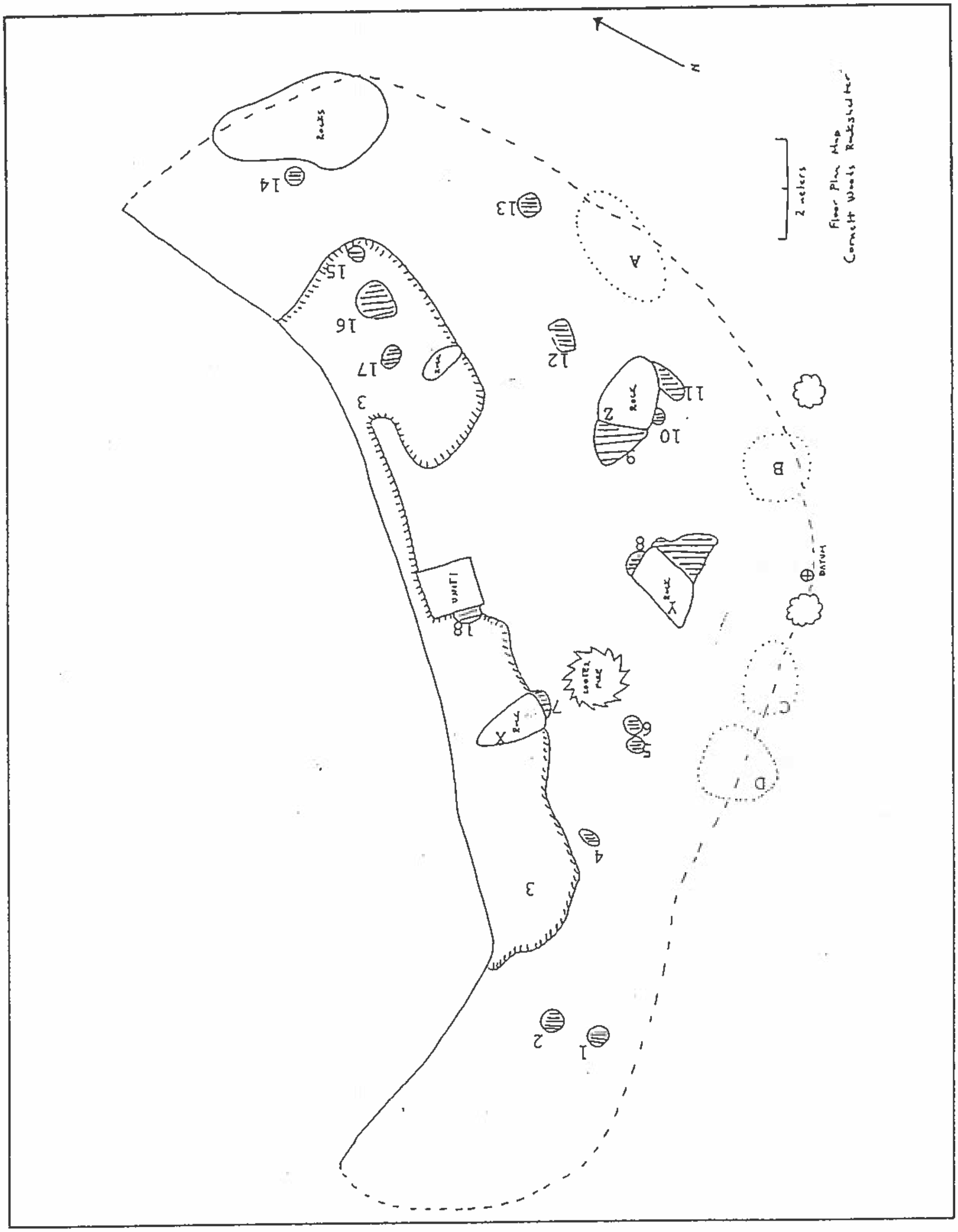

Figure 1. Floor Plan Map of Cornett Woods Rockshelter

Table 1. Artifacts Recovered.

Lithic Tools	#	% of total
Madison Point	1	2.2
Kirk corner notched point	1	2.2
Point tip	1	2.2
Drill, reworked point	1	2.2
Hafted scraper	1	2.2
Uniface fragments	5	11.5
Biface fragments	13	29.7
Modified flakes	21	47.8
Total	**44**	**100.0**
Identifiable Bone		
Mammal	13	72.2
Bird	4	22.3
Reptile	1	5.5
Total	**18**	**100.0**
Ceramics		
Limestone tempered	122	53.9
Sandstone tempered	50	22.3
Siltstone tempered	9	4.2
Shell tempered	2	0.9
Shell-sandstone tempered	2	0.9
Undetermined	40	17.8
Total	**227**	**100.0**

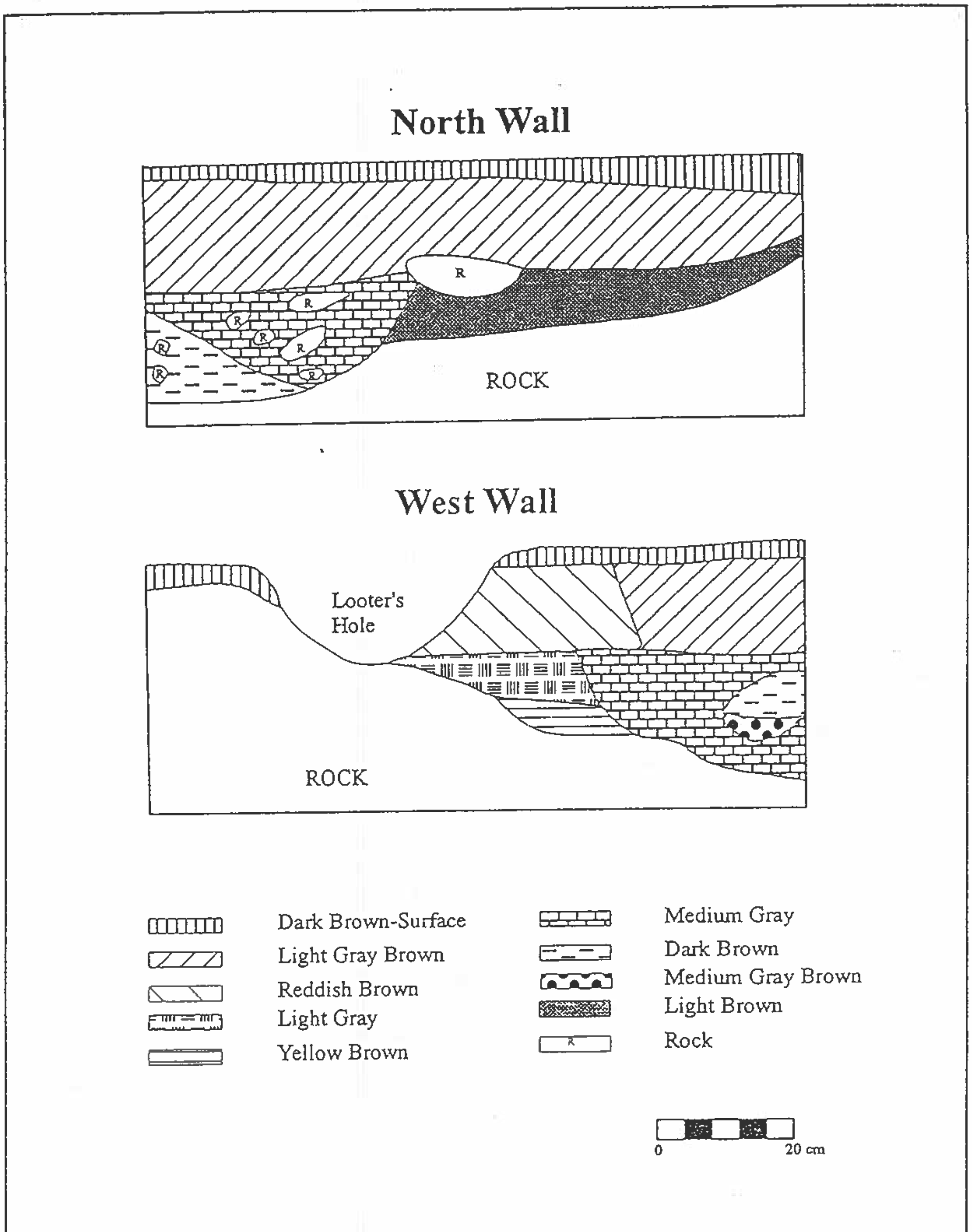

Figure 2. Unit 1: Profiles of the North and West Walls.

These sherds, which appeared to have similar paste, temper size and thickness range, resemble Wright Check Stamped (Browning 1982:18-19).

The occurrence of shell tempered sherds and a Madison point indicate the presence of a Late Prehistoric component at the site. If the Crase Site (15Lr2) (Purrington 1967) location can be confirmed on a knoll in the flood plain of Line Fork Creek, it may present the possibility of this rockshelter as a hunting camp associated with that village. The bulk of the pottery, however, appears to date to the late Middle Woodland or the early LateWoodland, based on sherd thickness and temper types. Wright Check Stamped ceramics also suggest these Woodland periods (Browning 1982:18-19). The siltstone and sandstone tempered pottery lacks definitive evidence for type assignment, but the tetrapodal support argues for a Woodland assignment.

FAUNAL REMAINS

Bone was recovered from both features and from three levels of the test unit. Bone preservation was good. All of the samples had been subjected to intense heat and most were small. These conditions limited identification to major animal taxa. Of the identifiable bone, 81% was mammal, 15% was bird, and 4% was amphibian. None of the bone appeared to have been altered. The faunal remains from 15Lr23 suggest a varied diet available to the inhabitants.

BOTANICAL REMAINS

A small amount of botanical material, consisting of carbonized wood, nuts, and seeds, was recovered from two liters of flotation samples taken from the two features excavated at the site. These samples were processed through a flotation tank designed by John Carter. The tank uses a two tub utility basin with plumbing to allow water circulation from both the bottom of the tub and from a hand held sprayer, and for controlled drainage. It has a two piece heavy fraction screen (.85 mm) assembly, which fits inside the basin. The light fraction is floated through an upper, side tube into an .85 mm (#20 mesh) fiberglass screen, while the heavy fraction is collected in the lower screen.

Once dried, each sample was sieved through a 2 mm mesh. Samples larger than 2 mm were examined for both wood charcoal and seeds. Charcoal samples larger than 2 mm provide more reliable identification and are considered representative of smaller specimens, except for acorn and squash rind (Asch and Asch 1975). All material smaller than 2 mm was carefully scanned for carbonized seeds.

Analyzed samples were examined under 4x and 8x magnifying lenses and a microscope at 10x and 30x. Seed and nut identification was aided by use of a comparative collection of both archaeological and modern seeds, along with standard seed catalogs (Martin and Barkley 1961; Montgomery 1977). Wood charcoal analysis was accomplished through comparison with wood blocks. Macroscopic wood characteristics were discerned from species' cross section. Changes occurring during carbonization were also accounted for to ensure accuracy of identification (Rossen 1985; Rossen and Olsen 1985).

WOOD CHARCOAL

The majority of the charcoal specimens (n=1963, or 72%) are wood charcoal, but species identification was limited by the small size and the extreme firing of the samples. Identifiable species include white oak, pine, southern yellow pine, American chestnut, and butternut (Table 2).

Table 2. Wood Charcoal.

Wood	Number	% of Total
White oak	32	.0163
Pine	31	.0158
S. Yellow Pine	5	.0025
American chestnut	6	.0030
Hickory	10	.0051
Butternut	2	.0010
Softwood (unspecified)	12	.0061
Hardwood (unspecified)	37	.0188
Subtotal	**135**	**.0687**
Unidentified	1828	.9312
Total	**1963**	**.9999**

Table 3. Nutshell.

Nut	Number	% of Total
Hickory	66	.623
Walnut	17	.160
Butternut	3	.028
SUBTOTAL	86	.811
Unidentifiable	20	.189
TOTAL	**106**	**.999**

NUTSHELL

Nutshells were present in both flotation and screened samples. Hickory accounted for 77% of identifiable nutshell remains, with black walnut 20% and butternut 4% (Table 3).

SEEDS (Table 4)

Catchfly (*Silene sp.*)

This species is represented by one seed from Feature 2. A native plant in a widespread family, often called pinks (Meijer 1990:40), varieties recorded in Letcher County include *Silene ovata*, *Silene stellata*, and *Silene virginicum* (Meijer 1990:50-51). Though not recorded in Letcher County, Leaved Catchfly (*Silene rotundifolia*) has been found in dry rockshelters in nearby counties. This species is not a recognized food source and may be intrusive.

Sumac (*Rhus sp.*)

One sumac seed (*Rhus sp.*) was found in Feature 2. Early historic Native Americans chewed the root for mouth sores and made a decoction of the root and bark to cure gonorrhea (Lust 1987:370-371). The berries, rich in Vitamin C, were eaten fresh and stored for the winter (Rossen 1985:252). The fruits also contain calcium and potassium along with volatile oils and tannins (Moore 1989:118-119).

Pokeweed (*Phytolacca americana*)

Two pokeweed seeds (*Phytolacca americana*) were found in Feature 1. The leaves and young shoots were an early spring plant food (Reed 1971:148). The root was also used medicinally by Native Americans (Millspaugh 1974:558). Pokeweed seeds were used prehistorically, perhaps medicinally, as represented in fecal matter from Salts Cave, Kentucky (Yarnell 1969:44-46).

Grape (*Vitis sp.*)

Three wild grape seeds (*Vitis sp.*) were recovered from Feature 1. Wild grape was a common food source of Native Americans (Niethammer 1974:69-69).

Amaranth (*Amaranthus sp.*)

Two amaranth seeds (*Amaranthus sp.*) were found in Feature 2. Amaranth is a native erect annual (Angier 1978:33) that grows in disturbed places (Niethammer 1974:118). The seeds are low in fat but are considered superior to other seed foods as a protein supplement because they contain the essential amino acid lysine. Archaeological evidence of amaranth is not widespread, and its prehistoric use in the eastern United States has only been firmly documented at a few sites (Fritz 1990:399; Smith et al.1992:294-5; Watson 1969).

Goosefoot (*Chenopodium sp.*)

Goosefoot (*Chenopodium sp.*), also referred to as lambsquarters, is represented by one seed in the sample from Cornett Woods Rockshelter, from Feature 1. Goosefoot is similar to amaranth in appearance and habitat (Angier 1978:33). The seeds have a high carbohydrate content. Goosefoot was a major food source for

Table 4. Recovered Seeds from Test Unit One

Seeds	Feature One	Feature Two
Catchfly		1
Silene sp.		
Sumac		1
Rhus sp.		
Pokeweed	2	
Phytolacca amer.		
Grape	3	
Vitis sp.		2
Amaranth		
Amaranthus sp.		
Goosefoot	1	
Chenopodium sp.		
Squash	1	
Cucurbita sp.		
Maise	1	1
Zea mays		
Maygrass		2686
Phalaris caroliniana		
TOTAL	8	2691

many Middle and Late Woodland people (Styles 1981:82-83), and its consumption is documented for the Archaic period (Asch et. al. 1972:16).

Squash (Cucurbita *sp.*)

Squash (*Cucurbita sp.*) is represented by a rind segment from Feature 1. Cucurbits are thought to be one of the earliest cultivated New World plants, having been dated to 5500 - 4000 B.C. at the Koster and Napoleon Hollow sites in Illinois (Adovasio 1982; Fritz 1990). The seeds, fruit pulp, flowers, and roots were used for food. Also, the hollowed shells were used as containers (Fritz 1990:406; Smith 1992:10).

Squash is believed, by some, to have diffused into North America from Mexico through the southwestern United States (Chomko and Crawford 1978; Cutler and Whitaker 1961; Kay et al 1980); while others believed that it traveled north along the gulf coast (Riley et al 1990). A recent view is that some gourds may have been native to the eastern United States (Decker-Walters 1990:96-101; Decker and Wilson 1987:263-273; Smith 1992:35-62).

Maize (*Zea mays*)

One segment of a maize kernel (*Zea mays*) was found in Feature 1 and a segment of a cupule was recovered from Feature 2. These samples were too small for thorough analysis. Although not considered to have been heavily used until the Late Prehistoric period in the eastern United States (Jennings 1989:135), it is found occasionally in Woodland sites in small quantities (Adovasio 1982:922-926; Fritz 1990:397). Because of their small size and the possibility that they may have drifted from a later context, these samples cannot be solidly assigned to a Woodland context.

Maygrass (*Phalaris caroliniana*)

Maygrass (*Phalaris caroliniana*) is the most plentiful seed occurring in this collection with 2686 seeds recovered from the light fraction of the flotation sample from Feature 2. Maygrass is a weedy annual that occupies disturbed habitats (Rossen 1985:249-250). It has been recognized as an important plant food of Woodland cultures, having been found in sites in West Virginia (Rossen 1985; Wymer 1990), Tennessee (Cowan 1978), Illinois (Johanesson 1989), and Kentucky (Asch and Asch 1982; Railey 1990). It is nutritionally similar to *Chenopodium* (Crites and Terry 1984). Its spring maturation would have made it an important food source during a period when other important foods were just beginning to grow (Cowan 1985:213).

Of the total 2686 maygrass seeds recovered, the length and width of a random sample of 150 seeds were measured (Table 5). These specimens have an average length of 1.49 mm and an average width of 1.04 mm. These measurements are within the normal range for maygrass.

Although maygrass has been found in archaeological contexts outside of its native range (Gould 1975; Reed 1971), it has not changed morphologically nor lost its trait of indeterminate inflorescence (Cowan 1978:267-268). This sample contained some immature seeds, indicating an indeterminate inflorescence.

The native range of maygrass is limited mainly to the Gulf Coast States, the Ozark Plateau and parts of Missouri and Kansas. One suggested reason for this is the inability of maygrass to overwinter through severe cold. The interior of rockshelters would have been an ideal location to store maygrass seeds to protect them from the cold winter for early spring planting (Cowan 1978:284). Maygrass would need to have been planted in the early spring and protected from late frosts. Another possibility is that maygrass was planted in the spring and harvested with the other crops, possibly indicated by its occurrence with late season crops (Cowan 1985:212-214). This does not seem to be the case at this site, as maygrass appears plentiful, while late season crops are near depleted status. Perhaps this is indicative of a crop rotation cycle through the entire growing season.

Table 5. Maygrass (*Phalaris caroliniana*) Sample Seed Size, measurements in mm.

W/L	1.00	1.10	1.25	1.50	1.75	2.00	2.10	Total
0.50	3							3
0.75	1							1
0.80	4	1	2	1				8
0.90	5	1	7	3	1			17
1.00			40	32		8		80
1.10				4	3	3		10
1.25				11	3	10	2	26
1.50					1	4		5
Total	13	2	49	51	8	25	2	150

DISCUSSION

Analysis of the Cornett Woods Rockshelter's botanical collection has provided important information about prehistoric environment and Woodland subsistence patterns. The presence of the hardwood oak-hickory Mixed Mesophytic Forest, defined by Braun (1974:87-112), appears substantiated by the wood charcoal remains. Seed remains provide a basis for speculation about the prehistoric diet of the shelter inhabitants. The prevalence of hickory nuts over other distinguishable species is consistent with the Mixed Mesophytic forest pattern discerned by Braun. Oak is the other dominant species in this type of forest, demonstrated by its prevalence in fire wood remains, in which oak and pine are dominant.

The seed remains from the site suggest that both collected and cultivated seeds were used. Because of its small size, the only maize specimen found in either feature may not represent a secure context. The maygrass in Feature 2 may help to identify this feature as belonging to the Woodland period, since maygrass has yet to be found in northeastern Kentucky Late Prehistoric settlements (Rossen 1987:68).

Site occupation could be interpreted as late spring or early summer by the presence of maygrass, which reaches maturity in the late spring when other plant sources are still not ready for harvest (Cowan 1978:267). This collection of maygrass appears to have been in storage for use as a food rather than for planting in a following season, because of the presence of immature seeds. Seeds stored over the winter for the next planting season would have been the most mature seeds to insure next season's crop. Immature seeds would have been consumed, if only for bulk.

As maygrass is highly intolerant of shady habitats (Cowan 1978:272), land would have had to be cleared to plant the seeds. Most likely a site downslope from the shelter would have been used, allowing protection from roaming animals (Ison 1991:4) and opportunity to avoid late spring frosts (Ison 1991:9) that might have injured the plants. Based on the occurrence of maygrass with other late season grasses (Cowan 1985:213), maygrass may have been withheld from planting until early summer and harvested with the other late season crops. At Cornett Woods, the supposition of early spring planting and late spring harvesting bears greater significance since late season food sources appear, but only in limited, perhaps exhausted, numbers. Because of the presence of immature seeds, the maygrass collection seems to have been used as food. The extreme scarcity of other food plants may indicate that those food plants were near exhaustion as the maygrass was being harvested.

CONCLUSIONS

The collection of artifacts from the Cornett Woods Rockshelter adds important data to the slowly increasing knowledge of prehistoric life in southeastern Kentucky. The lithic and ceramic assemblages indicate not only occupation from the Archaic to the Late Prehistoric, they also suggest intensity of occupation during various periods. The limited Late Prehistoric ceramics along with a Late Prehistoric projectile point may indicate only limited use as a hunting camp. The larger collection of Woodland period ceramics may indicate a prolonged utilization of the shelter.

The botanical remains contribute to these histories of occupation of the site. The maize particles are too small to attribute to any Woodland use, but may correlate to the Late Prehistoric visits. The large number of maygrass seeds in this shelter indicates concentrated use, at least at the time of deposition. The presence of other, late season seeds may indicate, by their scarcity, that a yearly cycle of plant foods had formed with maygrass filling the period in the late spring when food reserves were low.

More work is necessary in southeastern Kentucky to assess the extent of life and relationships with other cultures in prehistoric times. The reason for the lack of past investigations, as well as conditions of sites when excavated today, is the tremendous extent of looting and destruction that has occurred in the region.

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LATE WOODLAND UTILIZATION OF THE ROCK BRIDGE SHELTER IN WOLFE COUNTY, KENTUCKY

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ABSTRACT

Investigations at the Rock Bridge shelter in eastern Kentucky have revealed evidence of one or more relatively brief occupations during the Late Woodland period. Cultural materials show few signs of spatial segregation by type; instead, they form a heterogeneous midden deposit whose density varies primarily with elevation. Although not partitioned into "activity areas", the site's material assemblage indicates a wide range of everyday activities. However, the absence of cultigen remains demonstrates that only a subset of known Late Woodland subsistence activities is represented at Rock Bridge. This pattern of variation is probably related to the environmental features of different shelters and their role in annual subsistence cycles.

INTRODUCTION

In 1989, Forest Service archaeologists recorded an apparently undisturbed rockshelter located a few kilometers south of the North Fork of the Red River near Rock Bridge Fork. A single radiocarbon determination from surface deposits indicated at least one occupation dating to ca A.D. 600, and limestone tempered plain pottery was collected from the surface of the site along with an expanding-stem projectile point base in support of the radiocarbon date. Recent excavations at the Rock Bridge shelter during the summer of 1992 were designed to maximize recovery of subsistence data relevant to the development of agriculture based on native crops. In addition, it was hoped that the basically intact nature of archaeological deposits at Rock Bridge would allow us to reconstruct spatial patterning of activities on the site. Although the shelter proved to be too wet to allow the sort of excellent preservation of organic material that made contemporaneous sites such as Haystack and Rogers key sources of evidence for food production (Cowan 1978, 1979a, 1979b), charcoal and more durable materials seemed to have remained undisturbed on the surface of the site since prehistoric times. Consequently, we were able to pursue our second objective.

Rock Bridge (15Wo75) is a rockshelter with an eastern exposure situated along the top tier of a sandstone cliff line overlooking a small unnamed hollow that drains into nearby Rock Bridge Fork. Actually, there are two distinct sheltered areas associated with the site. Our investigations focused on the upper shelter, whose floor forms the roof of the lower shelter. The floor of the latter was covered with sandstone breakdown and showed signs of historic era niter mining activity. In addition, prehistoric material had accumulated there, at least some of which had eroded from the edge of the upper shelf. Although the lower shelter can be easily accessed by scaling a short cliff, the upper shelter is virtually unreachable without considerable climbing skill (or a ladder).

This characteristic, and the fact that more accessible shelters up and down the cliff line had apparently been bypassed by prehistoric people, suggests that defensibility may have played a role in the decision to occupy Rock Bridge.

CHRONOLOGICAL PLACEMENT

Two dates were obtained from Rock Bridge from subsurface deposits within the central portion of the overhang, where the main excavation block was located (Figure 1). Corrected for isotopic fractionation, these are 1310 ± 60:A.D. 640 (Beta 55368) and 1170 ± 70:A.D. 780 (Beta 55369). The charcoal sample obtained from surface sediments by Forest Service personnel provided an uncorrected date of 1380 ± 50 B.P.:A.D. 570 (Beta 33102). When calibrated, the two earlier dates overlap within one standard deviation (Table 1).

Artifacts from Rock Bridge that were useful for placing the site chronologically included Lowe/Chesser bifaces and predominantly limestone tempered cordmarked and plain pottery. Vertical S-twist cordmarking was the most common surface treatment. The few rim sherds that were recovered had flattened lips that were sometimes marked with short vertical notches. Thus, Rock Bridge fits well within the Newtown phase on the basis of its artifact assemblage (Ahler 1988, 1992; McMichael 1984; Railey 1990). The two earlier radiocarbon determinations are similarly consistent with the temporal span of Newtown as it is usually defined (ca A.D. 300 to 800), although the one standard deviation calibrated range of the later date falls beyond it (Ahler 1988) (Table 1). Despite this late chronometric date, there is nothing in the artifact assemblage from the site that clearly indicates terminal Late Woodland activity. Instead, artifacts from the site closely resemble those recovered from the nearby Rogers and Haystack rockshelters, which are thought to date to between ca A.D. 400 and A.D. 700, based on radiocarbon assays and material remains (Cowan 1979a, 1979b).

SPATIAL ORGANIZATION

VERTICAL STRATIGRAPHY

Sediments at Rock Bridge were quite shallow, not exceeding 20 to 30 cm. Over most of the site, an upper layer of unconsolidated, ashy midden overlay a yellow sandy subsoil forming from the sandstone shelf beneath. Between the two was a transitional zone of brownish silty sand, becoming increasingly mottled with sand at lower depths (Figure 2). The ashy midden contained sherds, charcoal, animal bone, and lithics in varying quantities. It was thickest in the central part of the shelter, where we concentrated our excavations (Figure 1).

FEATURES

Obviously, due to the shallow depth of sediments, the site held limited potential for the excavation of pits. Pits for storage would, in any case, have had little utility in a briefly occupied and periodically wet shelter, and refuse was easily disposed of over the cliff edge. A number of soil anomalies were recorded as features, but some of these proved to contain no cultural materials and most had indistinct boundaries. Some of the smaller features may be postmolds; however, no pattern emerged within the excavated area that might indicate a structure or windbreak (Figure 3). The more amorphous features may simply be shallow natural depressions that have filled with anthropogenic sediments (in many cases, feature fill is virtually identical to the ashy midden that covers much of the site).

Although deep pits were not expected, hearths of some kind were. In at least two cases, features were marked by partial rings of rocks parallel to the cliff edge. The first of these, initially observed as a heavy

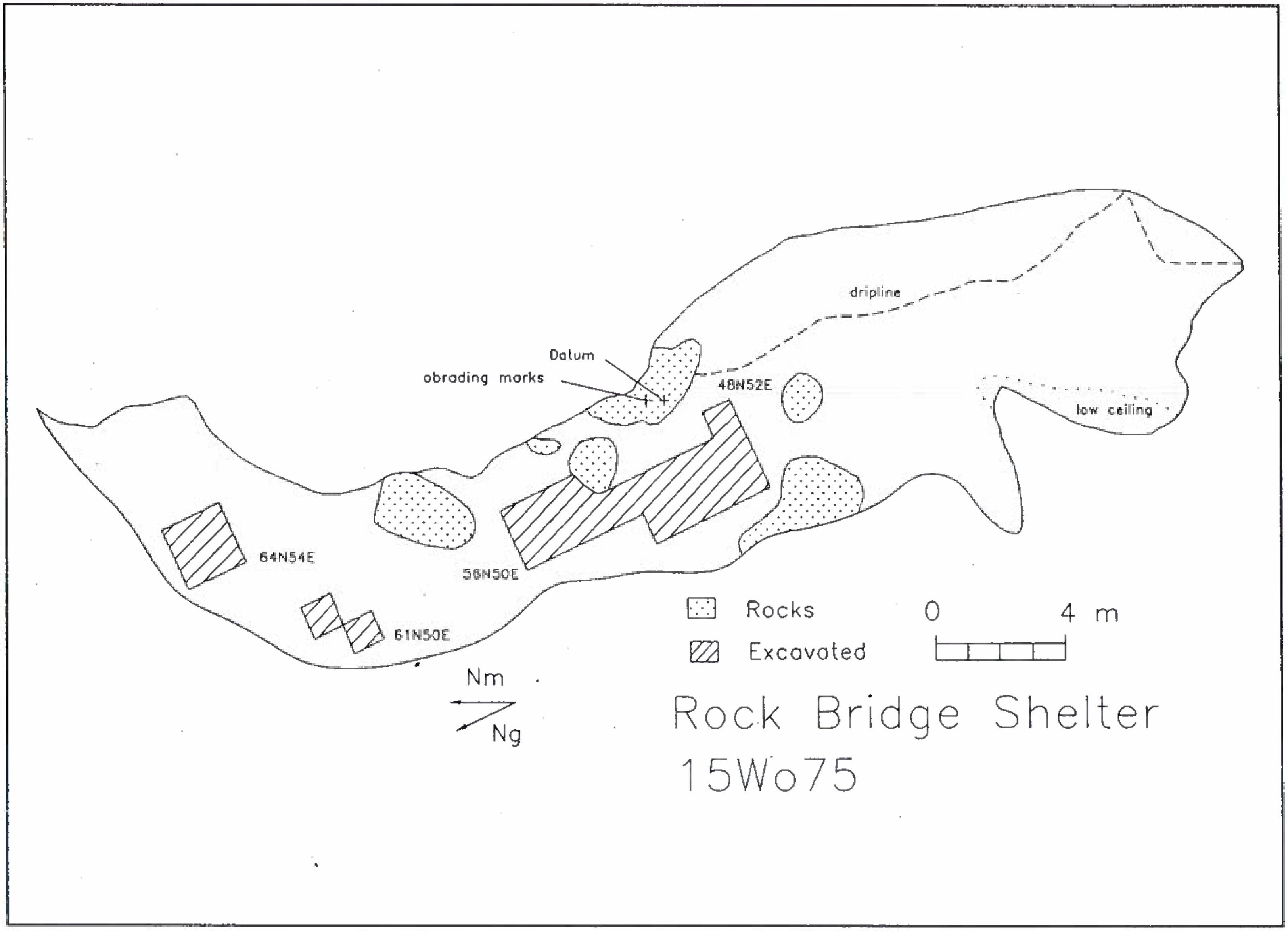

Figure 1. Map of Rock Bridge Shelter.

Table 1. Calibrated Age Ranges for Carbon Samples from Rock Bridge Shelter.

Source	Uncorrected		Corrected	
	RCYBP	Cal age ranges[1]	RCYBP	Cal age ranges[1]
49N50E, L. 1 (Beta 55368)	1350 ± 60	A.D. 641 (661) 760	1310 ± 60	A.D. 650 (677) 773
Feature 16 (Beta 55369)	1220 ± 70	A.D. 686 (777, 793, 798) 890	1170 ± 70	A.D. 773 (784, 786, 874) 978
Surface (Fea. 6) (Beta 33102)	1380 ±`50	A.D. 612 (648) 671	NA	NA

[1]One-sigma minimum (calibrated age) one-sigma maximum (Stuiver and Becker 1986; Stuiver and Reimer 1986).

Table 2. Correlation Matrix for Density of Four Classes of Material and Elevation Within the Main Excavation Block at Rock Bridge Shelter (n=16 units).

	Bone	Charcoal	Lithics	Pottery	Elevation
Bone	1.00				
Charcoal	.47	1.00			
Lithics	.70	.54	1.00		
Pottery	.18	-.02	.53	1.00	
Elevation	-.87	-.49	-.69	-.21	1.00

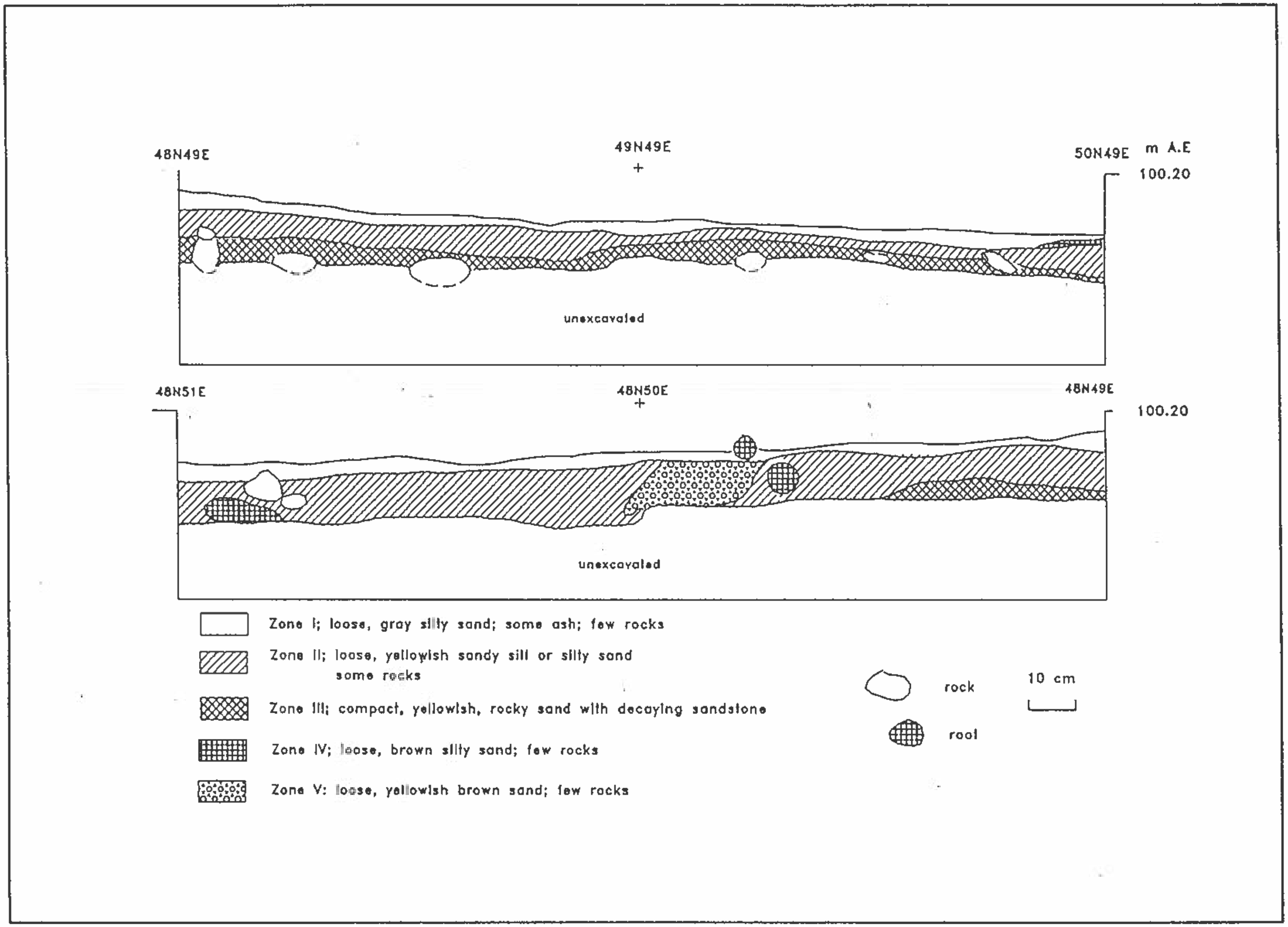

Figure 2. Representative Profiles from the Main Excavation Block, Rock Bridge Shelter

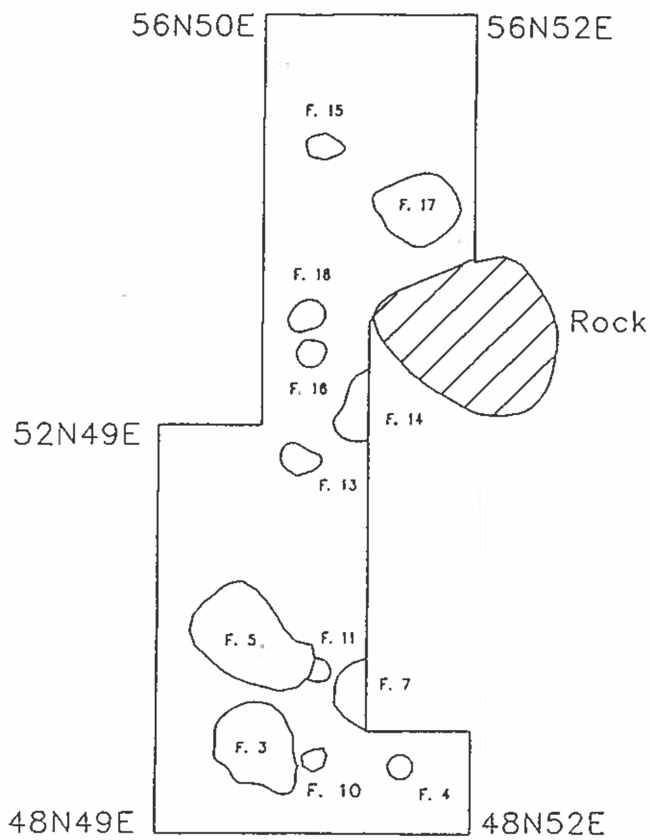

Figure 3. Plan View of the Main Excavation Block at Rock Bridge Shelter Showing Feature Locations.

concentration of charcoal and unburned plant material (Feature 1), proved to be the residue from a packrat midden tucked into a niche above. Although artifacts were recovered from this feature, there was no sign of fire-cracked rock or charred sandstone and soil, and burned bone made up only about 10% of the total assemblage. After removing the organic overburden, what remained was a thin (about 2 cm) layer of dark sandy silt over bedrock.

The second feature, a potential hearth (Feature 5), was difficult to define initially, but in the course of excavation proved to be shallow and roughly oval in shape. The large rocks were not just in an apparent ring along the eastern edge; they also occurred within and below the feature's soil matrix. The percentage of burned bone in Feature 5 was over 80%, but there were no signs of in situ burning. Thus, Feature 5 may represent the redeposited remains of a surface hearth whose contents were dispersed during the occupation(s) of the site.

HORIZONTAL DISTRIBUTION OF CULTURAL MATERIALS

Although the morphology and contents of features revealed very little about the nature and organization of human activities at Rock Bridge, it was hoped that the horizontal distribution of cultural materials would retain more information about how the site was used. Spatial analyses used two sources of data: surface collections over the entire shelter (controlled using 2 m by 2 m squares), and excavated materials from the main block (based on 1 m by 1 m units). Fragment counts for four categories of material (animal bone, charcoal, lithics, and pottery) were obtained from 1/4 in screenings. Counts were normed to soil volume processed in order to control for differing sample sizes. These density figures were used as a basis for comparing distributions of the four material classes.

First, density contours were plotted for each of the four categories in the main excavation block. Results indicated that bone shows the clearest pattern of concentration, with densities decreasing gradually from northwest to southeast (Figure 4). The other three classes of materials exhibit high densities in the northern part of the block as well; however, secondary concentrations are evident in the west central portion of the excavated area for pottery, lithics, and charcoal, and at its southern extremity for lithics and pottery. Bone fragments also tend to be more densely concentrated than other materials in all units, and charcoal has higher values than sherds and lithics at the northern end of the block. High numbers of bone and charcoal fragments may to some extent reflect greater fragmentation of food remains as compared to artifacts.

This impression of a positive association between the four material classes was in general supported by Pearson's r coefficient, as shown in a correlation matrix and associated scatter plots (Table 2; Figure 5). All pairs of variables are positively correlated, except for one value (charcoal and pottery) that is near zero. Values of Pearson's r for pairs of variables ranged from about 0.3 to 0.7. The correlation between lithics and bone proved to be the highest and is the only correlation between artifact classes that is statistically significant ($p=0.002$), although lithics also showed a moderately high positive correlation with pottery and charcoal. The relationship between density of bone and of lithic artifacts may indicate a particular link between processing animal carcasses for transport or consumption and deposition of lithic debris. The other pairs of variables are only weakly positively correlated, but observation of the resulting scatter plots also reveals that outliers appear to have a major effect on coefficients in many cases.

Thus, the primary pattern revealed is one of concentration of all four categories of material in the northern portion of the main excavation block. Presumably this concentration extended farther to the north beyond the excavated area. Neither the correlation matrix nor the cluster analysis revealed any strong negative correlation between categories. Thus, either different activities that might involve some materials to the exclusion of others (say, for example, butchering a deer carcass and cooking a meal) were not spatially segregated; or, if

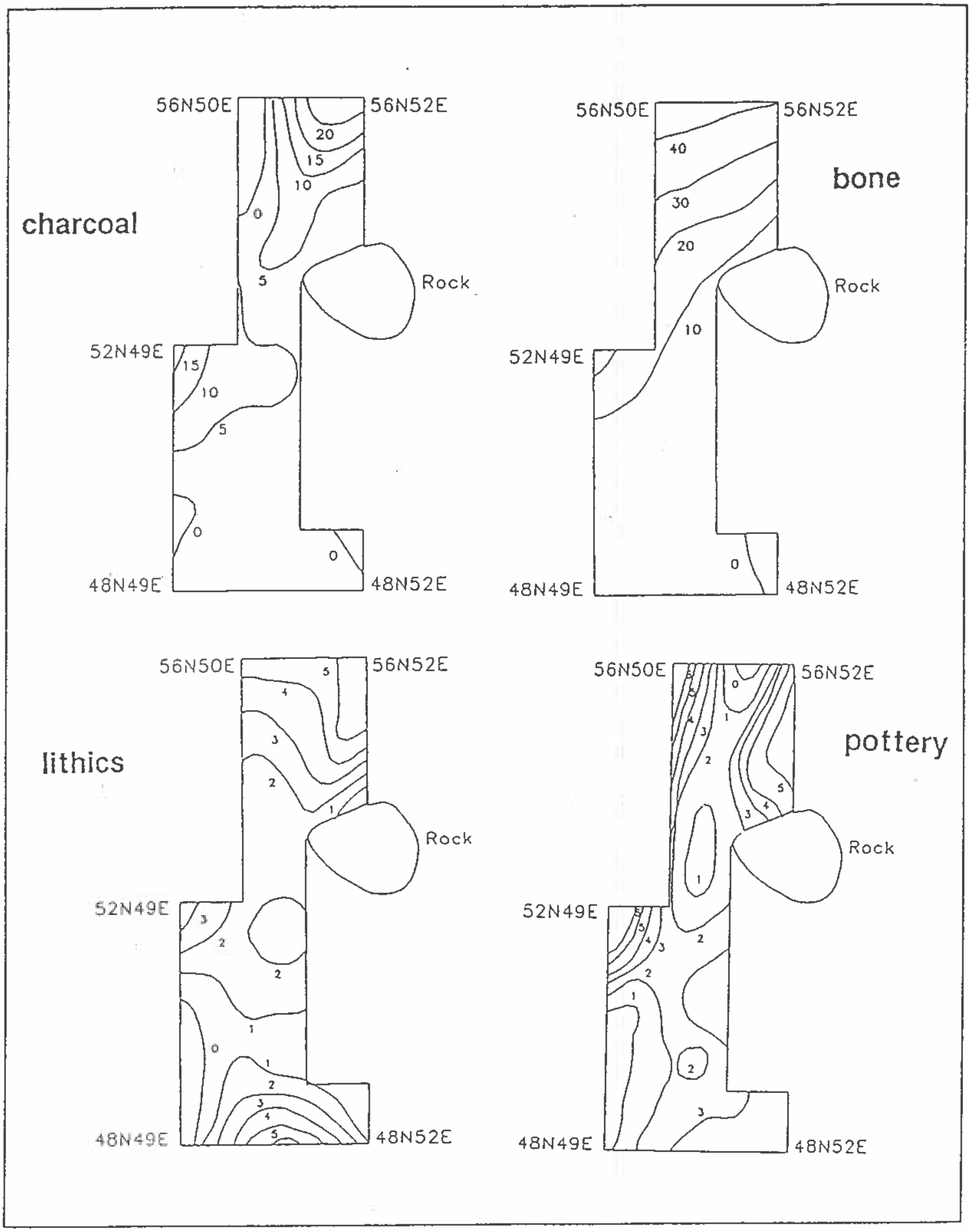

Figure 4. Contour Maps of Density of Four Categories of Cultural Material in the Main Excavation Block at Rock Bridge Shelter: *(a)* charcoal; *(b)* bone; *(c)* lithics; *(d)* pottery. Contour intervals represent numbers of fragments per 10 liters soil.

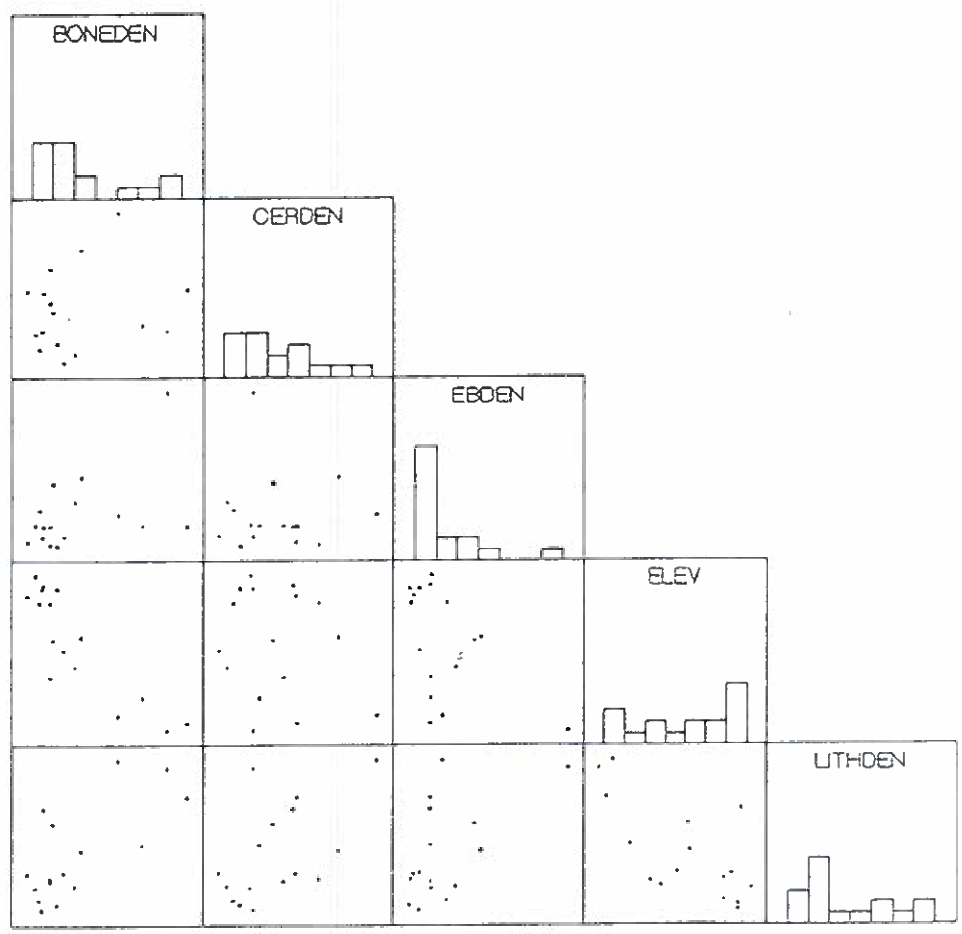

Figure 5. Scatterplot Matrix for Density of Four Materials Classes and Elevation at Rock Bridge.

they were, their distinctive archaeological signatures were obscured by other processes. Secondary concentrations that were noted usually involved rather high densities of more than one of the four categories of material. For the most part, localities rich in bone, pottery, lithics, or charcoal were also rich in one or more of the others.

FORMATION PROCESSES

The next step was to evaluate the role of natural and cultural formation processes in producing observed patterns of spatial distribution. Any primary deposits that might have been present at one time seem to have been disturbed, resulting in some mixing of animal bone, debitage, sherds, and charcoal from fires. Trampling and scuffage (lateral displacement of materials due to foot traffic) (Schiffer 1987:126; Stevenson 1991:271; Stockton 1973) by prehistoric inhabitants are implicated (Applegate 1996). In sandy substrates such as the loose, unconsolidated soils found at Rock Bridge, vertical displacement tends to be greater than on firmer substrates (Schiffer 1987:126; Stevenson 1991:272). This phenomenon probably accounts to a great extent for the distribution of cultural materials throughout the upper soil zones and into the subsoil. However, lateral displacement in sandy soils is generally less than that encountered in hard-packed substrates (Gifford-Gonzalez et al. 1985; Stevenson 1991:273). Thus, concentration of materials in the northern portion of the main excavation block is unlikely to be exclusively a product of down slope movement related to trampling, scuffage, and gravity-related natural processes. Rather, that pattern probably reflects at least to some extent the selection of the central part of the site as a convenient and comfortable location for everyday activities.

Elevation

It seems likely in light of these facts that natural processes related to gravity, such as soil and water movement, might be to some extent responsible for observed patterns of concentration of cultural materials. An important role for such processes is borne out by the fact that the densest concentration of cultural materials is also the lowest point in the main excavation block. Midden deposits are at their deepest here as well. The correlation between elevation and density is particularly high for bone (-0.87; p=0.000) and lithics (-0.69; p=0.003) (Table 2) (Figure 6). Lithic data do support some movement due to frost action and creep, though gravity appears to have had little effect on the distribution of lithic artifacts (Applegate 1996). On the other hand, that same low-elevation spot is one that would have been particularly comfortable for a variety of activities due to the high ceiling and convenient sandstone boulders for seating. Both factors, as well as perhaps some protection afforded by deep sediments, probably explain the northward trend in evidence of human activity.

Comparison of Surface and Subsurface Deposits

Comparison of spatial patterning in surface and subsurface deposits supports the conclusion that postdepositional disturbance is only partly responsible for distributions of materials. High densities of debris in the northeastern corner of the main excavation block are essentially reproduced by data obtained during surface collection. This indicates either that surface and subsurface deposits represent the same episode of occupation, or that activity was centered on the same parts of the site each time it was used. Although vertical movement may have contributed to this correspondence between upper and lower zones at the same grid location, extreme movement either upward or downward would have created a very different pattern of concentration. Further, natural processes causing lateral movement of objects must have either been minimal, or affected both surface and subsurface deposits in similar ways. The most parsimonious alternative is limited movement in the horizontal dimension, in light of experimental studies that indicate constraints on lateral movement in sandy substrates (Gifford-Gonzalez et al. 1985; Stevenson 1991). Given this, the concentration of materials in the northern block reflects its role as a focus of activity as well as, to some degree, postdepositional disturbance.

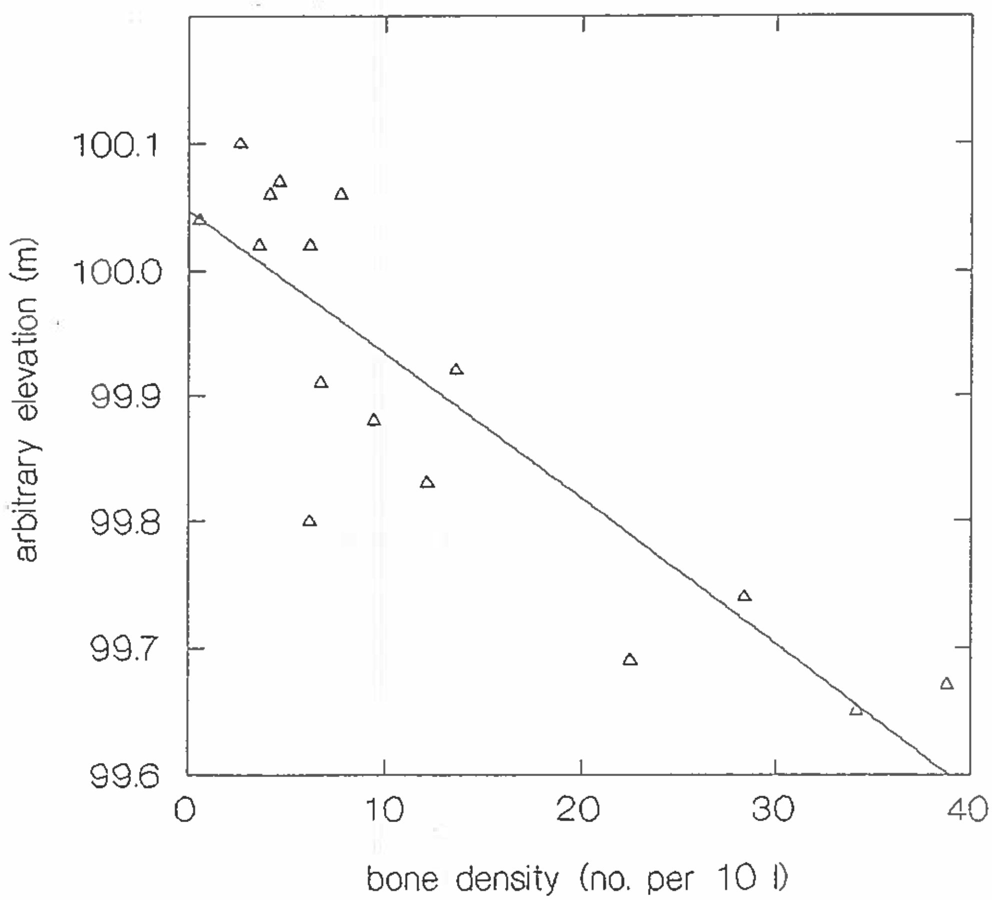

Figure 6. Scatterplot Showing the Relationship Between Density of Bone and Elevation in the Main Excavation Block at Rock Bridge.

MATERIAL ASSEMBLAGE

ARTIFACT CATEGORIES

The overall composition of the artifact assemblage from Rock Bridge is, of course, also of use in determining how many times Late Woodland people visited this site and what they did while they were there. In general, the collection of artifacts and biological remains from the site is rather small, despite the excavation of 22 1 m by 1 m units: a total of 163 sherds, over 2000 animal bone fragments (most of them unidentifiable, and totaling an MNI of only 11 individuals, including likely commensals), and just over 100 g of carbonized plant remains from flotation samples (not counting material collected during general screening). The assemblage of lithic debris was by far the most abundant category of cultural material. Although certain kinds of expected behavior are clearly not represented (such as burying the dead and storing food), most types of everyday activities are; represented activities include food consumption and preparation, hunting and plant food collection, collecting and storing water, and the manufacture and maintenance of stone tools. Judging from this evidence, Rock Bridge was probably occupied for no more than a few weeks at any one time. However, occupations of this kind may have been repeated during the Late Woodland; the two hammer stones cached behind a rock near the shelter's back wall attest at least to the intent to return.

PLANT AND ANIMAL REMAINS

Subsistence

Subsistence remains support the interpretation of an occupation of limited duration. The assemblage of animal bone is dominated by deer and, somewhat surprisingly, bear; three species of turtle were also identified. Although reasonably diverse, the collection only represents a small MNI for each taxon represented: one each for bear, mouse/vole, turkey, most reptile and amphibian taxa, and two for deer. Such a pattern could have easily been produced by a small group of three or four people who stayed in the shelter for a period of weeks (or even less time). The assemblage of carbonized plant remains reflects some use of nuts (particularly hickory and walnut), but none of cultigens, and very little of fleshy fruits. Nutshell occurs in small fragments, suggesting processing for consumption. Presumably nuts were collected locally, since in the shell they would have made an inefficient trail mix. The absence of many plant foods may of course be a result of poor preservation in the upper shelter, a point that is emphasized by the discovery of a single Cucurbita seed in a pocket of dry sediments in the lower shelter.

Seasonality of Occupation

Unfortunately, an examination of the animal and plant remains was not very informative about season of occupation, as is usually the case. Assuming the nuts were collected locally, fall/winter occupation is indicated, though other times of year need not be ruled out. The various animal taxa represented could have been hunted at any time of year. Bears are inactive in winter, but this need not have discouraged human predators. Winter and early spring are archaeobotanically invisible, so we should not expect to find signs of use at that time of year. Judging by the presence of charcoal, fires were used at least for cooking and perhaps for heat; however, the absence of formal hearths is not really strong evidence for strictly warm weather occupation, since surface hearths might easily have been dispersed after their use life had ended.

DISCUSSION

SITE FUNCTION

Interpretations of site function are limited by the fact that excavation of the occupied area was only partial; however, they are based on a large sample from the deepest part of the site's midden. Rock Bridge was a short-term encampment of Late Woodland people. A small group stayed at the shelter for a period of weeks, perhaps to hunt, collect plant foods or visit chert outcrops, or for some purpose that left no archaeological traces. While there, they consumed nuts collected on the surrounding slopes and ridgetops and took at least two deer, a bear, and a variety of small animals. Pots were transported for cooking and/or storage, but probably not in great numbers. The shelter may have been selected partly for its defensible location and would have made a secure encampment for a small group on a brief excursion away from their village.

ROCK BRIDGE IN REGIONAL CONTEXT

What is the relationship of Rock Bridge to other early Late Woodland components in the Middle Ohio Valley in general, and the Red River drainage in particular? Similarities to dry shelters like Haystack and Rogers are obvious (Cowan 1978, 1979a, 1979b); all three sites display the same pattern of paired shelters, with the upper being somewhat inaccessible. The sites share a characteristically Newtown-like material assemblage of cordmarked and plain pottery and expanded stem projectile points paired with chronometric dates (where available) of ca A.D. 400 to 700 (with perhaps a slightly later occupation represented at Rock Bridge). At none of the sites is there evidence of food storage. The primary difference is in the presence (though not abundance) of domesticates at the two dry sites.

To what extent can this difference be attributed to preservation? In light of the discovery of well-preserved uncharred plant remains in deposits within the lower shelter, it seems likely that Rock Bridge would resemble sites such as Haystack and Rogers much more closely had it remained dry. Thus, all three sites may have played similar roles in early Late Woodland settlement systems. All seem to have been short-term occupations carried out for some purpose other than food storage or gardening. They may have been used at various times of year; fall is indicated by plant remains at all sites, and Haystack was occupied during the spring, based on pollen evidence from paleofeces (Cowan 1978). All three sites are difficult to access. This apparent concern with defense seems to be mirrored at early Late Woodland village sites in the mid-Ohio valley, where household clusters are typically situated in defensible locations and are sometimes surrounded by embankments (Dancey 1992; Shott 1990; Shott and Jefferies 1992). A valuable next step would be to investigate in some detail contemporaneous sites in flood plain or terrace settings in the Red River Gorge area that are likely candidates for agricultural villages or farmsteads. Studies of this kind will be needed to establish the role of rockshelter utilization during the Late Woodland in eastern Kentucky and its relationship to warfare, subsistence, and community organization.

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LITHIC ANALYSIS AT THE ROCK BRIDGE SHELTER (15WO75) WOLFE COUNTY, EASTERN KENTUCKY

By

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ABSTRACT

Rock Bridge Shelter is a prehistoric site located in the Red River geological area of Wolfe County in eastern Kentucky. An assemblage of 755 lithic artifacts was recovered from the site during the summer of 1992. Composed largely of chipped stone artifacts, the lithic assemblage is dominated by macrodebitage flakes, most of which were recovered from the silty midden layer of the main excavation block. Diagnostic hafted bifaces of the Lowe Cluster indicate a terminal Middle Woodland to Late Woodland Period (AD 300 to 600) occupation. The lithic remains indicate that tool manufacture and maintenance, as opposed to core reduction, were the dominant lithic production activities at the site. Based on the lithic assemblage, Rock Bridge probably served as a temporary residence for a group of people who were engaged in specialized activities, tool manufacture, and hunting.

INTRODUCTION

Analysis of the lithic remains recovered from Rock Bridge Shelter was guided by five primary research goals. Specific research questions derive from the major goals of the lithic analysis. The analysis focuses on chipped stone artifacts, as these are the predominant form of lithics recovered from the site.

The first goal is to identify the cultural and temporal affiliation of the prehistoric inhabitants of the site. An absolute time range for occupation of the site is proposed, and the cultural phase associated with the occupation is suggested. The question of cultural and/or temporal affiliation of the Rock Bridge Shelter inhabitants will be addressed through a study of the diagnostic lithic tools and identifiable tool fragments recovered from the site. Morphological and stylistic characteristics of the artifacts will be compared with published descriptive point and artifact typologies (Justice 1987) in order to identify point types and to determine an absolute range of dates of potential site use. Phase designation of Rock Bridge Shelter is determined by comparative studies with lithic remains from other eastern Kentucky sites.

The second research goal is to identify site formation processes that may have affected the accumulation, preservation, distribution and/or alteration of the lithic artifacts at Rock Bridge Shelter. Two forms of chert alteration, heating and weathering, are assessed. Gravity, soil creep, frost heaving, bioturbation, trampling, and intentional cleaning, processes that may affect the spatial distribution and fragmentation of lithics, are considered. The question of formation processes may be studied using lithic fragmentation, distributional, and typological data.

Reconstruction of the prehistoric lithic production system is the focus of the third goal. One set of questions involves raw material use. What types of local and/or exotic cherts were used in tool production? Is the lithic assemblage characterized by high or low raw material richness and evenness? To what extent were unmodified raw materials imported to the site? Were knappers selective when choosing chert raw materials for tool manufacture? Identification of the types of chert used in tool manufacture makes use of published descriptions of chert types (Applegate 1993; Gatus 1987; Graham 1990; Ledbetter and O'Steen 1991; Meadows 1977; Yerkes and Pecora 1991) in consultation with archaeologists of the U.S. Forest Service. A comparative chert sample supplied by the U.S. Forest Service is also used. Relative measures of richness (the number of chert types) and evenness (the proportions of each chert type) will be used to characterize the lithic assemblage. The cortex index, or the ratio of primary and secondary flakes to all debitage except resharpening flakes, is suggestive of the importation of unmodified raw materials to the site. If knappers were selective about chert types used for tool manufacture, one would expect low raw material richness in the tool assemblage, as well as use of high quality or altered chert, assuming there were no barriers to chert access.

Another set of questions is related to the processes of tool manufacture and maintenance. Did initial core reduction take place at the site? Did primary blank reduction take place at the site? Did secondary reduction or retooling occur in the shelter? What types of reduction techniques were employed by the Rock Bridge inhabitants? Several attributes will be used to assess reduction activities: reduction class distribution, flake fragment distribution, platform morphology, dorsal flake scars, and tool:debitage ratios.

Functional issues are also investigated. Four questions are pertinent. First, what were the functions of lithic tools? Second, what were the functions of the features containing lithics? Third, can areas of specialized activities be identified within the site? Fourth, what was the primary function of the site with respect to the overall settlement pattern of the inhabitants? The functions of finished tools may be determined by examining a combination of attributes: overall shape, context, and edge wear, recognizing of course that morphology does not necessarily indicate function. The functions of marginally modified and utilized flakes may be determined according to morphology and wear patterns. Feature functions may be determined based on the types and proportions of lithic artifact types they contain, assuming that the artifacts in each feature are there due to the feature's use. Assuming that the distribution of artifacts represents primary deposition, it may be possible to identify specialized activity areas within the site based on the horizontal distribution of different raw materials, functional categories, reduction classes of lithic artifacts, or a combination of these. Site function interpretations are based on the functions and relative proportions of different lithic artifact categories. Expected assemblages associated with various site functions are outlined in Ledbetter and O'Steen (1991:224).

The final goal is to determine the nature of occupation at the site with respect to the overall settlement system. How intensely was the site or parts of the site used prehistorically? What was the frequency and duration of occupation? Intensity of site occupation may be addressed according to the spatial distribution of lithic artifact types and the degree of fragmentation with respect to artifact dimensions. Because the nature of the prehistoric occupation at Rock Bridge Shelter within the context of the larger settlement system involves a number of variables, it will be more difficult to address this question. Relevant variables are frequency of occupation, duration of occupation, group size, group composition, and purpose of occupation (site function). These variables are contrasted in Table 1 and several expectations are suggested.

Table 1. Expected Archaeological Assemblages with Respect to Varying Frequency of Site Occupation, Duration of Site Occupation, Group Size, and Group Composition.

ARCHAEOLOGICAL ASSEMBLAGE	FREQUENCY OF OCCUPATION	DURATION OF OCCUPATION	GROUP SIZE	GROUP COMPOSITION
few, thin, temporally distinct strata; specialized tools; few remains	infrequent	short	small	any
temporally distinct strata; many tool types; more remains	infrequent	long	small	any but family units likely
temporally distinct strata; specialized tools; more remains	infrequent	short	big	any
temporally distinct strata; many tool types; substantial dwellings; more remains	infrequent	long	big	family units
no temporally distinct strata; specialized tools; few remains	frequent	short	small	any
no temporally distinct strata; specialized tools; more remains	frequent	short	big	any
no temporally distinct strata; many tool types; substantial dwellings; more remains	frequent	long	small or big	any but family units likely

METHODOLOGY

LABORATORY PROCEDURES

Prior to analysis, the lithic remains from Rock Bridge Shelter were gently cleaned with water and a soft toothbrush. The lithics were air-dried. If a thick weathering rind (patina) obscured the surface of a particular specimen, it was dissolved with vinegar and the specimen was rinsed in water and gently brushed with a toothbrush. The patina was only removed after dimensional measurements, weight, and patina type and amount were recorded.

All lithic samples were minimally examined with a hand-held 10x magnifying glass. Small artifacts (especially those less than about 1 cm in size) and lithics with some form of alteration (e.g. edge treatment, edge wear, heat alteration, etc.) were also examined with a binocular zoom microscope, the power of which ranged from 8 to 40x. All linear measurements (e.g. length, width, thickness) were made with a Vernier caliper read to the nearest millimeter. The sizes of all lithics less than 4 mm were determined using a set of standard geologic screens: number 7 (2.8-4.0 mm), number 8 (2.36-2.8 mm), number 10 (2.0-2.36 mm), number 12 (1.7-2.0 mm), number 14 (1.4-1.7 mm), and number 18 (1.0-1.4 mm). None of the specimens in the assemblage are smaller than 1.0 mm. Specimen weights (less than 400 g) were determined with a digital electronic balance; weights were recorded to 0.01g.

The Rock Bridge Shelter lithic assemblage comprises all lithic artifacts recovered by systematic surface collection, as well as from 1/4 in and 1/16 in screening of unit and feature fill. Twelve of the 0.6 mm samples recovered for paleoethnobotanical analysis contained small lithic specimens; these are included in the assemblage.

RAW MATERIAL IDENTIFICATION

Raw material types were identified on the basis of personal experience, physical properties of the raw materials (e.g. color, streak, luster, fracture, texture), reference to published descriptions, consultation with U.S. Forest Service archaeologists, and comparison with chert samples provided by the U.S. Forest Service. Seven types of chert are represented in the assemblage: Boyle, Saint Louis, Paoli, Haney, Breathitt (Flint Ridge of Morse), Kanawha, and Ste. Genevieve. Descriptions of each of these may be found in Applegate (1993), Gatus (1987), Graham (1990), Ledbetter and O'Steen (1991), Meadows (1977), and Yerkes and Pecora (1991).

ATTRIBUTES RECORDED

In addition to dimensions and weight, the following characteristics and measurements were recorded for all lithic artifacts greater than 4 mm in size. An estimate of the percentage of cortex (if present) along with the location (e.g. dorsal, ventral, margins, etc.) was recorded. The type of edge treatment and edge was were noted. Raw material type was identified. Indicators of heat treatment (color change, reduced translucency, increased luster, ripple marked flake scars) and unintentional heat alteration (crazing and pot lid fractures) were recorded. Provenience data and volumes of screened soil were documented. The type of patina, if present, and the presence or absence of frost pits were recorded.

For hafted biface tools, dimensional measurements were expanded to include blade length, shoulder length, neck length, blade width, notch width, and basal width. Additional attributes were also evaluated for macrodebitage (greater than 4 mm in size) flake specimens: platform presence/absence, platform faceting, platform lipping, presence or absence of a single interior (ventral) surface, cortex amount and location, number of dorsal scars, intact or not intact margins, and edge remnants. The latter refers to damage of the dorsal-platform intersection of a flake, which may be indicative of tool resharpening. Flake lengths were measured from proximal to distal ends, with width and thickness being measured perpendicular to length. A number of miscellaneous characteristics were noted if they were present on a particular flake specimen: hinge fracturing, bulb scars not interpreted as pot lids or frost pits, and platform breakage. Finally, the type of flake fragment was documented for each macroflake specimen: complete, proximal, medial, distal, interior, and broken. Complete flakes are those with platforms and margins preserved intact. Proximal flakes have platforms, but are broken from one lateral edge to the other, such that the distal end is absent. Medial flakes have two intact side margins, but lack platforms or distal ends. Distal flakes are broken from one lateral edge to the other, such that the platforms are absent, but the distal ends are present. Flakes lacking two lateral margins could not be assigned to any of these categories.

Lithic remains less than 4 mm in size (microdebitage) were evaluated somewhat differently. Attributes of these lithics were not recorded for each individual piece due to their small size. Rather, microdebitage remains were grouped into specimens according to field sample number, such that lithics from a particular unit and vertical level or from a particular feature were treated as a single specimen. As such, the 238 microdebitage remains were lumped into 34 specimens defined by provenience. The number of lithics in each specimen was recorded. The multi-count specimens were then passed through the series of six nested screens described earlier, and the number of lithics caught in each screen was documented. Using the binocular microscope, the number of lithics of each raw material type was counted by specimen. The number of complete, proximal, medial, and distal flakes was recorded as well as the number of debris fragments (lithics without a single interior surface). Finally, provenience and soil volume were recorded.

Formation processes will be assessed based on the following data: dimensions, patina, crazing, pot lids, frost pits, provenience, and the conditions of margins. Lithic procurement will be evaluated using raw material types in comparison with spatial distribution and lithic category. Manufacturing processes will be examined on the basis of dimensions, cortex, heat treatment indicators, flake fragment types, margins, platform presence or absence and morphology, edge treatment, and dorsal scars. Functional issues will take into account artifact dimensions, provenience, morphology, edge treatment and edge wear. Occupational interpretations will be based on the number and distribution of different artifact categories within the site, strata formation, and tool diversity. The specifics of each of these aspects of the analysis, and the relationship between research questions and lithic attributes, will be discussed in later sections of this paper as each research problem is considered.

CLASSIFICATORY ISSUES

The lithic assemblage from Rock Bridge Shelter will be categorized using a combination of criteria: raw material, function, mode of genesis, and reduction class. A primary dichotomy of lithic artifacts, ground stone versus chipped stone, takes into account raw material and technological attributes. Specific ground stone tools are identified according to presumed function. Chipped stone artifacts are techno-functionally subdivided into two groups: tools/tool fragments and debitage. Tools and tool fragments are further partitioned into bifacial tools, marginally modified flakes, and utilized flakes based on the nature and extent of modification. Three categories of debitage are identified on the basis of size and morphology: cores, macrodebitage, and microdebitage. Macrodebitage is further divided into two morphologically defined categories: flakes and debris. In addition to ground stone and chipped stone artifacts, a third category is referred to as fracture lids. This category includes pot lids and frost lids. This combination of various criteria used to characterize the Rock Bridge lithic assemblage was employed to facilitate answering the research questions outlined previously.

Ground stone artifacts are defined as lithics that are shaped by preliminary pecking and chipping of the raw material followed by grinding of the surface to finish the object. *Fracture lids* are produced by the fracturing of chert and other materials due to heating and mechanical weathering. *Pot lids* are generally small (less than 1 cm), circular lithic debitage with plano-convex dorsal and ventral sides formed by the thermal fracturing and breakage of chert surfaces. *Frost lids* are large (1 to 3 cm), elongate lithic fragments with plano-convex sides; they are detached from lithic surfaces as a result of fracture and failure due to the expansion and contraction of water. *Chipped stone artifacts* are formed by the direct or indirect application of pressure to a brittle raw material in order to detach pieces of the material. The initial material or the detached debris may be further modified.

Chipped stone *tools and tool fragments* include any artifacts that were specially modified in order to perform some function or functions, or were altered during the course of usage. *Bifacial tools* are those which have been modified on two sides, ventral and dorsal, and have received special edge treatment, such as hafting. Modification of such artifacts proceeded well beyond simple shaping of edges. *Marginally modified flakes* are lithics that "exhibit uniform flake removal along one or more edges; they may also exhibit ground or crushed edges" (Ledbetter and O'Steen 1991:78). These tools do not have special edge treatment. *Utilized flakes* are artifacts whose edges were altered as a result of use rather than intentional shaping. As such, "edge wear resulting from the use of an unmodified flake for activities such as cutting and scraping" characterize utilized flakes (Ledbetter and O'Steen 1991:79).

Chipped stone *debitage* refers to material left over from the manufacture of chipped stone tools. Three categories of debitage are recognized. *Cores* are the remains of raw materials from which flakes were detached during the course of chipped stone tool manufacture. *Microdebitage* refers to non-tool lithic remains less than 4 mm in diameter. *Macrodebitage* is defined as non-tool lithic remains greater than 4 mm in diameter. Two types of macrodebitage are identified. Flakes are chipped stone debitage with a single interior (ventral) surface indicating where they were detached from cores by the application of pressure to the core. Debris is chipped stone debitage lacking a single interior surface. Debris with bulbs of percussion were probably formed during lithic reduction, while debris lacking bulbs may have been formed by chert failure and explosion as a result of heating (Luedtke 1992; Purdy 1975), or by frost action (Luedtke 1992).

Macrodebitage flake specimens were assigned to reduction classes based on amount of cortex, number of dorsal scars, platform faceting, bulb of percussion, and relative size. *Primary flakes* possess at least 50% cortex, lack dorsal ridges, and are generally large and thick. *Secondary flakes* have less than 50% cortex, may have dorsal scars, and tend to be thick. *Tertiary flakes* have little to no cortex, single or multiple dorsal flake scars, lack platform faceting, have pronounced bulbs of percussion, and are generally thin. *Bifacial thinning flakes* lack cortex, have multiple dorsal scars, exhibit faceted platforms, and tend to be small in size. Small, thin flakes without cortex and lacking platforms could not be confidently identified as either tertiary or bifacial thinning flakes, and are classified as *tertiary/bifacial thinning flakes*. Macrodebitage debris is divided into two categories on the basis of size. *Chunk* refers to angular debris greater than three cm in maximum dimension, while *shatter* includes those angular specimens less than three cm in size.

ANALYSIS OF THE LITHIC ASSEMBLAGE

ASSEMBLAGE COMPOSITION

Table 2 summarizes the composition of the lithic assemblage recovered from Rock Bridge Shelter organized according to the categories outlined above. The assemblage is clearly dominated by chipped stone artifacts, which account for over 99% of the sample. Ground stone artifacts and fracture lids represent only minor proportions of the assemblage. The most common form of chipped stone artifacts is debitage, which accounts for over 95% of the assemblage. Within the debitage category, the most prevalent type is macrodebitage flakes; these remains constitute almost 64% of the total assemblage.

Table 2. Composition of the Rock Bridge Shelter Lithic Assemblage. Assemblage size is 755.

LITHIC CATEGORY	SAMPLE SIZE	% OF TOTAL ASSEMBLAGE
GROUND STONE	3	0.4
FRACTURE LIDS	3	0.4
Pot lids	2	0.3
Frost lids	1	0.1
CHIPPED STONE	749	99.2
Tools and Fragments	26	3.4
Bifacial tools	7	0.9
Margin. mod. flakes	11	1.4
Utilized flakes	8	1.1
Debitage	723	95.8
Cores	2	0.3
Microdebitage	238	31.5
Macrodebitage	483	64.0
Flakes	452	59.9
Debris	31	4.1

SPATIAL DISTRIBUTION

The distribution of lithic artifacts recovered by systematic surface collection and excavation of various areas of Rock Bridge Shelter is summarized in Table 3. The largest proportion (90%) of the lithic assemblage derives from the southern (main) excavation block. Three percent and 2% of the assemblage were recovered from the northern and middle excavation blocks respectively. Almost 5% of the lithics was collected from the surface of areas outside the excavation blocks. Adjusting for the differences in soil volumes among the excavation blocks, a similar pattern emerges. Concentrations range from 0.48 lithics per liter of soil (southern block) to 0.21 lithics per liter (northern block) to 0.05 lithics per liter (middle block). Not only was the greatest total number of lithics recovered from the southern excavation block, but the largest numbers of most lithic types derive from here as well.

Table 3. Horizontal Distribution and Density of Lithic Artifacts from Rock Bridge Shelter by Excavation Block and by Method of Recovery. Densities are based on estimated soil volumes. Soil volumes are in liters. Total assemblage size is 755.

	GROUND STONE	CHIPPED TOOLS	DEBITAGE	FRACTURE LIDS	BLOCK TOTALS	PERCENTAGE OF ASSEMBLAGE	SOIL VOLUME	LITHIC DENSITY
NORTHERN BLOCK								
surface collection	0	0	4	0	24	3.2	115.5	0.21/l
excavation	0	1	19	0				
MIDDLE BLOCK								
surface collection	0	0	0	0	14	1.8	265.0	0.05/l
excavation	0	1	13	0				
SOUTHERN BLOCK								
surface collection	0	0	20	0	684	90.6	1407.5	0.4/l
excavation	0	21	640	3				
OUTSIDE BLOCKS								
surface collection	3	3	27	0	33	4.4		
TOTALS	3	26	723	3	755			

Table 4 summarizes the horizontal distribution of lithic artifact types by feature. Of the 138 lithics recovered from feature fill, 73% of them derive from Feature 3 in the main excavation block. Taking into account volumes of feature fill, the highest density of lithics was recovered from Feature 15 (3.0 lithics per liter). As indicated in Table 4, only chipped stone tools, macrodebitage flakes, macrodebitage debris, and microdebitage specimens were recovered from the features. No ground stone artifacts, debitage cores, or fracture lids were found in this context. In addition, three of the chipped stone tools found in features are utilized flakes and two are complete bifacial tools. The distribution of lithics in the features must be interpreted with caution, however, since some features were partially excavated prior to assignment of feature status.

The vertical distribution of artifacts from Rock Bridge Shelter is summarized in Table 5. The stratigraphy of the site is simplified to include three strata: (1) an upper, loose, grayish ashy midden layer, (2) a brownish, loose to somewhat compact, sandy silt midden layer, and (3) a lower, somewhat loose to compact, yellow to orange, sandy to clayey substratum. The number of lithic specimens (all categories) recovered from these three layers in each excavation block is indicated and site totals are given. For the site as a whole, 65% of the lithics were recovered from the middle layer. Thirty-two percent derived from the upper ashy midden stratum, while only 3% were recovered from the sandy subsoil. As with the feature distributions, the vertical lithic distributions at Rock Bridge should be evaluated with caution since only 69% of the specimens could be vertically provenienced.

GROUND STONE ARTIFACTS

Three lithic specimens are identified as ground stone artifacts. All were recovered during systematic surface collection of the rockshelter to the west of excavation unit 49N50E in a niche along the back wall. None of the ground stone artifacts show signs of heat alteration.

Two lithic specimens are identified as ground stone hammerstones (Figure 1). Both are asymmetrically spherical with flattened tops and bottoms and smoothed surfaces. Specimen 26 is made of limestone and has numerous chips on its edges and small pits on one of the flattened surfaces. Dimensions are 10.78 cm x 11.02 cm x 5.39 cm. Specimen 27 is a hematite concretion with some chips along its edges. Because its shape is probably the result of geologic rather than cultural processes, the hematite concretion may not qualify as a ground stone artifact as defined in this study. Nonetheless, Specimen 27 is included in this lithic category since its function was likely similar to that of Specimen 26. (Perhaps the hematite hammer stone should be categorized as an unaltered but utilized lithic artifact). The hematite hammer measures 9.95 cm x 12.30 cm x 5.02 cm. The two specimens are functionally identified as hammerstones, implying that one of their uses may have been as batons for applying direct or indirect pressure to chert during chipped stone tool manufacture. Shape, wear, raw material type, and provenience are the relevant attributes indicating this proposed function.

FRACTURE LIDS

The three fracture lids recovered from Rock Bridge Shelter were excavated from the southern excavation block. Two small, circular, plano-convex lithic specimens are identified as pot lids. Both were excavated from the northern end of the main excavation block. They could not be associated with a specific stratum due to insufficient provenience data. One pot lid, made of Breathitt chert, has a pot lid fracture on its dorsal surface. The sandstone pot lid showed no signs of heat alteration. The frost lid recovered from the main excavation block is a large (1.55 cm x 1.83 cm x 0.24 cm), elongate, plano-convex fragment of Haney chert. Its dorsal surface has one pot lid fracture, indicating unintentional heat alteration. Since it was recovered while cleaning the southern excavation block, the frost lid cannot be provenienced to a specific unit or stratum.

Table 4. Horizontal Distribution and Density of Lithic Artifacts in Features by Lithic Category for Rock Bridge Shelter. Sample size is 138. * indicates estimated soil volumes.

FEATURE NUMBER	CHIPPED TOOLS	MACRODEB FLAKES	MACRODEB DEBRIS	MICRO-DEBITAGE	TOTAL LITHICS	% OF SAMPLE	SOIL VOLUME	LITHIC DENSITY
1	0	7	1	0	8	5.8	74.0 liters*	0.11/liter
3	1	40	0	59	100	72.5	72.0 liters*	1.39/liter
5	0	1	0	9	10	7.2	80.5 liters	0.12/liter
13	2	0	0	0	2	1.5	7.0 liters	0.29/liter
14	0	1	0	0	1	0.7	2.0 liters	0.50/liter
15	0	0	0	9	9	6.5	3.0 liters	3.00/liter
16	0	0	0	2	2	1.5	2.0 liters	1.00/liter
17	2	0	0	3	5	3.6	20.0 liters*	0.25/liter
18	0	0	0	1	1	0.7	6.0 liters	0.17/liter
TOTALS	5	49	1	83	138	100%	266.5 liters	0.52/liter

Table 5. Vertical Distribution of Lithic Artifacts by Excavation Block for Rock Bridge Shelter. Sample size is 518, or 69% of the total lithic assemblage.

AREA	ASHY MIDDEN	SILTY MIDDEN	SUBSOIL	AREA TOTAL
SOUTHERN EXCAVATION BLOCK				
Lithic Count	155	320	8	483
Block Percentage	32%	66%	2%	
MIDDLE EXCAVATION BLOCK				
Lithic Count	1	0	10	11
Block Percentage	9%		91%	
NORTHERN EXCAVATION BLOCK				
Lithic Count	10	14	0	24
Block Percentage	42%	58%		
ALL EXCAVATION BLOCKS				
Lithic Count	166	334	18	518
Site Percentage	32%	65%	3%	

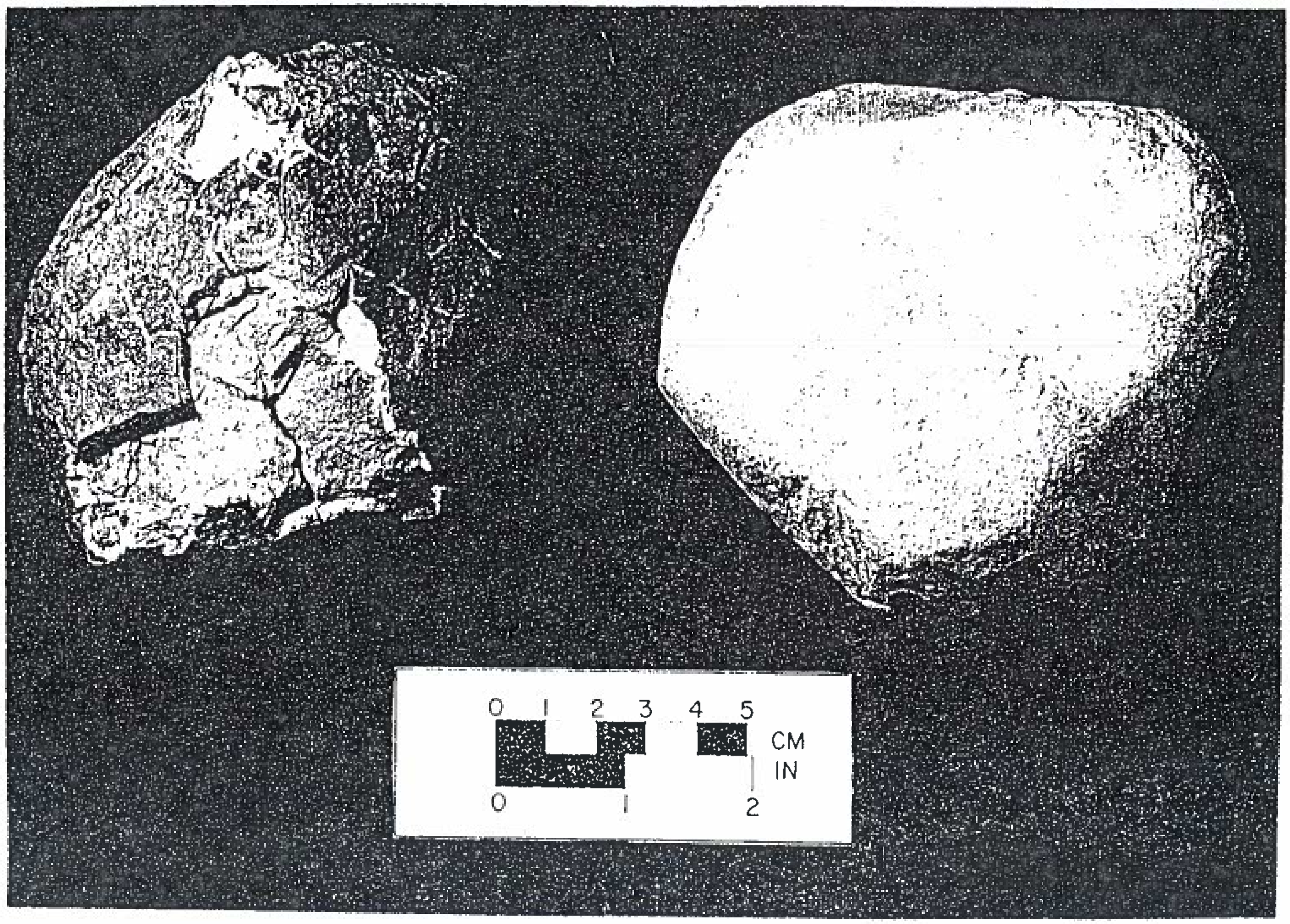

Figure 1. Ground Stone Tools Recovered from Rock Bridge Shelter. Specimen 27 (left) is a hematite hammerstone, and specimen 26 (right) is a limestone hammerstone.

CHIPPED STONE ARTIFACTS

Most of the lithic remains of the Rock Bridge Shelter assemblage are classified as chipped stone artifacts. These are divided into two groups: tools and tool fragments and debitage. Thermal alteration of the chipped stone artifacts will be discussed in the following section.

Tools and Tool Fragments

Twenty-six specimens are classified as chipped stone tools and tool fragments, based on edge treatment and edge wear. Most were recovered from the southern excavation block (Figure 2), and from the silty midden layer.

Bifacial Tools and Fragments

Seven bifacial tools and tool fragments were recovered from the site (Figure 3). Six are from the main excavation block and one could not be provenienced. Five of the six bifaces (83%) with provenience data were excavated from the midden layer; one derived from the ashy stratum. Within the main excavation block, the bifaces are concentrated at the northern and southern ends (Figure 2).

There appears to be an emphasis on the use of Paoli chert for biface manufacture. Five of the seven (71%) specimens are made of this chert type; one is öolitic Haney and one is Breathitt. These three chert types are considered to be high quality material for knapping (Graham 1990; Meadows 1977). Three of the four Paoli bifaces with provenience were found in the south-southwestern part of the main excavation block.

Three of the seven bifaces are complete specimens. Some physical attributes of these are outlined in Table 6. The complete specimens may be generally described as hafted bifaces. Using traditional functional categories, two would qualify as projectile points and the third as a perforator.

Table 6. Dimensions of Three Complete Hafted Bifacial Tools Recovered from Rock Bridge Shelter. Lengths, widths and thickness are in cm; weight is in grams.

SPECIMEN NUMBER	TOTAL LENGTH	BLADE LENGTH	SHOULDER LENGTH	SHOULDER WIDTH	NECK WIDTH	BASAL WIDTH	THICKNESS	WEIGHT
71	3.49	2.26	1.23	2.74	2.01	2.48	0.62	5.68
25	4.59	3.86	0.73	1.18	1.20	1.67	0.87	4.54
251	3.24	2.15	1.09	1.79	0.98	1.52	0.85	4.75
AVERAGES	**3.77**	**2.76**	**1.02**	**1.90**	**1.40**	**1.89**	**0.78**	**4.99**

Projectile Points

Specimen 71, a Paoli biface recovered from the southern end of the main excavation block, closely resembles a Lowe Cluster point, probably Bakers Creek (Justice 1987:211-212). Some use wear is present on the edges under low magnification. Specimen 251 was excavated from the northern end of the main excavation

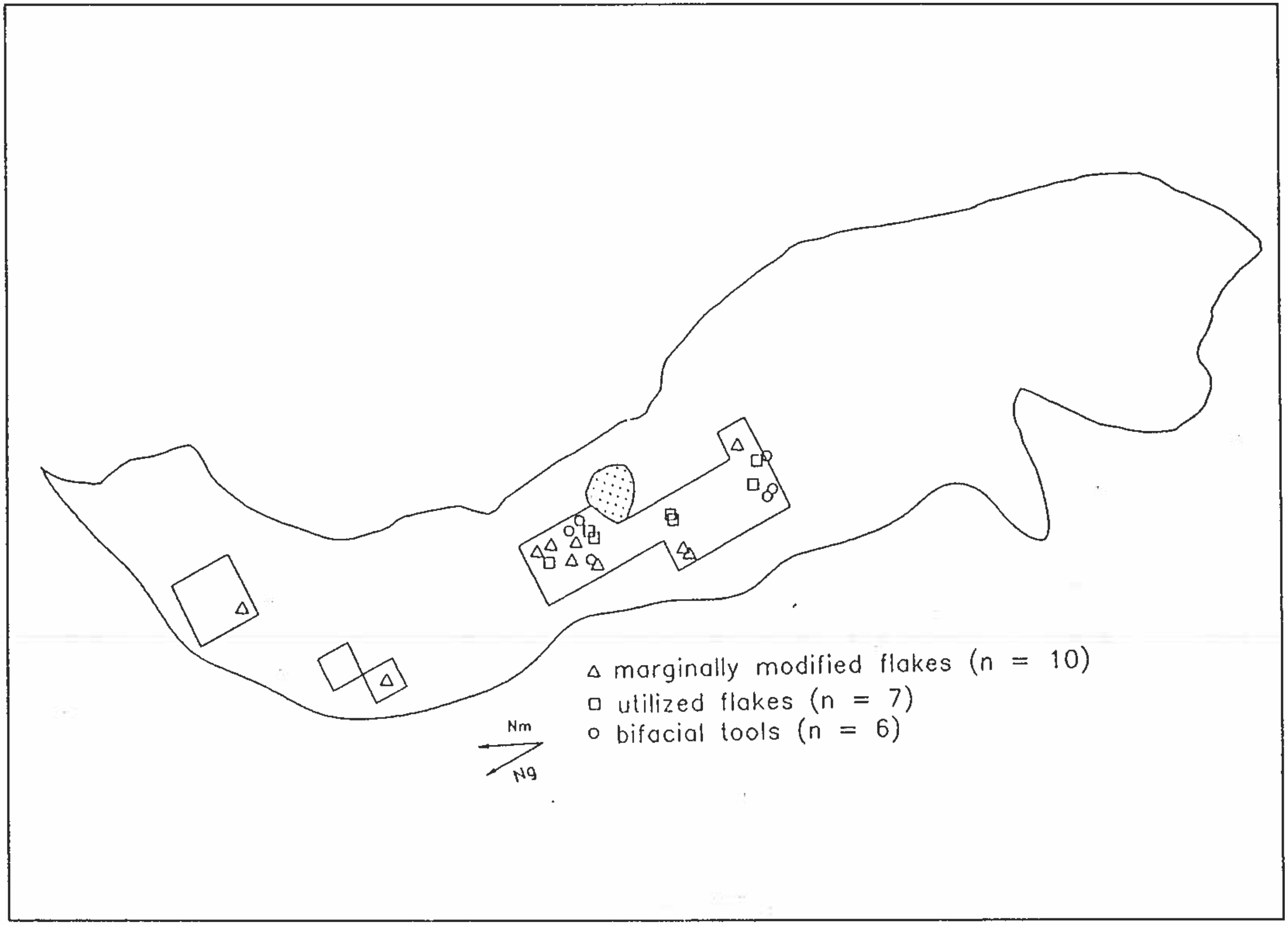

Figure 2. Horizontal Distribution of Chipped Stone Tools and Tool Fragments from Rock Bridge Shelter (n=23).

Key: △ = marginally modified flakes (10/11 provenience known), □ = utilized flakes (7/8 provenience known), ○ = bifacial tools (6/7 provenience known).

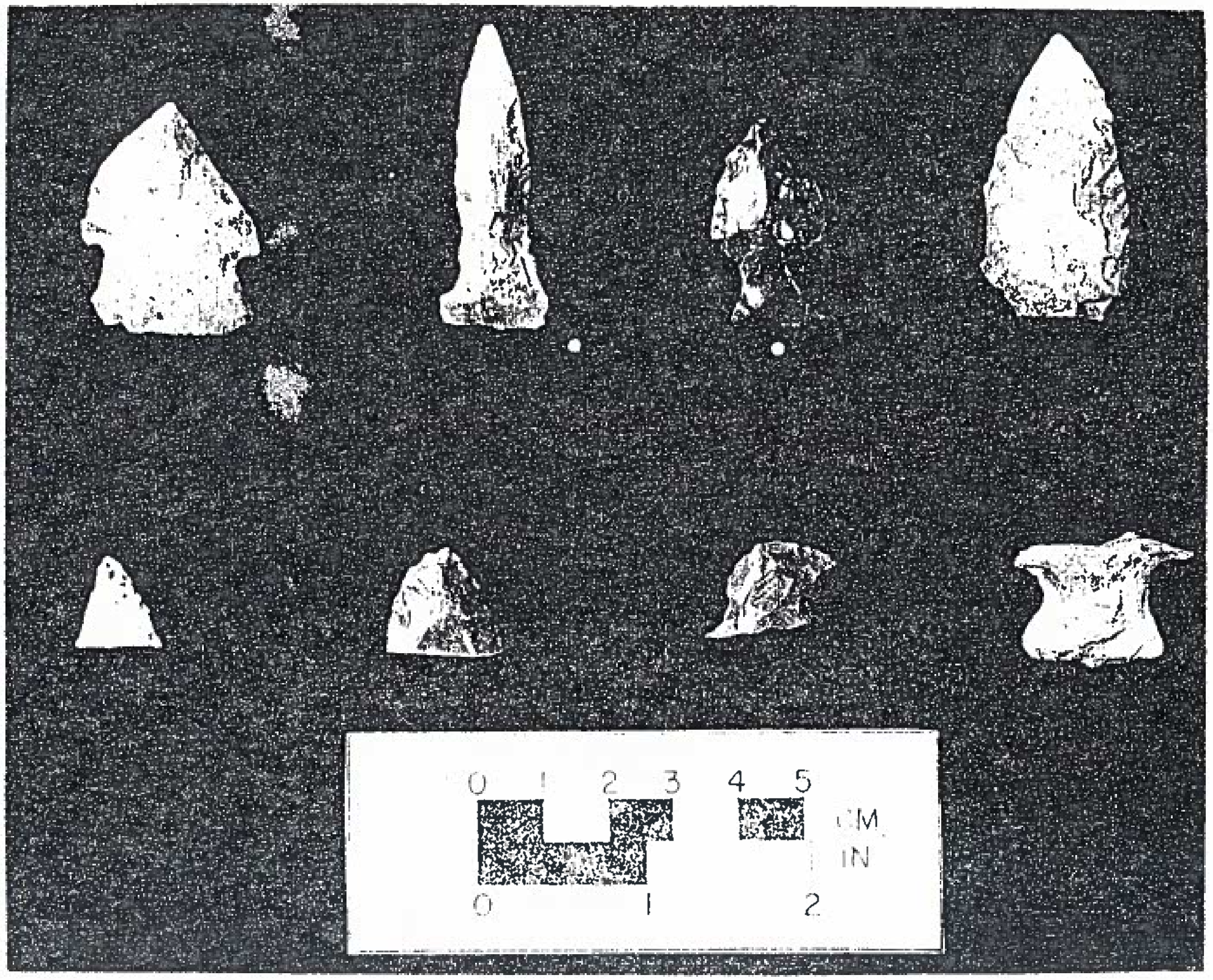

Figure 3. Chipped Stone Bifacial Tools and Tool Fragments Recovered from Rock Bridge Shelter. Top row, left to right: Specimens 71, 250, 251, and 333. Bottom row, left to right: Specimens 78, 134, 285, and 350. Specimen 333 was recovered from a rockshelter directly below the Rock Bridge Shelter site.

block. It is a Breathitt hafted biface that may be typologically classified as a Lowe Cluster Chesser Notched projectile point (Justice 1987:213). This specimen exhibited the most edge wear of the three complete bifaces.

These two hafted bifaces are important as temporally sensitive artifacts. According to Justice (1987:214), Chesser Notched points are diagnostic of the terminal Middle Woodland to Late Woodland periods, from about A.D. 300 to 700. Most Bakers Creek points from other sites date from A.D. 150 to 600, the terminal Middle Woodland Period (Justice 1987:211-212). Based on this information, Rock Bridge Shelter could have been occupied as early as A.D. 300 to as late as A.D. 600. The dates for the bifaces agree well with the radiocarbon dates for the site. Ahler (1988) notes that Lowe and Chesser points are characteristic of Early and Late Newtown Phase sites in eastern Kentucky. Spatially, Rock Bridge Shelter falls within the recorded ranges of these two point types (Justice 1987:212-214).

Perforators

Specimen 250 may be functionally classified as a hafted perforator (Figure 3). It is more than twice as long as wide, has roughly parallel blade edges, and tapers to a point. Made of öolitic Haney chert, the specimen was recovered from the northern end of the main excavation block in the vicinity of the northern half of Feature 17. Lateral margins are serrated and exhibit use wear.

Biface Fragments

Four of the seven biface specimens are broken fragments of (presumably) tools (Figure 3). Specimens 78 and 134 are triangular-shaped biface tips recovered from the southern end of the main excavation block. Both are made of Paoli chert. Specimen 134 shows evidence of use wear in the form of roughening and breakage of edges. Specimens 285 and 350 are hafted biface bases which were broken above the shoulders. Both are made of Paoli chert. Specimen 285 was excavated from the northern end of the main excavation block; Specimen 350 lacks provenience data, as it was recovered during initial investigations of the site by the U.S. Forest Service. No edge wear was observed on Specimen 350, while haft wear and chippage on one broken edge of the blade were noted for Specimen 285. It is possible that Specimen 285 was used as an end scraper, hafted after it was broken.

Marginally Modified Flakes

Eleven lithic specimens are identified as marginally modified flakes. About 64% (7 of 11) of the marginally modified flakes are classified as primary (n=1) and secondary (n=6) flakes and the other four are tertiary and bifacial thinning flakes that probably represent the later stages of lithic reduction. Compared to bifacial tools, a wider range of raw materials are represented in the marginally modified flakes sample. Paoli, Haney, öolitic Haney, Saint Louis, and Kanawha cherts are identified, with Paoli and öolitic Haney being the most common.

Marginally modified flakes were recovered from all three excavation blocks at Rock Bridge Shelter (Figure 2). Of the 10 provenienced tools, eight (80%) were excavated from the main excavation block. Within this area, five (63%) marginally modified flakes derive from the northern end (Figure 2). Vertically, six of nine (67%) of the marginally modified flakes which could be provenienced were found in the silty midden layer.

Most of the marginally modified flakes show signs of utilization on the modified edges. One marginally modified flake resembles a spokeshave and several others may have been modified to be side or end scrapers. Because the proposed functions of the marginally modified flakes are based on the nature of modification and macrowear rather than microwear analysis, the identifications are tentative.

Utilized Flakes

Eight lithic specimens show evidence of use wear but no intentional edge modification. In general, the utilized flake tools are smaller than the marginally modified flake tools. There is also a predominance of tertiary and bifacial thinning flakes as opposed to initial reduction flakes. Five of the eight (63%) utilized flakes are associated with the later stages of lithic production. Compared to marginally modified flakes, utilized flakes are made of fewer raw material types. Only Paoli, Haney, and öolitic Haney are represented; Paoli chert accounts for 75% of the sample.

Utilized flakes were recovered from the main excavation block only (Figure 2). Three were found in feature fill: Feature 3 (n=1) and Feature 13 (n=2). There appears to be three groupings of utilized flakes: at the northern, middle, and southern parts of the excavation block. Vertically, utilized flakes are fairly evenly distributed. One utilized flake, collected during Forest Service investigations at the site, lacks provenience data.

Most of the utilized flakes show signs of edge chipping; smoothing or grinding was evidenced on some utilized flakes. Most specimens are damaged on only one margin. Three of the eight specimens are tentatively identified as end or side scrapers.

Debitage

Debitage is the most common form of chipped stone lithics in the Rock Bridge Shelter assemblage. As indicated in Table 2, 723 specimens, or over 95% of the assemblage, are classified as debitage. About 65% of the provenienced debitage was recovered from the silty midden layer; 33% was found in the upper ashy midden stratum. Most of the debitage was recovered from the southern excavation block. Haney, öolitic Haney, and Paoli cherts are the most common raw material from which the debitage are made. These cherts account for almost three-quarters of the debitage sample. Boyle, Breathitt, Kanawha, Saint Louis, Ste. Genevieve, hematite, sandstone, and quartz are also identified.

Cores

Two worked cores were recovered from Rock Bridge Shelter. Both were found on the surface of the site. A core of Paoli chert was found during systematic surface collection of the site in unit 40N52E, south of the main excavation block. A Breathitt core was found by the Forest Service; provenience data is not available. It has two pot lid fractures. Both specimens have scars where cortex and flakes were removed. About 15% of the Paoli core surface has cortex, while the Breathitt core is about 60% cortex.

Microdebitage

The main excavation block yielded 238 pieces of microdebitage. All microdebitage was recovered from 1/16 inch and 0.6 mm screenings of unit and feature fill. There are three concentrations of microdebitage: one at the southern end of the block, especially near Feature 3, one in the middle of the block centered at unit 51N51E, and one at the northern end of the block, associated with unit 54N51E and Feature 15. The highest density of microdebitage (3 specimens per liter) is associated with the latter cluster. Vertical provenience according to stratum could be determined for 170 of the 238 pieces of microdebitage. The microdebitage is vertically distributed in the silty midden (n=123, 72%) and ashy midden (n=47, 28%) layers of the block. No microdebitage was recovered from the subsoil, even though some of the subsoil was fine screened. While nearly 25% of the sample could not be securely typed due to small fragment sizes (despite the use of magnification), there seems to be a predominance of Haney and öolitic Haney fragments. This chert accounts for over half of the microdebitage. Paoli and Boyle cherts are moderately represented at 10% and 7%, respectively. Minor amounts of Kanawha chert, quartz, and sandstone are identified.

Macrodebitage

Nontool lithic remains greater than 4 mm in size dominated the Rock Bridge assemblage, accounting for 64% (n=483) of the collection (Table 2). Almost 88% of the macrodebitage was recovered from the southern excavation block. Within this area, three concentrations of macrodebitage are indicated when the density of macrodebitage is plotted for each unit and feature. The southernmost concentration is centered around Feature 3. Excavation unit 51N51E is the center of the second concentration near the middle of the excavation block. The greatest density of macrodebitage specimens is at the northern end of the excavation block.

The distribution of macrodebitage by specimen count per unit or feature shows essentially the same pattern as that of the density distribution. Vertically, the macrodebitage is concentrated in the silty midden and ashy midden layers. With respect to raw material distribution, Haney and Paoli are the dominant cherts represented, accounting for 50% and 25% of the macrodebitage, respectively. Almost 10% of the macrodebitage is Boyle. Small amounts of Saint
Louis, Breathitt, Kanawha, Ste. Genevieve, sandstone, and hematite are noted. Only 3% of the macrodebitage could not be typed.

Flakes

About 94% (n=452) of the macrodebitage is flakes (Table 2). Most (87%) were recovered from the southern excavation block and the silty midden layer (55%). When the horizontal distribution of flakes is plotted by specimen count and specimen density for the main block, three clusters that correspond to those for all macrodebitage are evident. A wide range of raw materials are identified for the flake sample, in proportions roughly equal to those of the entire debitage sample. About 16% of the macrodebitage flakes are complete, 41% are proximal, 26% are medial, 14% are distal, and 3% could not be classified since they lacked two intact lateral margins. Average dimensions of the flake sample are: 1.53 cm long, 1.48 cm wide, 0.29 cm in thick, and 1.09 g in weight.

Debris

Thirty-one of the macrodebitage specimens are classified as debris. These represent about 6% of the macrodebitage sample. As with most lithic categories, the majority of the debris was recovered from the southern excavation block and the silty midden layer (90% and 67%, respectively). The debris in the main block is concentrated into three areas: northern end, middle, and southern end. Although several raw material types are represented in the debris sample, there seems to be a roughly equal emphasis on three cherts: Paoli, Haney, and Boyle. Other raw materials represented are Breathitt, Kanawha, and hematite.

CHERT ALTERATION

HEAT TREATMENT

For the purposes of this study, the visible effects of heat treatment are most relevant. Several indicators of chert heat treatment identified by Luedtke (1992:103) were employed: color change, loss of translucency, and increase in luster on post-heating flake scars. In addition, one effect of heat treatment on chert mechanical properties, rippling of flake scars, was noted as well (Luedtke 1992:103).

Only the chipped stone tools and tool fragments (n=26), cores (n=2), and macrodebitage flakes and debris (n=483) were examined for evidence of heat treatment. Fracture lids and microdebitage were not evaluated due, respectively, to their form of genesis and small size. Since the ground stone artifacts are not made of chert, they too are excluded from consideration. Twenty-six flake specimens, one piece of debitage, and three chipped stone tools/tool fragments show evidence of heat treatment. Neither of the cores exhibit the expected changes associated with heat treatment. Of the 30 specimens exhibiting signs of heat treatment, 23 have changed color, 10 have reduced translucency, 8 show more lustrous flake scars, and 8 have ripple marked flake scars.

Three chert raw materials were heat-treated by the Rock Bridge Shelter inhabitants: Haney (n=5) and öolitic Haney (n=10), Paoli (n=12), and Breathitt (n=2). One heat-treated lithic specimen is made of unidentifiable chert. This low richness is accompanied by low evenness, as 50% and 40% of all heat-treated specimens are of Haney/öolitic Haney and Paoli cherts, respectively. The heat-treated Haney flakes exhibit color changes (mostly oxidation to red shades, but some darkening as well) and reduced translucency. The heat-treated öolitic Haney flakes and tools show color changes (especially oxidation to red), reduced translucency, increased luster, and few ripple marks. Heat-treated Paoli specimens exhibit color changes (reddening and darkening), reduced translucency, increased luster, and a high proportion of ripple marks. Heat treatment of the Breathitt specimens produced increased luster and ripple marks.

The sample of heat-treated cherts, when examined with respect to reduction class, is dominated by chipped stone artifacts considered to be diagnostic of primary and/or secondary reduction . Cores and primary flakes did not exhibit intentional heat treatment. The highest incidence of heat treatment is among tertiary flakes, tertiary or bifacial thinning flakes, bifacial thinning flakes, and secondary flakes, in decreasing order.

Some patterns are noted in the spatial distribution of heat-treated cherts. Looking at the southern excavation block, where 83% of the heat-treated specimens were found, three concentrations of heat-treated artifacts are indicated. One concentration is in unit 48N51E at the southern end of the block. The second concentration is near the center of the excavation block. The third concentration, with the highest density of heat-treated specimens (0.06 per liter), is located at the northern end of the excavation block. No heat-treated cherts were recovered from the excavated features of the southern block. Two heat-treated flakes were recovered from the middle excavation block in the units adjacent to Feature 6. One heat-treated flake was found in northern excavation block adjacent to Feature 1. Again, no specimens with heat treatment indicators were recovered from the features.

The two remaining heat-treated cherts were recovered during preliminary systematic surface collection of the site. Vertically, 43% of heat-treated lithics derives from the silty midden layer, while 33% of the sample came from the upper ashy midden zone.

UNINTENTIONAL HEAT ALTERATION

Indicators of thermal damage due to unintentional heating (or uncontrolled intentional heating) include blocky, angular debris lacking bulbs of percussion, small, convex, circular pot lid fractures, crazing or internal fracturing, loss of color or luster, smoked areas, and distortion (Luedtke 1992:106). Pot lid fractures and crazing were used as criteria to assess unintentional heat alteration.

Crazing and/or pot lid fractures were present on 72 of the chipped stone and fracture lid specimens. Of the 704 specimens examined, then, 10.2% had evidence of unintentional heat alteration. Most of the altered specimens are macrodebitage flakes; these account for 86% (n=62) of the altered sample. No bifacial tools or primary flakes showed evidence of unintentional heat alteration. As with the heat-treated sample, most of the unintentionally altered specimens are dominated by chipped stone artifacts which were likely produced during the later stages of lithic reduction. Nearly 80% of the heat- altered remains are tertiary flakes and bifacial thinning flakes. Evidence of crazing and pot lid fractures was found on a wider range of chert types compared to the heat treatment indicators. Six raw materials were unintentionally heat-altered: Haney and öolitic Haney, Paoli, Breathitt, Boyle, Kanawha, and Ste. Genevieve. Nearly 70% of all internal and pot lid fractures were found on Haney/öolitic Haney and Paoli specimens.

Eighty-nine percent of the unintentionally heat-altered lithics were recovered from the southern excavation block, where three concentrations of unintentionally heat-altered cherts are evident based on the density distribution of altered specimens. One grouping is at the southern end of the block, centered in unit 48N50E. A second concentration occurs in the middle of the block, centered in unit 50N51E. The third concentration is at the northern end of the block, where the highest density of altered cherts (0.10 specimens per liter of soil) was found. Two heat-altered chert specimens were recovered from the southeast corner of Feature 3. A similar spatial pattern is indicated when the intentionally heated lithics are plotted by specimen count. Vertically, most of the altered specimens were recovered from the ashy and silty midden layers.

A consideration of whether the thermal alteration of Rock Bridge lithic artifacts was predominantly intentional or unintentional appears in Applegate (1993).

CHERT WEATHERING

Despite its hardness and resistance to weathering, chert does undergo various forms of chemical and physical alteration. One type of chemical weathering, patina formation, and one kind of mechanical weathering, frost fracture, are evaluated for the Rock Bridge Shelter lithic assemblage.

Several broad categories of patinas, or weathering rinds, are described by Luedtke (1992:108-110). Two of these were observed in the Rock Bridge assemblage. *White patina*, also referred to as bleached patina, forms on dark cherts when silica is removed from the surfaces in contact with alkaline soils. Such a rind often begins as a bluish film that grades into white or cream over time. A white patina may also form on light-colored cherts when silica is removed or when other minerals like carbonates are leached from the chert surfaces. Almost 53% of the debitage and chipped stone tool specimens exhibited varying degrees of this type of weathering rind. White patinas were more common on the former (54% of debitage) than on the latter (15% of tools).

Dark patinas range in color from yellow-brown to red to almost black. Luedtke (1992:109) suggests that dark patinas form in a number of ways; they may be the result of iron oxidation or of leaching and redeposition of iron from the chert interior to the surface in the presence of acidic or stagnant groundwater. The dark weathering rind was not as common as the white patina in the Rock Bridge assemblage, with only 12.5% of the debitage and chipped stone specimens exhibiting a dark patina. This type of weathering rind was found in equal proportions on specimens of both categories (12.5% each).

Nearly 35% of the sample showed no signs of patina formation. Over 73% of the chipped stone tools and tool fragments lacked weathering rinds, and about 34% of the debitage were without patinas.

According to Luedtke (1992:110), a common form of chert mechanical weathering is *frost fracture*, which occurs when water in contact with chert freezes, expands, and melts on a cyclical basis. Frost fracturing results in angular, blocky fragments of chert, scaling of cortex from chert surfaces, and frost pits. Similar in shape to pot lids but differing in size and genesis, frost pits are convex fractures, one to three centimeters in diameter, commonly oriented parallel to the chert surface. It is also common for frost pits to have cortex on the dorsal side.

Evidence of frost fracture in the Rock Bridge lithic assemblage took two forms. First, one lithic specimen is identified as a frost lid. It is elongate in shape, about 2 cm in length, and has a convex ventral side. Second, frost pits were observed on five debitage specimens. While this only amounts to about 1% of the sample, it does indicate the operation of frost action as a mechanical weathering process at Rock Bridge Shelter.

FORMATION PROCESSES

Formation processes refer to the natural and cultural processes that affect the deposition, preservation, alteration, and movement of artifacts. Natural formation processes may be partitioned into physiogenic and biogenic components (Butzer 1987:77). The former is represented by general geologic processes such as erosion and deposition, which are normal for the area of the site. The latter refers to plant and animal activities, such as burrowing, gnawing, and root growth. Cultural processes encompass human activities, such as introduction of material to the site, alteration of human imports, acceleration of natural physiogenic processes (Butzer 1987:77), artifact discard, artifact reuse, and post-occupation site disturbance (Butzer 1987:98-99).

Processes leading to artifact alteration were discussed in the previous section. This portion of the paper focuses on those processes affecting locational attributes and damage of artifacts. Several potential formation processes at Rock Bridge Shelter were investigated using the lithic assemblage: gravity, frost heaving, creep, bioturbation, trampling, and cleaning. Only creep, trampling, and cleaning are discussed; see Applegate (1993) for a complete report on the other processes. Most of these analyses will make use of the macrodebitage flake sample from the southern excavation block as the database, since it represents the largest lithic category sample and the southern block is the largest excavated area; some analyses also use the microdebitage and macrodebitage debris samples.

CREEP

Creep is the slow, down slope movement of soil and artifacts under the influences of frost formation and gravity. In cold climates, frost forms under dense objects like rocks, pottery and lithic artifacts because they have higher conductivity than soil (Butzer 1987:103). The ice crystals push the objects upward since water expands when it freezes. When the ice melts, the objects shift slightly down slope as it settles back due to gravity. Over time, the objects gradually move down slope. According to Butzer, the net result is that fine sediment is sorted from larger objects into "circular patterns of level surfaces and elongated ones on slopes" (1987:103).

Based on case studies, Butzer concludes that on slopes of 2° to 5°, circular rings of larger objects will form due to creep; the internal diameters of the rings are proportional to the size of the objects. At these lower inclinations, artifacts are rearranged but retain their "basic associations." The rings of large objects will be ellipsoidal in shape on slopes of 5° to 10°. Artifacts on slopes greater than 8° are "effectively dispersed" (Butzer 1987:104).

That frost formed at the Rock Bridge Shelter site is evidenced by the five frost-pitted lithics and by the one frost lid fragment described previously. The site is not a dry shelter. Hence, creep resulting in the movement of large lithic artifacts is a potential formation process. To evaluate this possibility, the locations of large flake specimens were plotted on an elevation map for the main excavation block. "Large" lithics are defined as those flakes with length and width values greater than the average of 1.5 cm x 1.5 cm or as those greater in weight than the average of 1.0 g.. In addition, a plot of flakes greater than 2.0 cm x 2.0 cm was drawn. Since the slope of the main block is less than 5°, one might expect rings of the fairly large artifacts to be present.

All three measures indicate that there are three "rings" of large lithic specimens in the main block at the northern, middle, and southern portions. Without more extensive east and west coverage it is difficult to say if these represent rings, but the southernmost cluster is 3 m wide and may be part of a linear to curvilinear trend. These three "rings" of large flakes correspond to the locations where the densest concentrations of lithics were found and where the highest numbers of heat-treated and heat-altered cherts were recovered. Based on this evidence, then, it is suggested that creep may have had an effect on the observed horizontal distribution of lithics at Rock Bridge Shelter.

TRAMPLING

According to many researchers, trampling can affect archaeological deposits in four ways. Trampling may increase the *penetrability and homogeneity of the substrate*, resulting in the formation of loose layer of soil overlaying a more compact zone (Nielsen 1991b). Trampling may also result in the *vertical migration of artifacts* by pushing surface materials into the substrate up to 2 cm in depth, thus preserving their horizontal but not vertical provenience (Nielsen 1991a, 1991b). *Horizontal movement of artifacts* may also result from trampling. For lithics, the amount of displacement is related to artifact size (Nielsen 1991b). Trampling also leads to *lithic damage*, including fracture or breakage, abrasion, and random edge scarring (Nielsen 1991a, 1991b; Prentiss and Romanski 1989).

With a site such as Rock Bridge, a rather small rockshelter in which movement is somewhat restricted, one would expect that trampling would have occurred in the past, as well as during the course of the recent archaeological investigation. One would expect a greater degree of trampling damage to occur in areas of easy access, such as where the ceiling is high enough to accommodate comfortable movement, in areas next to rock outcrops which are convenient spots for sitting, and/or in areas next to well defined features. Near the back wall of the cave where the ceiling is quite low, one would expect less lithic damage due to trampling. The zones of high and low traffic would run roughly parallel to the back wall of the site.

Substrate Penetrability and Homogeneity

If trampling did occur at Rock Bridge Shelter, one might expect that a loose, upper zone of soil formed over the high traffic areas away from the back wall. The thickness of such a zone may be proportional to the degree of trampling since, as Nielsen (1991b:488) suggests, the thickness will vary according to "intensity of treadage." As the site stratigraphy reveals, there is a loose top layer at Rock Bridge that may have formed as a result of trampling. This stratum has been referred to as the gray, ashy midden layer. It varies in thickness from

1 cm to 8 cm, and is thickest in the proposed zone of heavy traffic, away from the back wall of the site. Hence, there is evidence that an upper layer of loose soil formed in high traffic areas of the site as a result of trampling.

Vertical Movement

Based on experimental studies, Nielsen (1991b) demonstrates that small lithic specimens (less than 2 cm) are more likely to be vertically displaced than larger ones as a result of trampling. Moreover, movement is confined to the upper 1 to 2 cm zone of loose soil described above. Nielsen (1991b:490) explains that:

> If the surface was buried after a period of dry trampling (as can be assumed in the case of roofed areas), the less-disturbed evidence will be found in a thin (20 mm at most), loose level overlaying a hard, compact, and probably sterile one (unless previous occupations exist in the site). Holding constant other factors, the artifacts recovered in that upper layer should be very small and could be considered primary refuse.

If trampling did occur at Rock Bridge, one would expect the average length and weight of flakes in the somewhat thick ashy midden layer to be smaller than that of the surface collected flakes. For the southern excavation block, the average length of the 25 flakes collected from the surface is 2.10 cm (range is 0.91 to 4.21 cm) and the average weight is 1.88 g. The average length of the 82 flakes from the loose, ashy midden is 1.36 cm (range is 0.53 to 4.62) and the average weight is 0.48 g. The subsurface flakes are, on average, smaller than the surface collected flakes for this portion of the site. These data suggest that the small flakes in the upper ashy midden layer may have been displaced vertically as a result of trampling. Further, the horizontal provenience of these artifacts was probably preserved by this formation process.

Horizontal Movement

The horizontal displacement of artifacts due to trampling is a function of size. According to Nielsen (1991b), items less than two cm in size are not likely to be displaced horizontally since trampling often pushes them into the loose soil layer created by treadage. Artifacts less than 50 cm^3 are randomly moved such that they are shifted outside the zone of heavy trampling. Objects greater than 50 cm^3 also are displaced into the marginal zones of lower traffic. In sum, "even moderately trampled areas will be composed of a 'marginal zone' characterized by a high proportion of bulky artifacts, and a 'traffic zone' with small- and medium-size items randomly scattered and very small ones buried close to their original spot of deposition" (Nielsen 1991b:500). At sites where systematic maintenance or cleaning was practiced, the contrast between the two zones may be partially obscured.

Recalling that the average macrodebitage flake size of the Rock Bridge assemblage falls within Nielsen's "very small" size category of less than 2 cm, most of the flakes from the site were probably not drastically affected by trampling in terms of horizontal displacement. One might expect that lithics greater than 2 cm recovered from the surface would be concentrated in the low traffic areas of the site if trampling resulted in horizontal movement. Unfortunately, the number of surface collected specimens greater than 2 cm in size is small for the site, and a plot of their provenience does not suggest a preferred distribution. Therefore, the possibility that trampling leads to horizontal displacement of lithic artifacts cannot be addressed adequately.

Lithic Damage

The damaging effects of trampling will be assessed in four ways. First, the horizontal distribution of edge damaged and fractured macrodebitage flakes will be compared to the expected zones of high and low damage at the site. Second, the horizontal distribution of complete macrodebitage flakes, or those lacking edge damage, will be compared to the expected zones of high and low damage at the site. Third, the number of flakes, normalized by the total weight of the flakes, for each excavation unit will be plotted on the site map, assuming that smaller flakes (represented by high flake counts per gram of flakes) will be concentrated in the high traffic areas of the site. Fourth, the proportions of complete, proximal, and medial/distal flakes and debris for the Rock Bridge microdebitage and macrodebitage samples will be compared with experimental data on reduction and trampling assemblages, as reported by Prentiss and Romanski (1989).

Edge Damaged Flake Distribution

Edge damaged flakes are here defined as those flakes with randomly chipped margins which do not appear to have been intentionally altered by humans. If trampling did contribute to fragmentation of the Rock Bridge lithic assemblage, one would expect that edge damaged macroflakes will cluster in those areas more likely to have experienced prehistoric or historic human traffic. Horizontally, there are high percentages of edge damaged flakes in the main excavation block, an area of the shelter which is classified as a potentially high traffic area in a roughly (grid) north to south direction. The percentages show a generally decreasing trend toward the back wall, but the expected north-south orientation of the contour lines does not hold for the southern end of the main block. The contour lines near the middle excavation block show decreasing percentages of edge damaged flakes at the back wall as expected, but the pattern near the northern excavation block diverges from the expected.

Complete Flake Distribution

If trampling converts complete flakes into proximal, medial and/or distal flakes due to lateral, bending or compression fractures (Prentiss and Romanski 1989), one would expect higher proportions of complete flakes in areas of low traffic. For Rock Bridge, one would expect low percentages of complete flakes closer to the drip line and rock outcrops and high percentages toward the back wall of the shelter. When the data are plotted, there is a general orientation of the complete flake percentage contours roughly parallel to the back wall of the shelter, and the larger percentages of complete flakes is toward the wall, as expected. The percentage of complete flakes per macroflake sample of each unit, then, supports the conclusion that trampling may be responsible for at least part of the fragmentation of the Rock Bridge lithic assemblage.

Flake Count by Weight Distribution

The amount of macrodebitage flake breakage can be evaluated by looking at the distribution of flake counts normalized to 1 g of flake weight for each excavation and collection unit. One would expect relatively high flake to weight ratios (e.g., small flakes) in units where trampling was more prevalent. The expected distribution of flake per gram of flake weight involves decreasing numbers of flakes per gram (e.g., bigger flakes) as one approaches the back wall of the shelter. The observed distribution does not correspond to the expected distribution. Toward the northern end of the site, the number of flakes per gram of flake weight *increases* toward the back wall, indicating greater fragmentation in the less accessible part of the shelter. In the area of the main excavation block, there are two concentrations of high flake counts per gram which form ellipsoidal clusters trending grid northwest to southeast. The expected decrease in flake counts in zones parallel to the back wall is not indicated.

Flake Sample Composition

The three previous approaches to evaluating the operation of trampling as a formation process at Rock Bridge Shelter are based on the horizontal distribution of different measures of fragmentation (edge damaged flakes, complete flakes, and flake count per gram of flake weight). This last approach will make use of the entire microdebitage and macrodebitage samples for the site. The total numbers of complete, proximal, medial, and distal flakes, plus debris from both samples, will be compared to data reported by Prentiss and Romanski (1989:91). They conducted trampling experiments using four experimentally produced debitage assemblages generated by block core reduction, spheroidal core reduction, biface manufacture, and end scraper manufacture. Morrison chert from northwestern Wyoming, a very fine grained chert with incipient fracture planes and occasional inclusions, was used in all replicative knapping procedures. Each of the four experimental debitage assemblages was subjected to trampling on a loose sand substrate. The percentages of complete, proximal, medial/distal, and debris specimens were tabulated for each assemblage before and after trampling. These data are summarized in Table 7.

Table 7. Distribution of Complete, Proximal and Medial/Distal Flakes and Debris for Experimentally Produced Chert Assemblages Reported by Prentiss and Romanski (1989:91) Compared to the Distribution of the Same Lithic Categories for Rock Bridge Shelter Macrodebitage (n=471) and Microdebitage (n=149) Samples. Data are percentages.

ASSEMBLAGE	COMPLETE	PROXIMAL	MEDIAL/DISTAL	DEBRIS
BIFACE MANUFACTURE				
Untrampled	35.5	23.1	37.2	4.1
Trampled	15.9	29.2	50.4	4.4
END SCRAPER MANUFACTURE				
Untrampled	30.8	23.1	35.9	10.2
Trampled	17.1	37.1	37.1	8.6
BLOCK CORE REDUCTION				
Untrampled	26.7	16.7	23.3	33.3
Trampled	13.2	18.9	45.3	22.6
SPHEROIDAL CORE REDUCTION				
Untrampled	17.5	20.0	27.5	35.0
Trampled	20.6	20.6	47.1	11.8
ROCK BRIDGE MICRODEB	14.8	47.0	37.6	0.7
ROCK BRIDGE MACRODEB	15.3	39.7	38.4	6.6
ROCK BRIDGE - TOTAL	15.2	41.4	38.2	5.2

Trampling of the two experimental core reduction assemblages generally resulted in fewer complete flakes and debitage specimens and increased amounts of proximal and medial/distal flakes. Trampling of the two tool reduction assemblages leads to fewer complete flakes and more proximal and medial/distal flakes (Table 7). The percentages of complete, proximal, and medial/distal flakes and debris for the Rock Bridge macrodebitage and microdebitage samples are included in Table 7. While it is recognized that comparisons of the Rock Bridge data with Prentiss and Romanski's (1989) are tenuous, since different raw materials are likely to produce different flake percentages due to variation in knapping properties, the data sets may be compared in general quantitative terms. The Rock Bridge samples closely resemble the percentages for Prentiss and Romanski's (1989) trampled tool reduction assemblages, especially the end scraper assemblage. Based on this somewhat tenuous comparison, then, the Rock Bridge lithic sample reflects the fragmentation effects of trampling.

CLEANING

Besides trampling, intentional cleaning of lithic materials is an anthropogenic process that may affect the spatial attributes of artifacts. Cleaning of activity areas, according to Nielsen (1991a), tends to affect the distribution of large objects which are more likely to be located and removed than smaller items. Nielsen notes that sweeping and manually picking up refuse are two common types of cleaning. Based on experimental studies, Nielsen concludes that sweeping results in the formation of three deposits: residual primary refuse, displaced refuse, and secondary refuse, each of which has distinctive debris size distributions (Table 8). Manual pick up cleaning "results in a complete dissociation of macro and micro artifacts" (Nielsen 1991a:3) and formation of two types of deposits: residual and secondary refuse.

TABLE 8. Debris Size Distribution Signatures for Deposits Resulting from Sweeping and Pick Up Cleaning (after Nielsen 1991a) and Debris Size Distributions for Three Lithic Concentrations from Rock Bridge Shelter.

DEPOSIT TYPE	MACRODEBRIS (> 8 mm)	LARGE MICRODEBRIS (1-8 mm)	SMALL MICRODEBRIS (< 1 mm)
Residual Primary	absent	high (> 80%)	low (< 20%)
Displaced	absent	low (< 20%)	high (> 80%)
Secondary	moderate-high (> 50%)	low (< 15%)	low-moderate (30%)
Pick-up Residual	absent	low-moderate (20-30%)	high (70-80%)
Pick-up Secondary	all (100%)	absent	absent
FEATURE 15	0%	78%	22%
FEATURE 16	0%	50%	50%
FEATURE 3	41%	55%	4%

Several discrete lithic concentrations at Rock Bridge were compared to Nielsen's (1991a, 1991b) data: Feature 15, Feature 16, and Feature 3. Table 8 summarizes the size distributions of macroflakes and microdebitage from these clusters. While Feature 15 has a small lithic sample size (n=9), it has the highest density of lithics (3.0/l). With a high percentage of large microdebris and a small proportion of small microdebris, the Feature 15 data resembles the signature for residual primary deposits resulting from sweeping. Like Feature 15, Feature 16 has a very small sample size (n=2), but a high density of 1.0 specimens per liter. The size distribution of lithics from Feature 16 does not approximate any of the cleaning deposit signatures. Feature 3 has a large sample size (n=97) and lithic density (1.35/l). With high proportions of macrodebitage and large microdebitage, the Feature 3 size distribution does not correlate with the expected cleaning deposit signatures.

LITHIC PRODUCTION SYSTEM

Examination of the lithic production system for Rock Bridge Shelter entails consideration of raw material utilization as well as tool manufacture and maintenance. While these activities represent a continuum of processes, they will be assessed as two groups of activities. Raw material utilization will take into account raw material acquisition, the first step in Collins' (1975) oft-cited model of lithic reduction, in addition to lithic utilization strategies and the distribution of raw material types by lithic category, reduction class and provenience. Tool manufacture and maintenance encompass core preparation and initial reduction, primary trimming and reduction, secondary trimming and shaping, and retooling and resharpening (Collins 1975).

RAW MATERIAL UTILIZATION

Chert is overwhelmingly the most common raw material represented in the assemblage, accounting for 89% of the assemblage. In addition, two types of minerals, quartz and hematite, are identified, and two sedimentary rocks, sandstone and limestone, are present in the assemblage.

Seven varieties of chert are represented in the lithic assemblage. They are, in decreasing order of abundance, Haney and öolitic Haney, Paoli, Boyle, Breathitt, Kanawha, Saint Louis, and Ste. Genevieve. The most common of these, by far, is Haney and öolitic Haney, which account for about 50% of the total assemblage and almost 58% of the cherts. Paoli chert makes up about 22% of the assemblage and 25% of the chert specimens. Almost 9% of the lithic specimens and 10% of the cherts are Boyle. The other chert types each account for about 2% or less of the lithic assemblage and chert samples.

The number of raw materials used by the Rock Bridge Shelter inhabitants (richness) and the relative proportions of these materials (evenness) are two measures which allow one to describe the raw material utilization strategy. With 11 raw material types evidenced at Rock Bridge, the lithic assemblage may be characterized as having high richness. Of the nine chert types found at sites in the area of Rock Bridge, including Renfro (Meadows 1977) and Muldraugh, seven of these were used by the inhabitants. But considering that about 73% of all specimens and 80% of all identifiable specimens are made of two cherts, Haney/öolitic Haney and Paoli, the assemblage has low evenness. Possible explanations for the observed patterns of richness and evenness are outlined in Applegate (1993).

Evaluation of the lithic procurement strategy for the Rock Bridge area would require more data from rockshelter and floodplain sites of the same time period. Data from quarry sites would also be helpful to gain a larger, more inclusive picture of the Rock Bridge inhabitants' procurement strategy.

In addition to the questions of assemblage raw material composition and raw material utilization strategy, the relative use of local versus exotic raw materials is considered. Meadows (1977:103-105) notes that Haney, Paoli, Boyle, Saint Louis, and Breathitt cherts occur in nearby Powell County in colluvium, alluvial deposits, and/or outcrops. The Pomeroyton quadrangle (Weir and Richards 1974) indicates that several chert-bearing strata of the Newman limestone formation outcrop to the north of Rock Bridge along the Red River; these strata contain Saint Louis, Ste. Genevieve, Paoli and Haney cherts. Alluvial deposits south and southwest of the site are cited to contain chert pebbles from Newman limestone formation. Archaeologists from the U.S. Forest Service also indicate that Breathitt chert may be found in alluvial deposits in nearby Estill County, Kentucky. It is likely, then, that six of the seven cherts found at Rock Bridge Shelter were locally available. Kanawha chert, on the other hand, is apparently found only in northwestern West Virginia (Yerkes and Pecora 1991), and is therefore not locally available. It appears, then, that the inhabitants of Rock Bridge Shelter made use of predominantly local chert materials.

According to Ericson (1984), the "cortex index" is an indicator of the importation of lithic raw materials to a site. The cortex index is the number of primary and secondary decortication flakes divided by the total number of debitage, excluding retouch and resharpening flakes, in an assemblage. A high cortex index suggests extensive importation of raw materials that were subsequently reduced, while a small cortex index indicates little importation of unmodified cores. Including flake tools and macrodebitage flakes, the cortex index for the Rock Bridge assemblage is 33%, which is rather low. It might be concluded, then, that small numbers of unmodified cores were imported to the site. Perhaps, instead, more blanks or preforms than cores were carried to the site. This possibility will be considered in more detail in the following section.

The final question related to raw material utilization at Rock Bridge Shelter concerns selectivity in chert use for tool manufacture and flake tool use. Before such an analysis is undertaken, however, one must determine whether or not raw material richness by category is a function of sample size. The relationship between raw material richness and sample size for the seven lithic categories employed in this study is rather high, with a Pearson's correlation coefficient of 0.85. This indicates that a strong relationship exists between sample size and richness. Hence, raw material richness for the lithic categories may be a function of sample size rather than, or in addition to, selectivity. Keeping this in mind, the following generalizations are suggested.

Chipped stone bifaces (n=7) are made of three chert types, and utilized flakes (n=8) are composed of two chert types. Marginally modified flakes (n=11) are made of four types of chert (Table 7). The common chert types for all three categories of tools are Haney and Paoli. These two types may have been selected for tool manufacture over other materials. This may be a function of availability and/or flint knapper preference.

TOOL MANUFACTURE AND MAINTENANCE

This section describes the nature of tool manufacture and maintenance at Rock Bridge Shelter. In general, the types of lithic artifacts recovered from the site suggest that several stages of lithic reduction are represented in the assemblage. Initial reduction is indicated by the presence of hammerstones, worked cores, and unmodified decortication debitage. Evidence of primary biface reduction includes marginally modified flakes and unmodified debitage, although no blanks or preforms were recovered. Secondary reduction or retooling is suggested by bifacial tools with specialized edge treatment, coupled with bifacial thinning and other flake debitage, in addition to dorsal surface platform retouch. The paragraphs which follow consider whether or not a particular stage(s) of lithic reduction predominated at Rock Bridge Shelter.

The debitage index is an indicator of general production at a site. Defined as the quotient of debitage (excluding retouch and sharpening flakes) and total tools and debitage (Ericson 1984), the debitage index for Rock Bridge is 45.6 %. This percentage includes as debitage the primary, secondary, and tertiary flakes and debris recovered from the site. Microdebitage is excluded, as it was not categorized by reduction class. The debitage index could be as high as 79.6%, if one assumes the sample of 173 tertiary/bifacial thinning flakes is composed of tertiary flakes. The debitage index, ranging from 45.6% up to 79.6%, is moderate to high and indicates considerable lithic production at Rock Bridge.

Reduction Stage

Several lines of evidence may indicate the predominance of certain lithic reduction activities. The variables and measures used for this analysis are: reduction class frequency distribution, flake fragmentation and flake type frequency distribution, platform lipping and faceting, dorsal surface platform retouch, biface index, ratio of modified lithics to debitage, the relationship between late stage debitage and debitage to tool ratio, platform cortex, and the relationship between flake size and dorsal scar count. While it is recognized that there is considerable variation in these attributes for different manufacturing stages and materials, and that actualistic studies using the raw materials present in the assemblage would be useful as a baseline for comparison, an attempt will be made to evaluate the Rock Bridge lithic assemblage without the benefit of replication experiments designed to address the particular raw material suite and research questions of this study.

The relative proportions of macrodebitage reduction classes may distinguish between early and late reduction stages. Assuming that larger debitage with cortex is indicative of initial reduction, high percentages of primary and secondary flakes and/or decortication debris are expected with initial reduction. Assuming that small debitage lacking cortex is indicative of the later stages of reduction, high percentages of tertiary and bifacial thinning flakes and cortex-free debris are expected to represent primary and/or secondary reduction. Only about 15% of the sample is representative of initial reduction, while the remaining 85% suggests late stage reduction.

Some researchers have proposed that the relative proportions of flake fragment types and debris are indicative of lithic reduction sequences. Sullivan and Rosen (1985) suggest that debitage assemblages with high proportions of "broken flakes" (proximal) and "flake fragments" (medial and distal) are indicative of shaped stone tool manufacture, while high percentages of complete flakes and debris represent core reduction. Thus, flake fragmentation serves as a means of broadly distinguishing initial reduction from primary or secondary reduction.

The proportions of complete flakes, broken (proximal) flakes, flake fragments (medial/distal), and debris for the microdebitage (n=190) and macrodebitage (n=483) samples from Rock Bridge are given in Table 7. There is a clear predominance (73%) of broken flakes and flake fragments in the samples. Less than 20% of the debitage is complete flakes and debris. When the microdebitage and macrodebitage are examined individually, the same pattern is indicated. These data are suggestive of shaped tool manufacture or primary and/or secondary reduction.

A crucial assumption built into Sullivan and Rosen's (1985) model is that trampling does not affect the proportions of flake types in the lithic assemblage. Trampling is suspected to lead to fragmentation of flakes, as described in the previous section. Because there is evidence for trampling at Rock Bridge Shelter, the possibility that this formation process has affected the proportions of flake types must be considered. Trampling may explain the low numbers of complete flakes relative to broken flakes and flake fragments. The experimental data reported by Prentiss and Romanski (1989), which were summarized previously, provide a means for assessing the effects of trampling on the Rock Bridge sample. Referring again to Table 7, the Rock Bridge data are very similar to the proportions for the two tool manufacture assemblages that were trampled. The Rock Bridge data differ from the trampled core reduction assemblages considerably, in that there are twice as many broken flakes and two to four times fewer debitage specimens for Rock Bridge. So even taking trampling into account, the Rock Bridge Shelter debitage sample indicates that tool reduction was more common than core reduction.

Replicative experiments by other researchers provide more data with which the Rock Bridge debitage may be compared. Biface production experiments using chert and quartzite are reported by Ingbar, et al (1989). For the two experiments, the percentage of complete flakes ranged from 45% to 60%; proximal flakes ranged from 10% to 20%, flake fragments from 25% to 30%, and debris represented 5% of the samples. These data indicate much higher proportions of complete flakes and fewer broken flakes than the Rock Bridge sample, but this may be because Ingbar did not expose the experimental samples to trampling, while the Rock Bridge specimens probably were damaged by trampling.

Tomka (1989) conducted three reduction experiments: core reduction to produce blades, flake reduction to produce a biface, and flake reduction to produce a point. These studies are important because they aid in distinguishing primary (biface production) and secondary (point production) reduction, reduction stages which are lumped together in the work of Sullivan and Rosen. Tomka's data, like Ingbar's, indicate much higher proportions (34% to 58%) of complete flakes than observed for Rock Bridge. The percentages of proximal flakes and flake fragments are accordingly lower in Tomka's assemblages. Again, this difference may be due to the effects of trampling at Rock Bridge; Tomka's experimental assemblages were not trampled.

Baumler and Downum (1989) conducted two replication studies of core reduction (6 experiments) and end scraper production (16 experiments) in order to assess the relationship between reduction strategy and waste flake type. Using the sample of flakes between 2 mm and 4 mm in size as the sample, untrampled chert and obsidian specimens were categorized as complete flakes, broken flakes (proximal, medial, distal), and shatter. The percentages of each category for the six core reduction replications and 16 end scraper experiments were reported. The average percentages of complete flakes, broken flakes, and shatter for core reduction are 10.9%, 57.2%, and 31.8%. For the end scraper replications, the average percentages were 50.4%, 45.1%, and 4.5%. Baumler and Downum note that the core reduction experiments showed the least amount of variation, but fewer of these experiments were conducted. In comparing the three debitage classes, Baumler and Downum note that the least variation was observed with the shatter. Hence, they argue that this class is the best indicator of reduction stage. The Rock Bridge microdebitage (4 mm to 1 mm) was compared to Baumler and Downum's results. The percentages do not correspond well to either of Baumler and Downum's replication categories. The Rock Bridge shatter (or debris) percentage is much lower than that of the core reduction experiments, although the complete and broken flake percentages are close. The Rock Bridge shatter percentage is similar to that of the end scraper experiments, but the complete flake proportion diverges considerably. If shatter is the best indicator of the three categories, then the Rock Bridge data best fit the end scraper replications. Perhaps the number of complete flakes in the end scraper samples is greater than that of Rock Bridge because the experimental debitage was not trampled.

Platform morphology may also be used to assess lithic reduction. If tool manufacture is indicated by the proportions of debitage categories, as it was with Rock Bridge, then one would also expect high incidence of platform lipping and faceting on the complete and proximal flakes. The relationship between flake type and platform morphology is as such because the two variables are systemically related. For the Rock Bridge sample, 55% of the complete and proximal flakes exhibit platform lipping, and 32% have faceted platforms. These data support the conclusion that flake completeness indicates the prevalence of tool manufacture at the site.

Another potential indicator of reduction stages is dorsal surface striking platform damage or retouch. This type of platform morphology is indicative of core preparation (Johnson 1975) or retooling. Of the 259 macroflakes with platforms, nearly 29% show evidence of retouch or damage on the dorsal lateral edge. This suggests that some retooling and/or core preparation took place at Rock Bridge Shelter.

The biface index is a sixth means of assessing reduction strategies. The quotient of bifacial thinning flakes and tool debitage is an indicator of biface production (Ericson 1984). Using the macrodebitage flake sample, and excluding those flakes which could not be identified as tertiary or bifacial due to platform damage, 78 of the 279 flakes are bifacial thinning flakes. The biface index is 28%; it could, however, range as high as 56% if some or all of the unidentified tertiary/bifacial flakes are indeed bifacial thinning flakes. The biface index suggests that biface manufacture took place at Rock Bridge Shelter.

Ahler (1988) suggests that the ratio of modified lithics to debitage in an assemblage is indicative of reduction activities. A high ratio represents tool use and discard, while a low ratio suggests tool manufacture and breakage. Approximately equal numbers of modified items and debitage indicates that "activities associated with tool manufacture, use and discard took place in similar parts of the site" (Ahler 1988:469). Eighteen modified lithics (bifacial tools and marginally modified flakes) were recovered, along with 673 pieces of debitage from Rock Bridge Shelter. The index is very low, only 3%, and is suggestive of tool manufacture and breakage.

The percentage of late stage debitage, referring to "debitage produced in finishing complex tools, and in resharpening and maintenance," and the ratio of debitage to tools are used by Magne (1989:20) to characterize lithic assemblage formation and reduction stages. Taking late stage debitage to be bifacial thinning flakes, the percentage of such material in the Rock Bridge assemblage ranges from 17% to 56%, depending on how many of the 173 tertiary or bifacial thinning flakes are of the latter reduction class. The debitage to tool ratio for Rock Bridge is 95 %. The low to moderate percentage of late stage debitage, coupled with the high ratio of debitage to tools, corresponds to the quadrants Magne (1989) associates with "tool/blank manufacture and high export rate" and "tool maintenance, low discard rate and high conservation". That one of the complete hafted biface tools was reworked supports the proposition that conservation was practiced by the Rock Bridge knappers.

Tomka (1989) contends that the percentage of flakes with platform cortex in an assemblage may be used to distinguish among core reduction, secondary trimming of bifaces, and point manufacture. His conclusions are based on experimental replication using Edwards Plateau (Texas) chert. The percentage of flakes with platform cortex in the core reduction sample is 1.8 %. For the secondary trimming sample, the percentage increases to 15.1 %. About 9.2% of the flake production sample had platform cortex. Using the 259 complete and proximal macroflake specimens from Rock Bridge, the percentage of flakes with platform cortex is 5.8 %. This falls in between the figures for core reduction and tool manufacture reported by Tomka. Therefore, this attribute is inconclusive for evaluating reduction stages in the Rock Bridge assemblage.

A pair of attributes that may be indicative of reduction strategies is percentage of large (greater than 3 cm) flakes and dorsal scar count (Tomka 1989). Using the data from the three replications described above (core reduction to blades, secondary trimming to biface, and flake reduction to point), Tomka demonstrates that core reduction produces high percentages of large flakes with three or more dorsal scars. Secondary biface trimming and point production produce a high percentage of large flakes with more than five dorsal scars. Thirty-eight of the 452 specimens of the Rock Bridge macroflake sample are larger than 3 cm in at least one dimension. Of these, 5% have less than 3 dorsal flake scars, 24% have 3 to 4 scars, and 71% have more than 5 dorsal flake scars. This distribution does not correspond to any of Tomka's samples and the results are inconclusive.

Reduction Techniques

While attempts to differentiate reduction techniques based on lithic debitage assemblages are reported in the literature, lack of familiarity with such approaches prohibits extensive consideration for the Rock Bridge lithic assemblage. One attribute, platform lipping, however, may be used to identify reduction techniques for Rock Bridge. Several authors (Mauldin and Amick 1989; Neumann and Johnson 1979) propose that small waste flakes with lipped platforms result from soft hammer percussion, which occurs near the end of the manufacturing process. As previously indicated, 55% of the complete and proximal macroflakes in the Rock Bridge assemblage exhibited platform lipping. The average weight of the lipped flakes is 1.41 g, indicating the flakes are rather small. In addition, most of the lipped flakes are tertiary flakes (55%) and bifacial thinning flakes (30%); the remainder are secondary flakes. This attribute, then, suggests that soft hammer percussion was a reduction technique employed by knappers at Rock Bridge Shelter.

FUNCTIONAL ISSUES

Four functional issues are considered in the analysis of the Rock Bridge Shelter lithic assemblage. Artifact function and feature function are discussed in Applegate (1993). Activity areas and site function are described below.

ACTIVITY AREAS

If the distribution of reduction classes is plotted by excavation unit for Rock Bridge Shelter, an interesting pattern that may be suggestive of activity areas is noted. The three portions of the main excavation block where the highest densities of lithic artifacts were recovered are represented by the widest range of reduction classes. At the northern end of the block, especially the four northernmost excavation units, primary through bifacial thinning flakes are recorded. Near the middle of the block, in units 51N51E, 51N50E, and 50N51E, secondary through bifacial thinning flakes were found. If a knapper were sitting on the large rock outcrop to the southeast of unit 53N52E and knapped while facing north or west, one might expect that the waste flakes would accumulate in the areas where the concentrations are found. North of the rock, the number of heavier secondary flakes decreases while the number of smaller flakes increases. Referring to Figure 2, there seems to be a concentration of chipped stone tools in these two portions of the main block as well.

At the southern end, in unit 48N50E, secondary through bifacial thinning flakes are noted. In adjacent Feature 3, only tertiary and bifacial thinning flakes are found. The sizes of flakes decreases away from this unit and feature. Perhaps a prehistoric knapper made use of the nearby rock breakdown as a seat during tool manufacture, and the waste debitage from this process fell in this area. Two bifacial tool fragments and two utilized flakes were recovered from this area in addition to the waste flakes (Figure 2).

As such, the northern, middle and southwestern portions of the main block may represent foci of knapping activities. This interpretation assumes that the lithic material is in its original context. The assumption is feasible given the previously described lack of horizontal movement of small lithics due to trampling. However, creep may have affected the distributions. If the effects of creep were offset by trampling, the distribution of reduction classes may be indicative of knapping activity areas.

The distribution of the most common chert types for the macroflake sample of the main excavation block was examined. Haney and öolitic Haney cherts are concentrated in the northern and middle portions of the block. Seven of the eight chipped stone tools made of this chert type are also from these two areas. Perhaps the reduction of Haney and öolitic Haney occurred in this portion of the block. Paoli chert is also concentrated at the northern end of the main block, but moderate densities are also noted for the middle and southwestern portions. Paoli chipped stone tools were recovered from all three of these areas. Paoli reduction may have occurred in these areas. Boyle chert is also clustered in these three areas.

So despite the potential influences of formation processes, the distributions of flakes by reduction class, of modified and utilized tools, and of raw materials in the main excavation block suggest that three loci of lithic reduction may be present at the northern, middle, and southern portions of the block. These areas are in close proximity to large rock outcrops which may have served as seats for people as they knapped chert.

SITE FUNCTION

Ledbetter and O'Steen (1991:224) suggest that different activities leave predictable archaeological residues which may be used to reconstruct site function. Based on the lithic assemblage from Rock Bridge Shelter, several activities might have taken place at the site prehistorically. Fabrication and processing of organic materials such as bone or wood is evidenced at Rock Bridge by the presence of hafted bifaces, end scrapers, a spokeshave, and utilized flakes. Hafted bifaces, utilized flakes, and bifacial flake knives or cutting implements also suggest that butchering and hide preparation may have occurred. Lithic manufacture and maintenance are indicated by cores, hammerstones, waste flakes, flake tool fragments, hafted bifaces and proximal fragments, and bifacial thinning flakes. Hunting may have occurred as evidenced by the presence of hafted bifaces and utilized flakes in the lithic assemblage.

SITE OCCUPATION

One must be cautious in discussing the nature of site occupation on the basis of just one artifact class, but the following interpretations are proposed based on the expectations outlined in Table 1. The varied but select activities that may have taken place at Rock Bridge Shelter, as indicated above, suggest that the site was occupied only on a temporary basis, as the full range of activities one might expect from a long-term habitation site (i.e. shelters, food processing and food storage, social activities) are not evidenced. The rather thin occupation strata, the lack of temporally distinct strata, the paucity of lithic and other artifactual remains, and the somewhat specialized nature of the lithic tools suggest that occupation of Rock Bridge Shelter was of short duration and involved small groups of individuals. That occupation was frequent is indicated by the caching of ground stone hammers, which suggests that the inhabitants returned or intended to return to the site.

Magne (1989) suggests a means of distinguishing temporary sites from habitation sites based on lithic remains, using the number of tools recovered from a site and the percentage of trimming flakes. If there are many tools relative to late stage debitage, then long-term habitation is indicated. Temporary use is represented by low numbers of tools and high percentages of late stage debitage. Using this scheme, Rock Bridge most closely resembles a temporary habitation site, as suggested above.

Johnson (1989) argues that evidence of chert thermal alteration may help to distinguish temporary sites from habitation sites, based on an archaeological survey of sites in the southeastern United States. At base camps, one would expect a high incidence of heat alteration, since this process requires adequate time and care to be carried out effectively. Signs of heat alteration should be more prevalent on reduction debris at base camps. At temporary sites, on the other hand, one might expect to find heat-altered tools and resharpening or reworking debitage. For Rock Bridge Shelter, the latter scenario is better supported than the former, suggesting that Rock Bridge was temporarily occupied.

Finally, Nielsen (1991b) argues that the loose layer of soil formed by trampling at a site should be underlain by a hard, compact, sterile strata, unless previous occupations exist at the site. That the underlying strata (the "silty midden layer") contained the highest proportion of lithic artifacts suggests that the site was occupied more than once. Thus, occupation was frequent, albeit temporary.

SUMMARY AND CONCLUSIONS

This lithic analysis described the lithic assemblage of Rock Bridge Shelter, determined the temporal range of occupation at the site, identified formation processes that may have affected the preservation and provenience of lithic remains, described the lithic production system of the site in terms of raw material utilization and lithic reduction strategies, addressed functional issues, and described the nature of site occupation.

The Rock Bridge lithic assemblage is composed of 755 specimens. Three broad categories of lithics are recognized: ground stone artifacts, chipped stone artifacts, and fracture lids. Three ground stone artifacts, including two hammerstones, are identified. Three lithic specimens are fracture lids produced as a result of chert failure due to heating and frost action. The remainder of the assemblage is chipped stone artifacts.

As chipped stone artifacts dominate the assemblage, this category was further divided into two groups: chipped stone tools (n=26) and debitage (n=723). The former includes bifacial tools and tool fragments, marginally modified flakes, and utilized flakes. Three of the bifacial tools are complete specimens and are functionally classified as projectile points and a perforator. The diagnostic points are identified as Lowe Cluster points of the Chesser Notched and Bakers Creek varieties. Some of the marginally modified flakes are functionally classified, on the basis of edge treatment and wear, as end and side scrapers, a spokeshave, and a knife. The utilized flakes appear to have been used mostly for scraping.

Both cores found at the site were worked, with 40% to 80% of the cortex removed. They were recovered during surface collections. The microdebitage was recovered from the ashy and silty midden layers of the main excavation block. This lithic class accounts for about 32% of the Rock Bridge lithic assemblage. The dominant form of lithic artifact is macrodebitage, which makes up 64% of the assemblage. Most of the macrodebitage (93%) is waste flakes of four types: primary, secondary, tertiary, and bifacial thinning flakes. The remainder of the macrodebitage is debris.

Lithic artifacts were recovered through excavation supplemented by systematic surface collection. The greatest density of specimens derives from the main or southern excavation block. Within the main block, three concentrations of artifacts are identified in the northern, middle, and southern portions of the block. Nine of the 13 excavated features produced lithic remains, with the highest density coming from Feature 3. Vertically, over 60% of the lithic artifacts were recovered from the silty midden layer, while over 30% derived from the upper ashy midden layer.

Several forms of alteration were noted for the chert artifacts. Heat treatment is evidenced by color changes, reduced translucency, increased luster, and ripple marked or crenated flake scars. These indicators are present on about 5% of the macro-chipped stone artifacts. Only three types of cherts were heat-treated: Haney and öolitic Haney, Paoli, and Breathitt. Most heat-treated artifacts are associated with the later stages of lithic reduction. Three clusters of heat-treated specimens are noted for the main excavation block, and most heat-treated cherts were recovered from the ashy and silty midden layers.

Unintentional heat alteration was indicated by crazing and pot lid fractures. About 10% of the specimens examined showed one or both of these indicators. As with the heat-altered specimens, most of the unintentionally heated lithics are representative of the later stages of lithic reduction. A wider range of chert types were unintentionally altered compared to the intentionally treated sample, but most internal and pot lid fractures were found on Haney/öolitic Haney and Paoli specimens. The three concentrations of unintentionally altered specimens correspond to those of the heat-treated sample. Approximately equal proportions were found in both the ashy and silty midden layers.

Chemical weathering led to the formation of two types of weathering rinds on the lithics at Rock Bridge. Over half of the specimens exhibit a white patina, while about 13% have a dark patina. The remaining specimens lacked weathering rinds. Mechanical weathering of the lithics takes the form of frost fracturing, which results from repeated freezing and thawing of water in and on the specimens. This form of alteration was uncommon, however, as only 1% of the specimens have frost pits.

There is evidence that creep affected the horizontal distribution of lithics at the site, leading to the concentration of specimens in three zones of the main excavation block. While there is little evidence that gravity affected the distribution of artifacts, the fragmentation effect of trampling, resulting in smaller artifacts, may have blurred any such evidence. No means of assessing the effects of frost heaving were available for the site. There is inconclusive evidence that bioturbation in the form of root action and animal activity occurred at the site. Trampling probably resulted in the formation of an upper zone of loose soil at the site, led to subsurface burial of small artifacts, and damaged the lithic specimens in the easily accessible areas of the site. Little evidence of intentional cleaning as a formation process was found.

The most common form of raw material used by the Rock Bridge inhabitants was chert. Most of the material is of local origin. Of the eight chert types known to exist in the area, six were found at the site: Haney and öolitic Haney, Paoli, Boyle, Breathitt, Saint Louis, and Ste. Genevieve. Kanawha is probably an exotic chert. This richness of raw material use is coupled with low evenness, as Haney/öolitic Haney and Paoli make up 80% of the identifiable specimens. There appears to be a rather low rate of importation of unmodified raw materials to the site based on the cortex index. Evidence suggests that Haney and Paoli cherts were preferentially selected for tool manufacture, but these are the most common cherts overall.

Several attributes indicate that the reduction system at Rock Bridge Shelter was dominated by tool manufacture and maintenance (primary and secondary reduction) rather than core reduction: reduction class frequency, flake fragmentation and flake type, platform morphology, biface index, the ratio of modified lithics to debitage, and the relationship between late stage debitage and debitage to tool ratio. Soft hammer percussion was probably used in lithic reduction. Heat alteration may also have been involved in the process. Overall, the assemblage suggests that raw materials in an altered form, perhaps blanks or preforms, were imported to Rock Bridge and further modified at the site.

Three foci of knapping activity may be evidenced in the main excavation block at the northern, middle and southern portions of the block. Despite the potential influences of formation processes, the distribution of reduction classes, tools, and raw materials suggest that primary and/or secondary reduction may have occurred while knappers were seated at rock outcrops in these parts of the site.

Several activities could have taken place at Rock Bridge, including organic material processing and fabrication, butchering and hide preparation, and lithic manufacture and maintenance. The lithic assemblage provides evidence that Rock Bridge was temporarily occupied for short but repeated periods of time by small groups of persons whose activities were specialized in nature.

Future analysis of the lithic assemblage of Rock Bridge Shelter should involve replicative experiments to serve as a baseline for evaluating chert alteration, formation processes, and lithic production. The locally available cherts should be thermally treated to determine the physical and mechanical changes which occur at various temperatures. Knapping experiments using the local cherts would help to build guidelines for identifying different reduction strategies and techniques in archaeological assemblages. Trampling and cleaning studies using different substrates would aid in assessing their effects on artifact assemblage and substratum. A distributional study of the sources of various cherts would be useful for better assessing the lithic procurement strategy of the Rock Bridge inhabitants. It would be helpful to know where each type of chert is located and in what form (outcrop, colluvium, alluvium) in Wolfe County. Microwear analysis would allow one to identify with more confidence and specificity the functions of lithic artifacts. This, in turn, would allow for more accurate characterization of the activities which took place at the site prehistorically. Finally, a survey of other Newtown Focus sites in the Red River area would allow one to place Rock Bridge Shelter into a larger cultural system to better understand the settlement system. With more data, one could use the composition of lithic assemblages to characterize occupations as short-term or long-term foci of the overall settlement pattern.

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ARCHAIC SHELL MOUND PALEODEMOGRAPHY: A CASE STUDY FROM THE READ SITE, 15BT10

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ABSTRACT

The Read Shell Midden (15Bt10), located in the Western Coal Fields of Kentucky, was a Late Archaic seasonal camp and mortuary site excavated from 1937 to 1939 under the Works Projects Administration (WPA) sponsorship. Because of poor preservation, only 152 of more than 240 burials identified at the site could be recovered from the midden. A complete inventory and macroscopic analysis was conducted using a case-by-case approach based on published standards for age and sex determinations. Results are compared to the Carlston Annis (15Bt5) research by Mensforth (1986, 1990) and to the Indian Knoll (15Oh2) data from Johnson and Snow (1961). The population proportions for 15Bt10 compare well with the data from 15Bt5 and 15Oh2. Therefore, taking into account census error associated with 15Oh2, methodological variations in the three studies, and taphonomic processes affecting skeletal preservation, the demographic results from 15Bt10 appear to be valid. Similarity in the mortality profiles of the shell mound skeletal series is key to the archaeological interpretation of the region. Just as these Archaic peoples exploited the Green River drainage basin in similar ways, as indicated from the consistent artifact assemblages recovered from the shell mound, they also experienced similar mortality as a result of their adaptations.

INTRODUCTION

Initiated by the work of Marquardt and Watson (1974, 1983; Marquardt 1977) through the Shell Mound Archaeological Project (SMAP), renewed research on the Archaic Green River shell mound populations has developed over the past 20 years. This research employs a broad interdisciplinary approach to examine the development, subsistence, and life ways of these Archaic populations. Research on these topics has required input from paleoethnobotany, geoarchaeology, lithic technology, and zooarchaeology. Vital contributions to research on these Archaic peoples have also been made through osteological studies of their remains (Cassidy 1972; Haskins and Herrmann 1989; Herrmann 1990; Kelley 1980; Mensforth 1986, 1990; Rolingson 1967; Rothchild 1975, 1979; Sullivan 1977; Sundick 1972; Wyckoff 1977). These studies have ranged from paleodemographic research to determination of health and status in these populations.

This paper deals with the paleodemographic analysis of the Read Site (15Bt10) skeletal assemblage and compares the Read profile with other demographic profiles generated from the Green River Archaic shell middens of Indian Knoll (15Oh2) (Johnson and Snow 1961) and Carlston Annis (15Bt5) (Mensforth 1986, 1990). All three sites yielded large burial samples, with 15Bt10 having the poorest preservation of skeletal material.

Mensforth's (1986, 1990) work with 15Bt5 provided an ideal format for methodological comparisons. Because Mensforth concluded that 15Oh2 and 15Bt5 displayed essentially the same demographic profiles, it was assumed that 15Bt5, 15Bt10, and 15Oh2 were all demographically similar, with any demographic differences being the result of methodological variation, taphonomic processes, or other factors that would become evident in research on the Read Site.

Constraints on time and funds necessitated a burial-by-burial study of the 15Bt10 sample. The individualistic format applied to 15Bt10 differs from Mensforth's analysis in that he seriated available age indicators. Two age indicators employed in Mensforth's study of 15Bt5 were age-related patterns of trabecular and cortical bone involution of the clavicle and proximal femur. For interpretations of these age indicators, a radiograph of the element is required, which was not possible for the 15Bt10 material. Mensforth's study of 15Bt5 did provide a general methodology and a format for data presentation permitting comparisons.

HISTORY

Since the early twentieth century, researchers have been investigating the archaeologically rich Green River drainage basin of western Kentucky. Moore (1916) conducted investigations of Indian Knoll and identified over 280 burials. Documentation of sites located throughout Kentucky increased in subsequent years, with the Green River drainage basin as a major focal point (Funkhouser and Webb 1928; Nelson 1917; Webb and Funkhouser 1932). During the late 1930s and early 1940s, as a result of funds provided through the Works Projects Administration (WPA), archaeological research flourished in the economically devastated coal region (Webb 1946, 1950a, 1950b, 1974). This research ended abruptly when the United States entered World War II. The 15Bt5 material was not even washed until the Mensforth study (1986,1990);however, most of the 15Bt10 material had been washed and briefly inventoried prior to the war.

The Read Site is located on the north bank of the Green River on top of a V-shaped bluff. The site is on the western edge of the region known as the "Big Bend". The river flows about 53 m to the southwest, and the bluff top is about 21 m above the river. Excavations at the site, under the direction of Albert C. Spaulding and Ralph D. Brown, began on December 28, 1937, and lasted until March 2, 1939 (Webb 1950b:357-360). Rolingson (1967:50) states that the shell deposits were aligned "along both sides of a long ridge of residual clay which overlies the bedrock of the bluff." The shell deposits average from 1.5 to 0.6 m in depth and taper off at the edges. Burials were distributed throughout the site. The entire mound, a surface area of around 3,846 m^2, was to be excavated.

Uncalibrated radiocarbon dates for 15Bt10 range from 3350 $\pm$ 70 to 3470 $\pm$ 200 (Haskins 1992). The Read dates are summarized in Table 1, as well as dates for Carlston Annis (Marquardt 1977:4; Marquardt and Watson 1974:7; 1983:326) and Indian Knoll (Arnold and Libby 1951:114; Libby 1952:673). The site dates approximately to 3400 B.P., a period contemporaneous with the other major shell mounds from that area.

Over 240 burials were identified in the field, but because of poor preservation only 152 were recovered from the site (Webb 1950b:377). The field supervisor made age estimates and sex determinations in the field. Since the original curation in the 1940s, some of the skeletal material has been examined, but no systematic reanalysis of the assemblage was ever conducted. Therefore, this paleodemographic study is the first reexamination of the Read skeletal material, which received only limited analysis by WPA researchers.

Table 1. Chronometeric Dates for 15Bt10, 15Bt5, and 15Oh2.

Site	Age (B.P.)[+]	Lab No.	Reference
15Bt10	3470 ± 200	ISGS-2245	Haskins 1992
Read	3400 ± 100	ISGS-2246	Haskins 1992
	3350 ± 70	ISGS-2249	Haskins 1992
15Bt5	2515 ± 80	UCLA-2117D	Marquardt and Watson 1983:326
Carlston Annis		3330 ± 80	UCLA-2117B Marquardt 1977:4
	4040 ± 180	UCLA-1845B	Marquardt and Watson 1974:7
	4250 ± 80	UCLA-1845A	Marquardt and Watson 1974:1
	4350 ± 85	UGa-3390	Marquardt and Watson 1983:326
	4500 ± 60	UCLA-2117I	Marquardt 1977:4
	4655 ± 540	UGa-3395	Marquardt and Watson 1983:326
	4670 ± 85	UGa-3391	Marquardt and Watson 1983:326
	4760 ± 90	WIS-1301	Marquardt and Watson 1983:326
	5030 ± 85	UGa-3393	Marquardt and Watson 1983:326
	5350 ± 80	WIS-1302	Marquardt and Watson 1983:326
15Oh2	3963 ± 350	C-741	Libby 1952:673
Indian Knoll	4282 ± 225	C-740	Libby 1952:673
	5302 ± 300	C-254	Arnold and Libby 1951:114

[+] All dates are uncorrected.

METHODS

Because the initial inventory of the burials was limited, a complete inventory and thorough examination of each burial was necessary. Most of the burials were fragmented, with the elements mixed together, and some had never been cleaned.

Subadult age determinations were based on the three primary indicators: dental maturation and eruption, long bone diaphyseal length, and, in the case of older adolescents, patterns of epiphyseal maturation derived from published standards (Johnson 1961; Krogman and Iscan 1986; Stewart 1934). Because dental radiographs were not taken, age estimates were based on macroscopic examination in accordance with published standards of maturation and eruption (Christensen and Kraus 1965; Demisch and Wartman 1956; Hunt and Gleiser 1955; Kraus 1959; Lunt and Law 1974; Meredith 1946; Moorrees 1965; Schour and Massler 1940, 1941; Ubelaker 1989). For subadults (<15 years), ages were based on dentition whenever possible.

Age estimates for individuals with measurable diaphyses only were based on Mensforth's polynomial regressions for predicting age at death from long bone diaphyseal length (Mensforth 1986:66-71). Mensforth derived these estimates from the 15Bt5 skeletal series through comparison of dental development to diaphyseal length.

To test the validity of applying Mensforth's 15Bt5 regressions to the 15Bt10 subadults, those subadults from 15Bt10 with both a dental age estimated and long bone diaphyseal length measurements (n=41) were examined. An average age at death from the 15Bt10 diaphyseal lengths was generated first, using Menforth's regressions. The estimated diaphyseal age estimate and dental age estimate were then compared. Because the two age estimates correlated well ($r = 0.974$), Mensforth's regressions were applied to these subadults in 15Bt10 for which there were no dental data.

For adults in the 15Bt10 sample, age was estimated by means of a case-by-case aging approach. Each burial was examined individually, with ages assigned for each available age indicator. All age ranges were then averaged to derive a composite age for the individual. This approach differs from Mensforth's seriation of age indicators for 15Bt5 series (Lovejoy et al. 1985a; Meindl et al. 1983; Mensforth 1986, 1990). A major goal of this study was to determine whether statistically similar results could be derived utilizing the basic case-by-case methodology.

For adult age determination, three primary age indicators were employed, as well as a fourth that combined several secondary age indicators. The primary indicators included auricular surface (Bedford et al. 1989; Lovejoy et al. 1985b), pubic symphysis (Gilbert and McKern 1973; McKern and Stewart 1957; Meindl et al. 1985; Todd 1920-21), and population specific rates of dental wear (Johnson and Snow 1961; Mensforth 1986). Secondary age indicators were age-specific epiphyseal fusion rates (Bass 1987; Steele and Bramblett 1988; Ubelaker 1989), age-related degenerative effects, and endocranial and ectocranial suture closure (McKern and Stewart 1957; Meindl and Lovejoy 1985). The average of the secondary age indicators was calculated and used as the fourth indicator.

Sex estimates were based primarily on the degree of expression of morphological indicators following Bass (1987), Krogman and Iscan (1986), Phenice (1969), and Stewart (1957). Additional metrics were used to supplement the morphological evidence and to increase the reliability of the sex determination following Bass (1987).

RESULTS

When considering any type of demographic study, one must have reasonable assurance that the sample is representative of the total population. In paleodemographic studies, however, researchers must assume that the skeletal sample is representative of either the total population or a specific portion or it (Acsadi and Nemeskeri 1970; Angel 1969; Weiss 1973). In the case of 15Bt10, poor preservation increases the likelihood of sample error. As noted earlier, 247 burials were identified in the field but only 152 were removed. Final analysis shows that the 152 burials represented a minimum of 173 individuals, but 24 of these individuals could not be placed in specific age ranges. Therefore, before calculating the population parameters, it was necessary to conduct a series of tests to determine if the 15Bt10 skeletal sample was representative of the total burial population and if all age indicators were similarly represented throughout all age ranges.

To determine whether the analyzed sample was representative of the excavated sample, comparisons of the general age distributions for each sample were generated. The six age classifications originally employed by the WPA excavators were used (Webb 1950b). Table 2 shows the differences between the two distributions, mainly in the infant and young adult categories. These differences could reflect the identification of some infants and young adults as a child or adult, respectively, in the WPA study. Also, additional infants were found mixed with adult burials during the sorting and inventory in 1989. A Kolmogorov-Smirnov (K-S) test of the two distributions showed that they did not differ significantly at the $p > 0.01$ level.

Because the percentage of adults who did not fit into a specific age range in the sample was high (23%), these burials were tested to determine whether they could influence the adult age distribution of the sample. Mensforth's approach (1986:24-27) for 15Bt5 was used to classify the 24 individuals as either under or over 40 years of age. Six individuals were judged to be over 40 years, 16 were under 40, and two could not be classified. This ratio was then compared to the ratio of adults over and under 40 years in the demographic sample, 28 to 52 individuals, respectively. A chi-square value was insignificant ($X^2 = 3.07$; $p > 0.05$); therefore, the unaged adults should not influence the 15Bt10 age distribution.

Human archetypal fertility data were incorporated in the life table analysis, in accordance with the assumptions of stable and stationary population theory. A life table (Table 3) was derived for the 15Bt10 skeletal sample using the methods defined in Weiss (1973). The life table for 15Bt10 compares well with Mensforth's 15Bt5 (1990:87) and Johnson and Snow's 15Oh2 (1961) results. The 15Bt10 and 15Bt5 results are almost identical. Life expectancy at birth and at age 15 for 15Bt10 is 22 and 19 years, respectively. The percent of the population surviving until age 15 for 15Bt10 is 58.4. 15Bt10's mean age-specific fertility value (B) is 0.076. Crude Birth Rate (CBR) for 15Bt10 is 45, the mean family size is 3.4, the Completed Family Sized (GRR) is 2.7, and the generation length (T) is 26.6 years. The relative proportion of individuals under 15 years for 15Bt10 is 0.416, between 15 to 50 years 0.550, and over 50 years 0.034. Table 4 presents a comparison of these results to those of 15Oh2 and 15Bt5.

The deaths for each age cohort from the three samples were examined and cumulative frequency distributions generated (Table 5). The statistical difference of these distributions was determined with a K-S two-sample tests at the 0.01 level. The 15Bt10 sample differed significantly from the 15Oh2 sample, but not the from the 15Bt5 sample. Mensforth (1990:89) demonstrated that the adult age distribution of 15Bt5 differs significantly from that of 15Oh2. The greatest difference between 15Bt10 and 15Bt5 is in the age cohort of 0-1 year. The greatest difference between 15Oh2 and both 15Bt5 and 15Bt10 is in the 35-40 year cohort. Mensforth attributes this difference between 15Oh2 and 15Bt5 to adult age determination error for 15Oh2.

Table 2. General Age Class Distributions for the 15Bt10 Sample.

AGE CLASS	Count 1950[1]	Count 1990	Cumulative Frequencies 1950	Cumulative Frequencies 1990
Infant	12	29	0.049	0.190
Child	40	15	0.211	0.285
Juvenile	45	13	0.393	0.407
Subadult	1	4	0.397	0.455
Young Adult	9	18	0.433	0.564
Adult	140	65	1.000	1.000
Totals	247	149		

Kolmogorov-Smirnov Two-Sample of the Difference Between the Two Distributions.

Critical Value = .141 K-S0.01 = .170

[1] Compiled from the field estimates (Webb 1950b).

Table 3. 15Bt10 Abridged Composite Life Table[1].

X	dx	l'x	lx	Lx	Tx	Ex	Qx	Cx	L'x	Kx	mL'x	FBx	FBx*5	FBx*Cx	Fbx*L'x*mn
0	20	149	100.0	93.3	2220.8	22.2	0.134	4.2	0.933						
1	13	129	86.6	328.9	2127.5	24.6	0.101	14.8	3.289						
5	11	116	77.9	370.8	1798.7	23.1	0.095	16.7	3.708						
10	18	105	70.5	322.1	1427.9	20.3	0.171	14.5	3.221						
15	7	87	58.4	280.2	1105.7	18.9	0.080	12.6	2.802	0.642	1.80	0.049	0.24	0.006	2.39
20	15	80	53.7	243.3	825.5	15.4	0.188	11.0	2.433	1.739	4.23	0.132	0.66	0.014	7.22
25	11	65	43.6	199.7	582.2	13.3	0.169	9.0	1.997	1.741	3.48	0.132	0.66	0.012	7.25
30	13	54	36.2	159.4	382.6	10.6	0.241	7.2	1.594	1.410	2.25	0.107	0.54	0.008	5.54
35	13	41	27.5	115.8	223.2	8.1	0.317	5.2	1.158	0.981	1.14	0.074	0.37	0.004	3.23
40	17	28	18.8	65.4	107.4	5.7	0.607	3.0	0.654	0.407	0.27	0.031	0.15	0.001	0.86
45	6	11	7.4	26.8	41.9	5.7	0.545	1.2	0.268	0.084	0.02	0.006	0.03	0.000	0.06
50	3	5	3.4	11.7	15.1	4.5	0.600	0.5	0.117						
55	2	2	1.3	3.4	3.4	2.5	1.000	0.2	0.034						
	149				2217.7						13.18 (B) 0.076 (1/B)		2.66 (GRR)	0.045 (CBR)	26.58 (T)

[1] Symbols: x, age in years; dx, absolute number of dead of age x; l'x, absolute number of survivors to age x; lx, number of survivors to age x out of a radix of 1,000; Lx, number of person years lived in age class x; Tx, total number of person years to be lived by the population at age age x before all are dead; Ex, life expectancy beyond the age already attained; Qx, probability of dying in the succeeding age class for those reaching age x; Cx, percentage of population who are age x in the age distibution; L'x, proportion of person years lived in age class x based on radix of 1,000; Kx, archetypal mean age-specific fertility coefficients; mL'x, age-specific fertiltiy rates adjusted for mortality in age class x; FBx, annual age-specific fertility rate for daughters; GRR, completed family size; CBR, crude birth rate; T, generation legth; 1/B, mean annual fertility rate.

Table 4. Comparison of 15Bt10, 15Bt5 and 15Oh2 Demographic Profiles[1].

Demographic Parameters	15Bt10	15Bt5	15Oh2
Adult Sex Ratio (M:F)	1.10	0.98	1.24
Fertility:			
Crude Birth Rate	45.0	45.0	52.7
Mean family size (MFS)	3.4	3.3	3.4
Completed family size (GRR)	2.7	2.7	3.2
Generation Length (T)	26.6	26.6	25.1
Mortality:			
Crude death rate	45.0	45.0	52.7
e0	22.1	22.4	19.0
e15	18.9	19.4	14.6
l15	58.4	61.6	58.6
Proportion Under 15 Years	0.416	0.384	0.414
Proportion 15 to 50 Years	0.550	0.528	0.585
Proportion Over 50 Years	0.034	0.088	0.001
Dependency Ratio	0.820	0.98	0.71

[1] Parameters caculated according to the model life table procedures presented in Weiss (1973). Crude death rate represents number of individuals per thousand per year.

Table 5. **Dx Cumulative Frequencies for 15Bt10, 15Bt5 and 15Oh2.**

Age Class	15Bt10	15Bt5	15Oh2
0-1	.134	.215	.195
1-5	.221	.297	.291
5-10	.295	.345	.353
10-15	.416	.385	.414
15-20	.463	.461	.481
20-25	.564	.560	.566
25-30	.638	.656	.714
30-35	.725	.744	.866
35-40	.812	.806	.967
40-45	.926	.862	.989
45-50	.966	.913	.999
50-55	.986	.950	1.000
55-60	1.000	.975	1.000
60-65	1.000	.992	1.000
65+	1.000	1.000	1.000
Totals	149	354	873

Kolmogorov-Smirnov Two Sample Test of the Difference Between Dx Profiles.

Paired Sites	Critical Value		K-S
15Bt10-15Bt5	.081		.159
15Bt10-15Oh2	.155	**	.145
15Oh2-15Bt5	.161	**	.103

**=Significant at 0.01 level

The survival percentage (lx) for 15Bt10, 15Bt5, and 15Oh2 was plotted (Figure 1). The 15Bt10 curve shows a moderately high infant mortality with a fairly regular mortality rate until the mid-forties. The survival rate for individuals from birth to 10 years at 15Bt10 is greater that at the other two sites. 15Bt10's higher infant survival may be related to differential bone preservation at the three sites, leading to a lower-than-expected number of infants at 15Bt10, as compared to the other sites. During the early teens, however, the survival rate drops rapidly and falls, being consistent with the rates for 15Bt5 and Indian Knoll. The survival rate of the Indian Knoll sample declines steadily from age 25-40, whereas rates for 15Bt5 and 15Bt10 populations gradually decrease to the ages of 40 to 45. The 15Bt10 population experiences a sharp increase in mortality at around 40. These differences in the adult survival rate may result from low age estimates for the 15Bt10 and 15Oh2 older individuals, or high age estimates for the older individuals in the 15Bt5 samples.

Death probability (qx) curves were generated next for the three samples (Figure 2). Mortality for 15Oh2 and 15Bt10 peaks at ages 35 to 40. The 15Bt5 curve, however, is smooth, with no substantial peaks in mortality. The overall age extension of each curve may be attributed to the limitations of the age criteria employed for each study.

In the 15Oh2 study, Johnson and Snow's age estimates were limited to approximately 50 years, the high range for the pubic symphysis method they employed and the upper age range for the dental attrition they defined. The auricular surface aging technique was employed in both the 15Bt5 and 15Bt10 analyses, and Lovejoy et al. (1985a) demonstrated that the range of this technique extends into the seventh decade. For the 15Bt5 study, Mensforth also used trabecular and cortical bone involution of the clavicle and proximal femur, for which age estimates could be over 60 years. For the dental age, Mensforth extended age estimates into the eighth decade.

An examination of the older dental age estimates (60+ years) from 15Bt5 showed that these dental estimates varied greatly from the age estimates for other indicators. Age estimates for five of the 11 individuals (45%) with dental estimates over sixty from 15Bt5 were based on dental evidence alone (Mensforth 1986:74-91). Furthermore, in five of the six remaining dental estimates (83%), the composite age estimate was over five years younger than the dental estimate, and in three cases dental estimates were more than ten years in excess of the composite age estimates. It should be noted that the composite age is calculated from the dental estimate, as well as the other available age estimates. Therefore, the dental age criteria employed for older individuals in the 15Bt5 analysis results in high age estimates in relation to the other age indicators.

The mortality peaks in the 15Bt10 and 15Oh2 curves are more difficult to explain. First, the peaks may result from the case-by-case approach that was used, in that age criteria for poorly preserved individuals are limited, and estimates do not allow for population variation. According to Meindl et al. (1983) and Lovejoy et al. (1985a), the seriation process accounts for and partially eliminates this type of age estimation error in that the single age indicator is incorporated into the population distribution. During the analysis of the 15Bt10 material, however, careful consideration was given to population variation for each age indicator. A second possible explanation is that the peaks are true representations of the midlife mortality of 15Bt10 and 15Oh2. If we assume that this mortality peak is representative of the populations of 15Bt10 and 15Oh2, then the mortality of older adults at 15Bt5 is slightly different. Another possibility is that the smooth mortality curve for 15Bt5 may result from the seriation process, in that the number of individuals per age range could be smoothed inadvertently. However, this explanation seems highly unlikely, because each age indicator is seriated independently of the others, and specific individuals are unknown.

The male-female sex ratio for the entire sample (15+ years) is 1.10. The difference between the age distributions is not significant ($D = 0.09$; $P > 0.01$). The 15Bt10 ratio is considerably higher than the 15Bt5 ratio

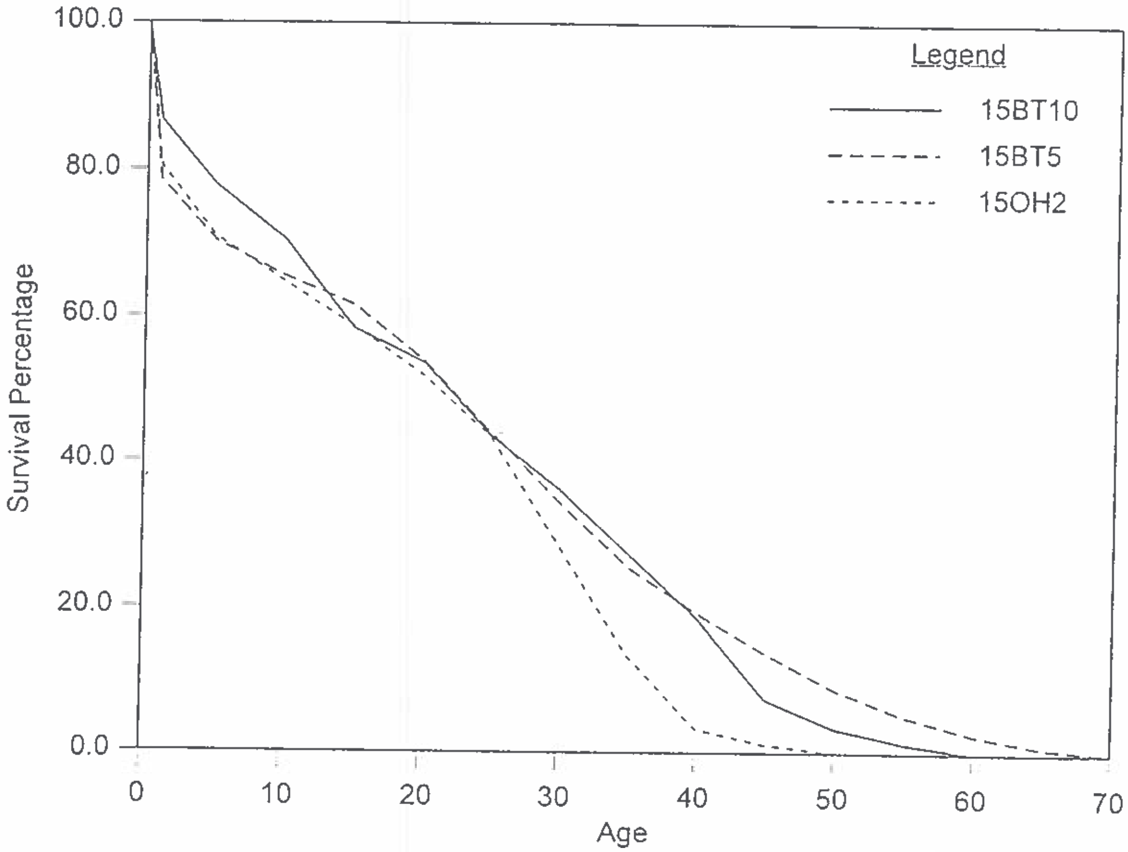

Figure 1. Survival for 15Bt10, 15Bt5, and 15Oh2.

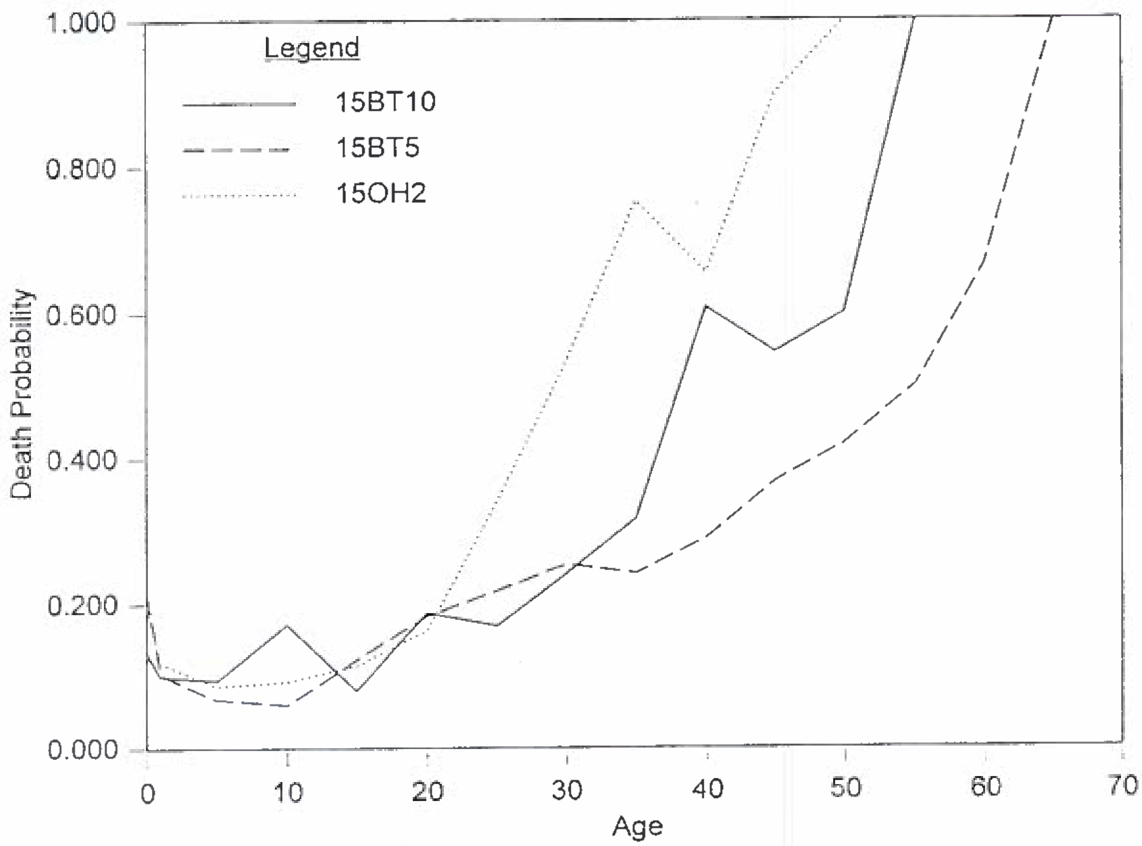

Figure 2. Death Probability for 15Bt10, 15Bt5, and 15Oh2.

of 0.98, but lower than the 15Oh2 ratio of 1.24. In Figure 3, the 15Bt10 male-female survival is plotted, and the curves show that the distributions are similar up to the age of 30, after which female survival is greater than that of males (see Table 6).

The mean sex ratio for the four adult age indicators (20+ years) was 1.18. This ratio shows a bias toward male representation for all the primary indicators, which is consistent with the result from 15Bt5 in that Mensforth also had a high male bias, with a ratio of 1.09 for the adult age indicators (Mensforth 1986:19).

SUMMARY AND CONCLUSION

The Read Site, 15Bt10, was a Late Archaic seasonal occupation and mortuary shell mound site dating to approximately to 3400 B.P., a period contemporaneous with the other major shell mounds from that area. Excavated during the late 1930s, the skeletal material removed from the site was washed and inventoried because "it was deemed inadvisable to attempt a complete physical anthropological study" (Webb 1950b:367). In this paleodemographic study, a case-by-case approach was employed to determine age and sex. This technique differs from the seriation approach employed by Mensforth for the 15Bt5 sample, in which age indicators are first seriated and a composite age then generated through a weighted system. However, the results from 15Bt10 show that similar demographic profiles can be generated from different methodologies. The profile for 15Bt10 fits well between the 15Bt5 and 15Oh2 demographic profiles, and did not differ statistically from either sample. In addition, the various population parameters calculated for 15Bt10 are almost identical to 15Bt5 and compare well with 15Oh2.

The 15Bt10 research shows that differing methodologies applied to related populations can produce similar results. The major differences in findings between the 15Bt5 and 15Bt10 occur in the data on survival in the age categories below one year and over 55 years. Several explanations of these differences are possible. First, the number of infants at 15Bt10 are under represented because of poor preservation. Second, the adult age indicators employed for each study varied. For example, age estimations for 15Bt5 adults could extend to 70 years. Third, dental age criteria for 15Bt5 could result in overestimates compared to other age indicators. As dental age estimates were given for 71% of the individuals aged over 50 in the 15Bt5 study (Mensforth 1986:74-91), this merits particular attention.

In conclusion, the curated shell mound skeletal collections at the University of Kentucky provide a variety of osteological research opportunities. This study offers new data on the Read Shell Midden and relates this information to other research from the region. The results suggest that the 15Bt10 burial population displays mortality patterns similar to those found for 15Bt5 and 15Oh2 and that the few differences shown in the samples result from methodological variations and taphonomic processes.

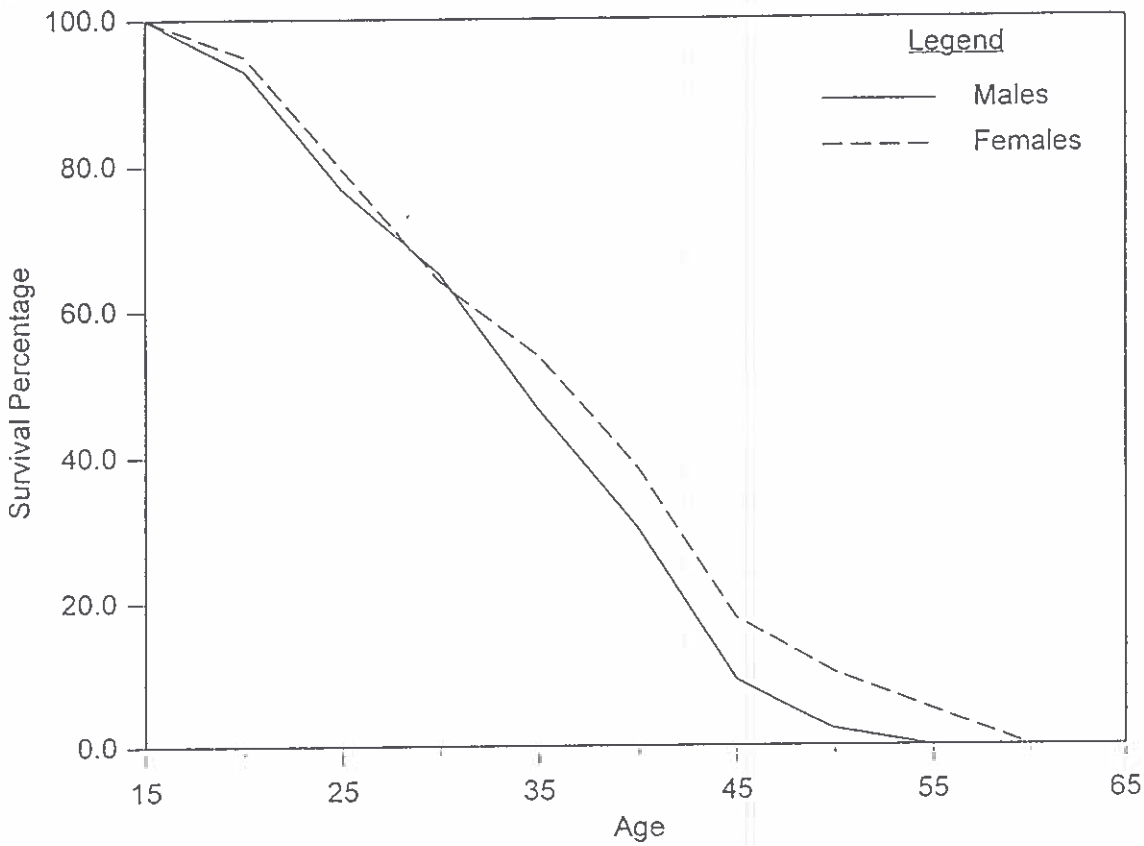

Figure 3. Male-Female Survival (>15 years) for 15Bt10.

Table 6. 15Bt10 Adult Sex Specific Survival[1].

AGE RANGE	N	Total %	lx	n	Males %	lx	n	Females %	lx
15-19	7	8.0	100.0	3	7.0	100.0	2	5.1	100.0
20-24	15	17.2	92.0	7	16.3	93.0	6	15.4	94.9
25-29	11	12.6	74.7	5	11.6	76.7	6	15.4	79.5
30-34	13	14.9	62.1	8	18.6	65.1	4	10.3	64.1
35-39	13	14.9	47.1	7	16.3	46.5	6	15.4	53.8
40-44	17	19.5	32.2	9	20.9	30.2	8	20.5	38.4
45-49	6	6.9	12.6	3	7.0	9.3	3	7.7	17.9
50-55	3	3.4	5.7	1	2.3	2.3	2	5.1	10.2
55+	2	2.3	2.3	0	0.0	0.0	2	5.1	5.1
Total	87*			43			39		

[1] The male:female adult sex ratio is 1.10.

* Sex estimations were indeterminate for five individuals.

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EARLY WOODLAND SITE VARIATION IN THE CONSTRICTED OHIO RIVER VALLEY BOTTOM LANDS AS REVEALED BY ARTIFACT PATTERNING

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ABSTRACT

A commonly used method in historical archaeology, artifact patterning is seldom applied to prehistoric assemblages because of constraints relevant to ambiguous or multiple artifact function, period of artifact manufacture, site contemporaneity, and more. This paper addresses Early Woodland site variation within the constricted Ohio River Valley, as revealed by artifact patterning. The variability in these sites has been commonly overlooked because of the predominance of lithic materials. The findings of this study are supported by feature analysis, and are possibly explained by geomorphological setting.

INTRODUCTION

From 1987 through 1992, archaeological investigations conducted within the bottom land pockets of the constricted Ohio River Valley by Archaeology Resources Consulting Services, Inc. of Louisville, Kentucky and MAAR Associates, Inc. of Newark, Delaware, have included Phase III data recovery efforts at two Early Woodland sites, and Phase I/II investigations at several others. The excavations at the Rockmaker Site, 15Bc138, in the Chenaultt Bottoms of Breckinridge County, Kentucky, and at the Mogan Site, 12Pe839, directly across the Ohio River in the Dexter Bottoms of Perry County, Indiana, were initiated in response to the proposed construction of a submarine natural gas pipeline crossing to supply incremental services to Indiana by Texas Gas Transmission Corporation. The archaeological remains from both sites represent short term, late summer to late fall occupations. However, the activities indicated at Rockmaker, a terrace site, appear to have been those associated with a specialized lithic (Turkey-tail projectiles) manufacturing and resource processing station, while the remains from the Mogan Site, situated on a flood plain ridge, suggest a range of activities more consistent with short-term residence, such as a camp.

ARTIFACT PATTERNING

All too often, prehistoric sites are termed "base camp", "hunting camp", "exploitive camp", "ceremonial/ritual center", etc. without any clear, defendable basis for making these judgements. It is often overlooked that settlement systems are region-, period-, and culture-specific, and that a settlement system of one area or time is not likely to be directly applicable to another. Artifact patterning is one method for analyzing data, whether excavated or surface collected, from contemporary sites across a region to allow a reasonable and empirical basis for determining settlement systemics based on functional site types.

Artifact patterning is based on the simple premise that most activities that occurred at a site are manifest in the archaeological record by the diversity and quantity of the surviving artifacts associated with those activities. It is assumed that the importance of different site functions is reflected in the relative proportions of functional groups of artifacts recovered, given similar recovery methods (Winters 1969:131). Generally, the more sustained the occupation at a site, the broader was the range of activities that occurred there, and the more diverse was the range of functional artifact types used. Specialized exploitive or processing sites, for instance, should yield a more limited range of functional artifact types than those associated with residence, often with a predominance of artifacts associated with a particular activity.

Artifact patterning as an analytical method is basically descriptive and lacks explanatory capability. It is nevertheless a valuable tool since a pattern must be recognized before it can be explained. This is especially meaningful for prehistoric sites whose functions are not as readily apparent, as with historic sites. The method has been of demonstrable worth in the field of historical archaeology, where it has been used to interpret the nature and function (i.e. to determine the activities) of a site (South 1977, 1978). It has also been applied successfully to surface collected materials to make preliminary assessments of site function(s) (Ball 1984b).

The quantification of functionally related artifact types has less often been employed to infer site type (i.e. activities) at prehistoric sites, however, because of certain limitations (Winters 1969:131-137). On most prehistoric sites, it is difficult if not impossible to determine site contemporaneity, since the beginning and/or ending dates of the occupations of the site cannot be based on the precise period of manufacture of specific artifact types, as is the case with historic sites. Furthermore, the functions of some prehistoric artifacts are ambiguous or multiple. Finally, many significant remains are not preserved. Given these limitations, however, artifact patterning as an analytical method can still be a means of objectively and quantitatively comparing intersite variation between prehistoric sites (components) of the same period within a given region, providing that a consistent artifact classification is applied to all assemblages, the excavation strategies and recovery techniques are similar between sites, and that representative samples of the sites were excavated.

STUDY AREA

The study area lies within the constricted Ohio River Valley, which comprises approximately 100 river miles from just south of Louisville, Kentucky (river mile 625), to Tell City, Indiana (river mile 725). This portion of the valley was never glaciated. Physiographically, it is dominated by a flood plain swell-and-swale topography, discontinuous linear terraces of the Ohio River, and adjoining steep uplands. Elevations range from 121 m above mean sea level at the flood plain, 128-134 m above mean sea level at the terrace remnants, to over 275 m above mean sea level in the uplands. The river is entrenched in a narrow, deep, sinuous, and gorge-like valley with few flood plains or bottom land pockets. These bottom lands are generally less than 1 km wide, but may reach 2 km (Ray 1974:3). They are usually restricted to one side of the river or the other, with steep bluffs rising from the water level on the opposing side. In the 100 river mile stretch between Louisville and Tell City, approximately 20 of these restricted bottom lands may be found (Figure 1).

The flood plain itself is comprised of three parts. The upper flood plain consists of gentle rises (swells) that parallel the river. The lower flood plain consists of swales that lie between the swells and contain wetlands. The third component is a discontinuous natural levee that parallels the river at its bank (Bader and Clarke 1990). On the broad extent of the alluvial plain, there are numerous linear swells less than 4 m high. The flood plain is poorly drained, with standing water in low areas during much of the winter and spring and after heavy rains in the summer.

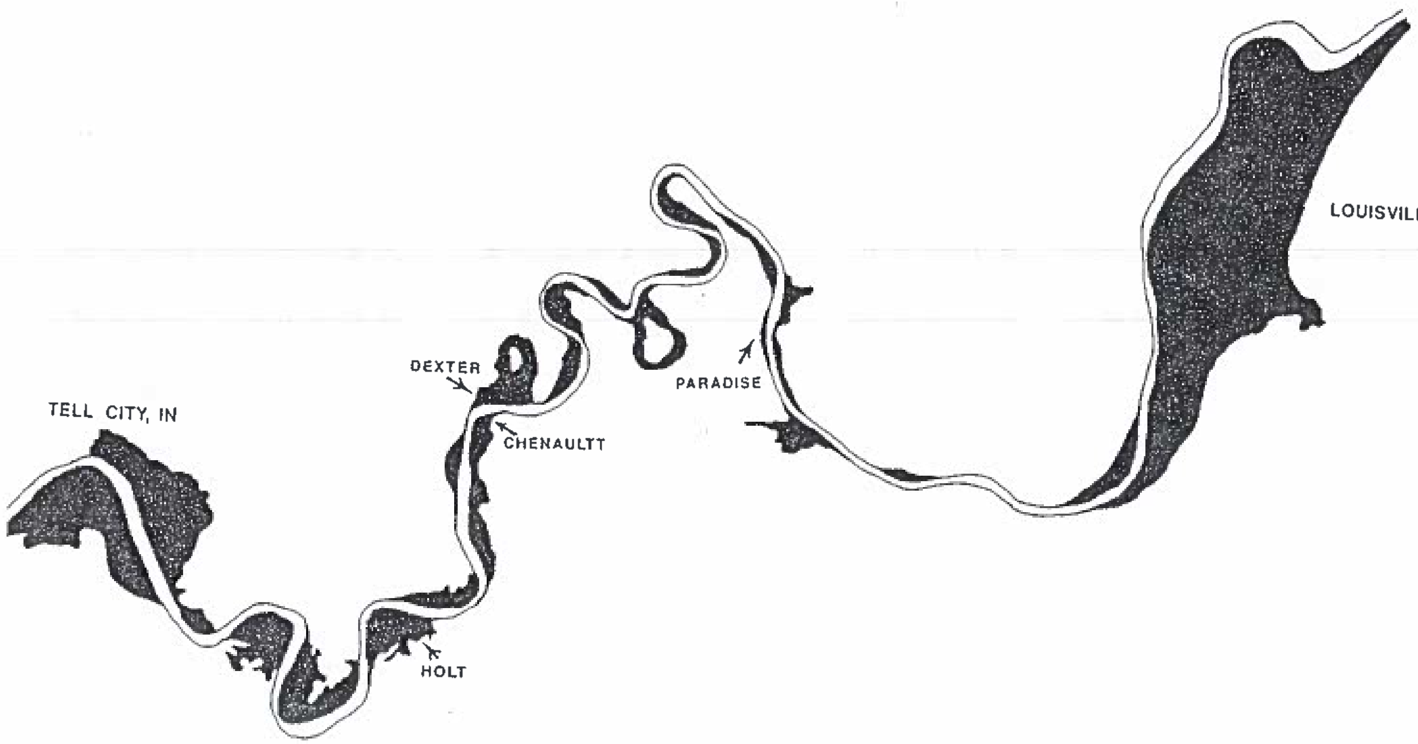

Figure 1. Bottomland Pockets within the Constricted Ohio River Valley.

The constricted Ohio River flows through several physiographic regions, but primarily the Mississippian Plateau in Kentucky and the Crawford Upland in Indiana. The Mississippian Plateau region, also called the Pennyroyal, is the largest geologic area of Kentucky, making up 30% of the state (Bladen 1984), and is varied in terms of its physiography. Generally, the uplands consist of a hilly, rugged terrain containing numerous rockshelters which would have been ideal for prehistoric use. The hills are dissected by numerous streams, creating narrow, flat bottom lands that widen as the streams enter the Ohio River. The Crawford Upland is generally similar in age and relief to the Mississippian Plateau. It is a dissected plain where local relief is due to stream action, which has down cut the sandstone and shale bedrock. Elevations in this area range from 107-299 m above mean sea level. Ridge tops can be found that are both broad or sharp, with slopes that are gentle or steep, and valleys that are broad or narrow. The area also contains peneplain remnants, along with caves and sinkholes.

The overall terrain of the Ohio River bottom lands in the regions of the Mississippian Plateau and the Crawford Upland contrasts with the glaciated portion of the valley that extends from Tell City, Indiana (river mile 725), to Cairo, Illinois on the Mississippi River (river mile 981). The latter is characterized by broad, extensive alluvial bottom lands which often exceed several kilometers in width, and behind which lie low, rounded hills.

Two features of the region are important among the factors that undoubtedly influenced prehistoric settlement in the area. The first of these is the flooding of the Ohio River. Evidence of intense flooding during prehistoric times is found at archaeological sites on the Ohio River flood plain that are deeply buried in alluvium. Backhoe testing has revealed sediments that were deposited in both fast currents, and slower, calmer waters. Sand deposits in these trenches are considered evidence of strong currents associated with flooding episodes (Bennett and Porter 1987).

In historic times, the river was generally low in the summer and winter before the snow melt, and was high in the rainy months of spring and fall. It is reported that a child could wade across the Ohio River in low water before the river was dammed. However, the unimpounded river was also subject to episodes of intense flooding (Sanders 1991:7, 20). Today, the study area is subject to flooding at several times of the year. In the early winter and again in the spring, the Ohio River floods and backs up into the numerous small, first order streams that lie within the flood plain swales. The rains begin in late November or early December, and continue through February. The swales become filled, forming sloughs, and hold the water for several weeks, gradually subsiding. The water may persist through April. Modern flooding patterns have been influenced by the historically recent damming of the Ohio River. The construction of dams such as at Cannelton, has raised the water level some 6 m from the unimpounded river levels.

A second feature that is of archaeological interest is the chert bearing geologic deposits of the region. The Haney limestone member of the Golconda Formation and the stratigraphically lower St.Genevieve limestone of the Chester Series contain valuable chert deposits that were widely used by prehistoric populations. Haney chert was available to these populations locally and is found along the upland bluffs adjacent to the flood plain within the study area. St. Genevieve chert, known as Wyandotte chert in Indiana, and also as Harrison County flint, does not outcrop in the immediate area of the Rockmaker and Mogan sites, but is readily available in Crawford and Harrison counties of Indiana, and in Meade County, Kentucky, within a few miles upriver to the north. Wyandotte chert was also mined prehistorically from caves, such as Wyandotte Cave in Harrison County. Nodules of Wyandotte chert may also be found in transported stream cobbles. It is likely that the exotic pebble cherts found in the older alluvial deposits along the Ohio River were also an important source of raw material.

PREVIOUS ARCHAEOLOGY

The archaeology of the constricted Ohio River Valley is in general poorly understood (Muller 1986:118). It has been overshadowed by the well-documented sites of the Adena heartland of the middle and upper Ohio River Valley to the north, and by the large bottom land Mississippian complexes of the lower Ohio River Valley to the south. Furthermore, urban and industrial development in the region has been limited, thereby reducing cultural resource management opportunities for discovering archaeological sites. Archaeological work in the area has been largely restricted to reconnaissance and site evaluation associated with environmental impact assessment work (Granger et al. 1973), and occasional industrial development projects (Bader and Clarke 1990; Bennett and Porter 1987; Bergman et al. 1989; Cowan 1975; Granger and Bader 1987; Turnbow et al. 1980; and Thomas et al. 1990). Much of the research in the area has been directed toward determining the range and intensity of chert exploitation in the area, and the identification of the Harrison County, Indiana lithic sources (Seeman 1975). An example of a more intensive study was done by Janzen in 1981, during which he tested 12 sites in the Holt Bottoms of Breckinridge County, Kentucky (Janzen 1981).

Along the constricted Ohio River Valley in southern Indiana, more systematic archaeological surveys have been conducted than in the Kentucky counties. One of the early surveys was done in Perry County, Indiana, during which 185 sites were documented (Kellar 1958). Other surveys include those of the state and national forests (Seiber et al. 1989; Smith 1982). Recent data enhancement studies accomplished in southwestern Indiana (Ellis et al. 1990) have greatly contributed to the understanding of archaeological site distributions in the southern Indiana counties. Eight hundred and sixty-six sites and 953 components have been identified in Perry County alone, in contrast to the 280 sites identified in Breckinridge County of Kentucky, directly across the river.

The evidence of prehistoric occupation in the bottom land pockets indicated by these studies is extensive. For instance, 9 km downstream from the area discussed in this paper is Holt Bottoms, which has been listed in the National Register of Historic Places as an archaeological district because of the large number and wide temporal range of recorded sites (Turnbow et al. 1980). The sites in the region range from Early Archaic through Late Woodland/Mississippian, and attest to the long-term use of the constricted Ohio River Valley. However, few sites dating to the Early Woodland have been identified in this area. Only two Late Archaic/Early Woodland sites and 13 Early Woodland sites have been documented in Perry County, Indiana (Ellis et al. 1990). The low number of sites dating to this period is partially due to sampling error. Transitional Archaic/Early Woodland sites in the bottom lands are located at least at a depth of 50 to 100 cm on the flood plain and flood plain ridges, while they may be found on the surface on the terraces. Prior to the 1991 excavations at the Rockmaker and Mogan sites, the only major data recovery effort at an Early Woodland site within the constricted Ohio River Valley bottom lands was that at the Mary Ann Cole Site, 12Cr1, located in Crawford County, Indiana, at the confluence of the Blue and Ohio rivers (Myers 1981). Recent excavations at the Yellowbank Site (15Bc164) in the Chenaultt Bottoms of Breckinridge County have produced additional information relative to this period (Evans et al. 1994), as have test excavations at the Carver's Lake Site (15Md318) in the Paradise Bottoms of Meade County, Kentucky in 1989 (Granger et al. 1989).

THE SITES

THE ROCKMAKER SITE (15Bc138)

The Rockmaker Site is located in northwestern Breckinridge County, Kentucky, just over 1.6 km southeast of the Breckinridge-Meade county line. It lies approximately 27 km northwest of the county seat of Hardinsburg in the state-owned Yellowbank Wildlife Management Area. The site is situated on the south side of the Ohio River within the Chenaultt Bottoms. It rests on the second terrace above the Ohio at an elevation of 131 m above mean sea level (Figure 1). A small first order stream, White's Branch, flows northward along the eastern periphery of the site and empties into the Ohio 460 m northwest of the northern boundary of Rockmaker. The terrace is in the form of a broad, level to undulating plain which abuts a hilly terrain with bluffs to the east. An eroded slope drops off steeply northeast to White's Branch. To the west, the land slopes away less steeply to the first terrace, which then forms a level plain for approximately 1500 m to the banks of the Ohio River.

The flat second terrace has long been cultivated. The majority of the site lies within currently cultivated fields that are undulating with small rises. The upper levels of the site within the cultivated fields have been severely deflated by intensive and long-term agricultural practices. Test excavations within this portion of the Rockmaker Site revealed cultural remains dating principally to the Early/Middle Archaic period. Diagnostic surface finds suggest that this component is situated well back on the second terrace, away from the terrace edge. The mechanical stripping of the plowzone in this portion of the site revealed no features or subplowzone deposits.

The northernmost portion of the site is contained within a narrow band of 40-50 year old trees along the steep sloping terrace edge overlooking the wetlands. In this area, testing revealed that a comparatively intact portion of the Rockmaker Site was to be found. The remains from this portion of the site date to the Early Woodland period (Bader and Atwell 1993). The excavation strategy involved the mechanical removal of the disturbed plowzone within the 15 m wide corridor of the proposed pipeline in order to identify and excavate all features, and thereby providing the data required to infer site function and to determine its internal structure. A total of 25 cultural features were recorded by this procedure. The majority of the features are located within 12-13 m of the northeastern edge of the site where the elevation drops off to the bottom land backwater slough. Away from the terrace edge toward the south, the features disappear and the artifact density declines dramatically.

Evidence from the few cases of extant floral remains at Rockmaker suggests a late fall occupation. Black walnut, butternut, and hickory nut remains were recovered through flotation. The narrow range of the few floral remains indicates a short-term occupation, for undoubtedly they represent only a fraction of the floral resources available in this area during other seasons (Moeller 1993).

THE MOGAN SITE (12Pe839)

The Mogan Site (12Pe839) is located on an east-west trending linear flood plain ridge that lies 200 m north of the Ohio River in the Dexter Bottoms of Perry County, Indiana. The Dexter Bottoms area is located within the Oil Creek drainage (Figure 1). However, unlike the Rockmaker Site, the Mogan Site lies some distance from any permanent or intermittent tributary stream. Oil Creek enters the Ohio River approximately 1.6 km southwest of the Mogan Site, and 1.6 km north of the town of Derby. A backwater slough formed in a former oxbow of the Ohio lies a short distance to the northwest. The flood plain ridge upon which the Mogan Site rests is approximately 130 m wide, measured from the low-lying swales that parallel the ridge to the north and south. The ridge runs along the flood plain of the Ohio River for nearly 1.2 km. The cultural deposits are concentrated along the linear apex of the ridge at an average elevation of 121-123 m above mean sea level. Since the excavations at the Mogan Site were restricted to a narrow corridor of 15 m in width, estimates of the size of the site cannot be realistic. Cultural materials are reported from the entire length of the ridge, but these almost certainly represent numerous overlapping sites.

Prior to excavation, the Mogan Site was divided into two sections, Area A and Area B (Bader 1994). Area A comprised the upper, more level portion of the flood plain ridge, while Area B consisted of its south facing slope. Previous test investigations at the Mogan Site indicated that cultural materials were present at the ridge top from the ground surface to a maximum depth of 1.3 m, while they extended to a depth exceeding 3 m on the ridge slope in Area B (Bader and Clarke 1991). This stratified site contained components ranging from the Late Woodland to the Mississippian in disturbed plowzone context to deeply buried Early Archaic deposits. The Early Woodland zone of the site was located only on the apex of the linear ridge at a depth of 70-90 cm below the surface. Only five features were identified within the 88 m² excavated within the Early Woodland component (Zone 4) of the Mogan Site. The heaviest use of the site during the Early Woodland occurred along the southern, riverward crest of the ridge slope.

No faunal remains of any kind were recovered from the Mogan Site. However, as at Rockmaker, floral remains in the form of charred nutshells were recovered from both feature and midden contexts. Hickory, butternut, and black walnut are the only carbonized specimens recovered from this site. These nutshell fragments were found in an Early Woodland feature, as well as throughout the midden of the Early Woodland zone. A possibly carbonized smartweed seed was also recovered. The remains suggest a seasonal exploitation from middle to late fall during the Early Woodland period (Moeller 1994).

The Assemblages

A total of 50,260 artifacts are known to have originated from all phases of archaeological work at the Rockmaker Site. Only 427, or less than 1% of the total, are formed artifacts, with debitage comprising the remainder. The Phase III excavations yielded hafted bifaces, which include Dickson Cluster (Figure 2a and 2d), Wade (Figure 2c), Turkey-Tail (Figure 2b and 2e) types (Justice 1987) (Table 1). A drill, reworked from a lobate based projectile point, and three fragmentary drills were also found. Twenty scrapers were recovered,

Table 1. Phase III Artifacts from Rockmaker and Mogan

Phase III Artifacts	ROCKMAKER	MOGAN Zone 4
ARTIFACT TYPE		
Projectile Points	12	8
Blanks/Bifaces/Preforms	88	23
Scrapers	20	4
Cores	70	4
Drills	4	3
Hammerstones	16	5
Cupstones	0	2
Pitted Stones	2	0
Grinding Stone/Abrader	7	1
Axe/Celt	3	0
Pestles	3	1
Mortar	1	1
Sherds	3	26
Flakes	30226	6830
TOTAL	30455	6908

all of which were expediently manufactured on flakes. Only two preforms were among the 71 bifaces and blanks of various reduction stages found at the Rockmaker Site. Most of the bifaces are fractured and represent production failures. Seventy manuports, or blocky raw material, were recovered. One chert celt or adze was

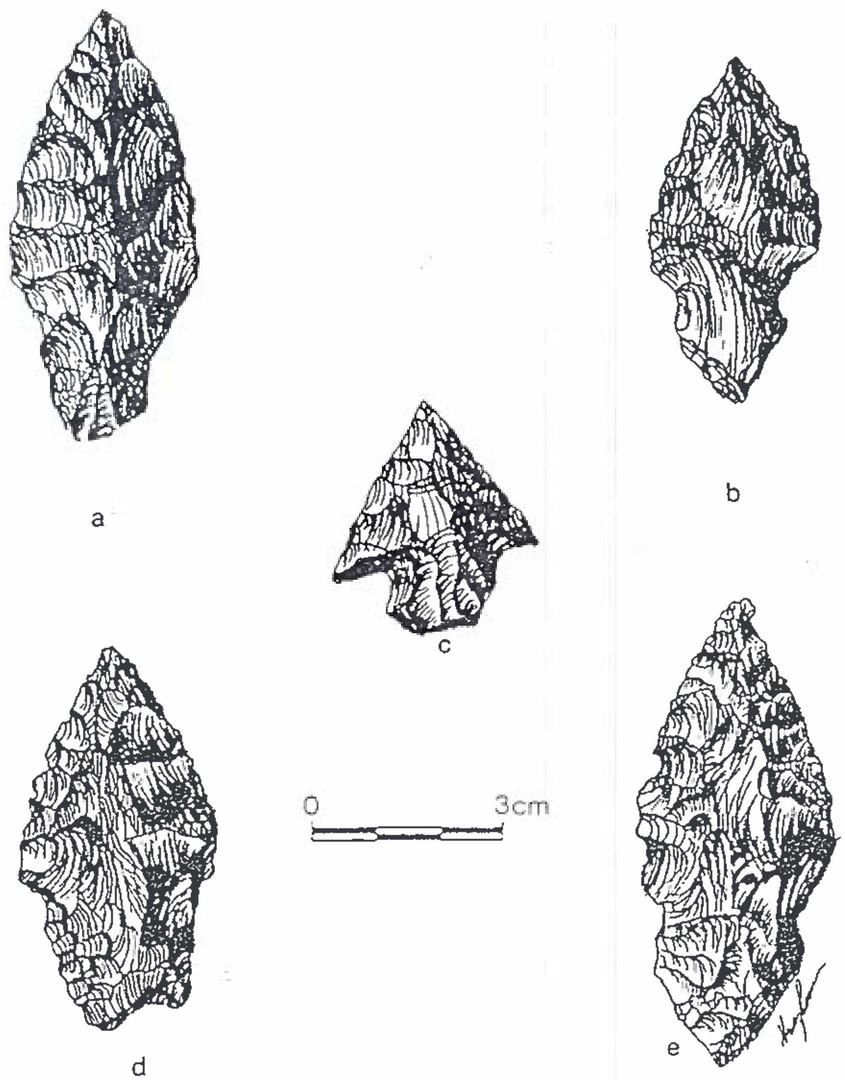

Figure 2. Rockmaker Site Projectile Points.

among the assemblage. A total of 15 ground stone tools were recovered from the Rockmaker Site. This includes three pestles, seven abrading stones, one axe fragment, one celt, one mortar, and two pitted stones. Also found were 16 Hammer stones. Three small grit tempered pottery sherds comprise the entire ceramic assemblage. One sherd was cordmarked, and one had a plain exterior surface finish.

A total of 52,130 artifacts have been recovered from all phases and all periods of the Mogan Site. The 1991 Phase III data recovery of the Mogan Site yielded 6,908 artifacts, including debitage from Zone 4, the Early Woodland zone. Hafted biface styles recovered from this zone include contracting stemmed points of the Dickson Cluster (Figure 3a, 3b, 3c), Wade (Figure 3d), and Motley (not figured) types (Justice 1987) (Table 1). Sixteen bifacial tools, including preforms, blanks, and miscellaneous bifaces and fragments, were also recovered from Zone 4, along with four cores. Four scrapers, one drill and two drill fragments were among the Zone 4 assemblage. An abrader, two cupstones, one mortar, one pestle, and five Hammer stones complete the recovered lithic assemblage from the site. Twenty-six ceramic sherds of the Zorn Punctate type were found at the Mogan Site (Figure 4). The excavated units of Zone 4 yielded a total of 6,830 flakes.

In order to investigate artifact patterning, the artifacts were assigned to one of five groups of functionally related types. While the artifacts could have been divided into more numerous and more narrowly defined groups, the range of artifacts recovered was limited, and it was necessary to define the groups more broadly. The five groups are food procurement, food preparation/storage, resource processing, lithic manufacturing, and personal ornamentation/ceremonial.

The *subsistence procurement* artifact group includes artifacts directly associated with the acquisition of food through hunting, fishing, and gathering activities. Among the artifacts in this group are projectile points (lithic, bone, and antler), netsinkers, fishhooks, and atlatl weights and hooks. The category of *subsistence processing* includes those artifacts that are related directly to the preparation and storage of food, i.e., the "kitchen" group. This category includes cupstones (nutting stones), mortars, pestles, potsherds, and knives. The *general utility*, or "activities", group includes a wide range of activities that are unrelated to food preparation. The artifacts associated with this category are scrapers, axes, celts, choppers, abraders, grinding stones, mauls, drills, and bone tools used for weaving, sewing, or matting. This group represents such activities as hide scraping and sewing, and woodworking, among others. The *lithic manufacturing* group reflects the production of stone tools, namely bifaces, blades, and blanks, Hammer stones (chert and hardstone), pitted stones, and also includes tested cobbles, cores, flakes, manuports, chert flakes, and shatter. Artifacts associated with the *personal ornamentation or ceremonial* group include beads, gorgets, engraved bone pins, drilled and incised shell, drilled teeth, and such items as concretion pots that may have been used for mixing pigments.

Since the expectation was that with increasingly intensive occupation of a site, a broadening in the range of activities should occur, and a broader range of functional artifact types or groups should be deposited into the archaeological record. The more restricted or specialized the activities that occur at a site, the more narrow is the range of functional artifact types expected. Aside from these observations, there is little hard data to formulate expectations for specific site types within the constricted Ohio River Valley. Or rather, the data recovered has not been framed in a manner which will allow these expectations to become visible. Few prehistoric archaeological studies in the region have quantified and compared functional artifact groups for sites in order to determine the representation of activities at each site. Outside of the region, Winters (1969) has examined settlement patterns in the Wabash River basin using a form of artifact patterning. His data, however, is from the Archaic period, and is not directly applicable to the ceramic-bearing Early Woodland sites of the Ohio River Valley. Wesler (1992) has also experimented with artifact patterning to examine the relationship between the spatial distribution of artifact groups and activity areas at Wickliffe Mounds.

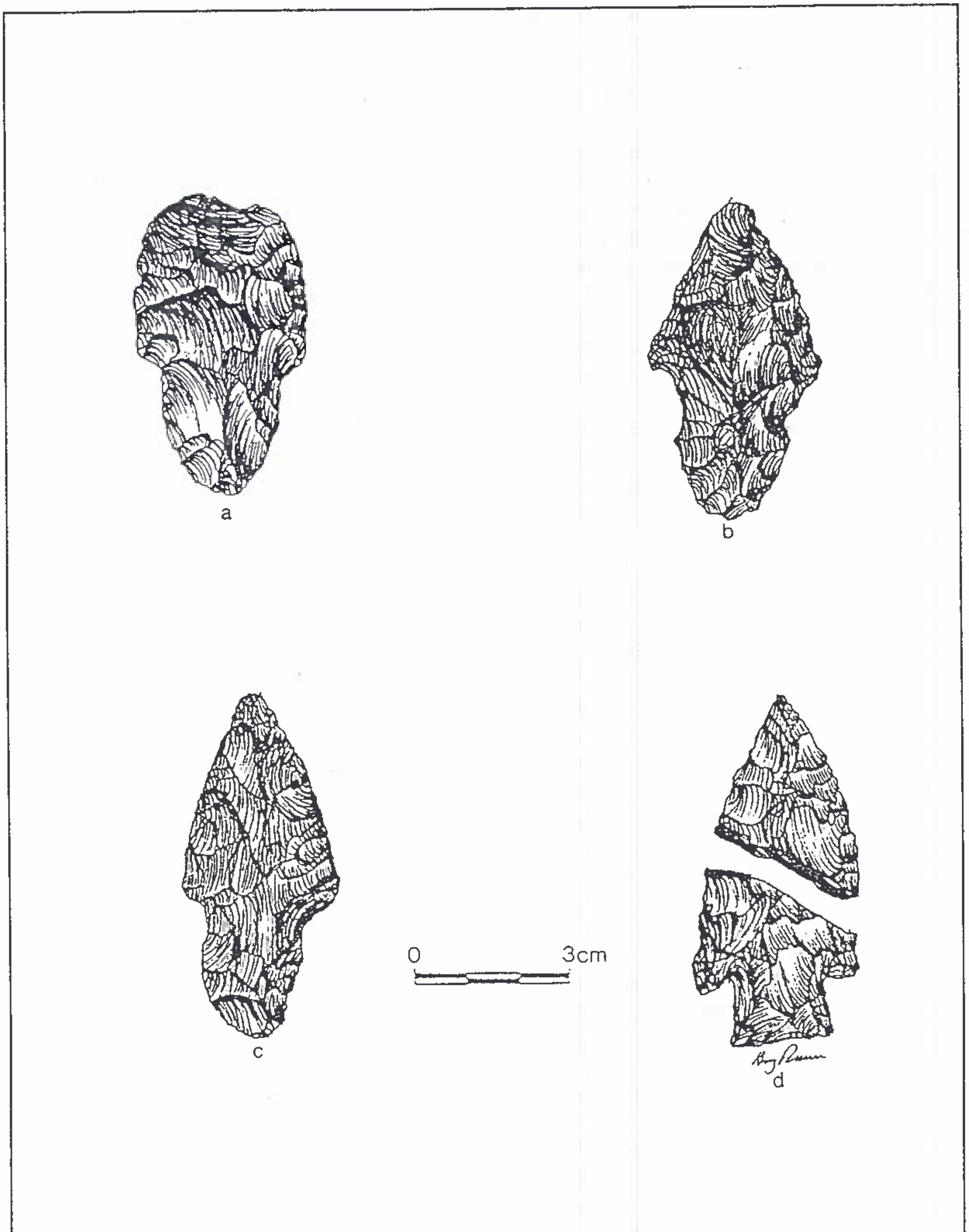

Figure 3. Mogan Site Projectile Points.

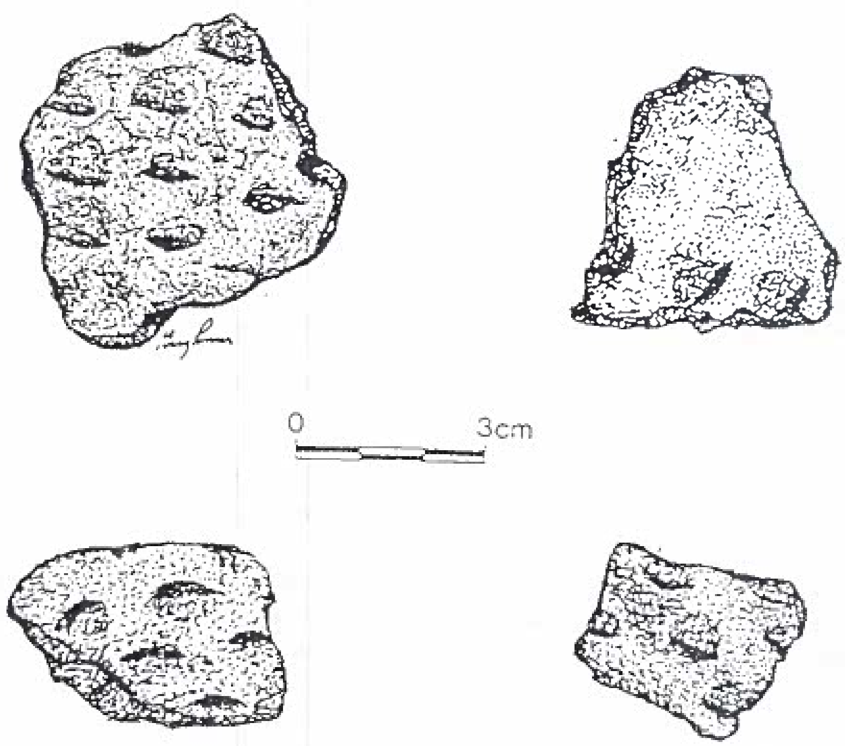

Figure 4. Mogan Site Ceramics.

A study of Early Woodland Meadowood settlement patterning in New York (Granger 1978), however, can be used to formulate expectations that might occur at sites of the same period in the study area. Although his terminology is different than that used here, Granger's data were presented in detailed tables that allowed comparison with that used here. Table 2 lists the percentages of functional artifact groups represented at each of three site types in Granger's model. At all three site types, lithic manufacture represents an important activity, or at least has retained the most archaeological visibility. At large base camps, or sites of intensive occupation such as the Riverhaven II site, food preparation figures heavily, largely due to the presence of ceramics. The subsistence procurement category, at 4%, is perhaps low, but may indicate that these activities occurred away from the base camp. The range of activities is more equitably distributed at sites like Sinking Ponds, a smaller, more lightly occupied residential and processing camp, and subsistence procurement artifacts are present in higher percentages. Aside from the variation in procurement artifacts, the main difference between the two site types appears to one of scale and is not discernible from percenatges. Many more artifacts were recovered from the

Table 2. Relative Percentages of Functional Groups-Meadowood Sites

	Base Camp Riverhaven II	Workshop Spicer Creek	Camp Sinking Ponds
Subsistence Procurement	4	<1	20
Subsistence Processing	36	0	26
General Utility	12	8	16
Lithic Manufacturing	48	92	38
Ornamentation/Ceremonial	0	0	0
Totals	100	100	100

base camp than the short-term camp. The third site type, typified by the Spicer Creek Site, has been interpreted as a specialized lithic workshop, with the lithic manufacturing category clearly dominating the assemblage.

It can be expected that the lithic manufacturing group will be the most heavily represented group at many sites for the obvious reason that bifacial manufacture results in large amounts of waste and because lithic remains are the most durable of all artifacts. Artifacts of this group should predominate at workshop and quarry sites, but should be well-represented at other sites, as well, since there was a constant need for tool maintenance and replacement. Artifacts of the personal/ceremonial group may be found at long-term residential camps, but are probably more heavily represented at sites with human interments, which are not among the sites in Granger's model.

An examination of the relative frequencies of the artifact groups from the Rockmaker and Mogan sites reveals, as expected, a predominance of artifacts associated with lithic manufacturing. Including debitage, 99.7% of the artifacts from the Rockmaker Site were associated with lithic manufacture, compared with 99.2% from the Early Woodland zone of the Mogan Site. Since lithic manufacturing results in a large amount of waste, the inclusion of waste material in the artifact count tends to statistically mask other activities. Therefore, debitage was excluded from consideration in the artifact patterning analysis.

The sample of formed artifacts from both sites is small. Formed artifacts were found at 1.4 pieces per m^2 at Rockmaker and 0.9 per m^2 at Mogan. However, the assemblages provide an accurate representation of each site's artifactual composition since they were recovered from the controlled excavations of large, areal sampling of the units. The distribution of artifacts by function (Table 3) shows that the *lithic manufacturing* group is predominant at Rockmaker, accounting for 76% of the total artifacts recovered. Most of the artifacts of this group are bifaces representing various stages of reduction. *General utility* artifacts from Rockmaker comprise 15% of the total, *subsistence procurement* 5%, and *subsistence processing* 3%. The relative importance of the subsistence procurement category is further diminished since it can be argued that many of the projectiles recovered are production failures, and should perhaps be more appropriately classed with the lithic manufacturing group. The subsistence procurement group was represented solely by lithic projectile points and point fragments, with 12 recovered during the Phase III data recovery effort. Only nine artifacts reflect the subsistence preparation group at Rockmaker, including three potsherds, three pestles, a mortar, and two nutting stones. The most frequently occurring functional artifact type within the subsistence processing group of 39 artifacts at the Rockmaker Site was that of scrapers, with 20 recovered from the site. The six large chert and hardstone implements that may have functioned as choppers were the next most frequent tool type in this group, followed by abraders and drills at five each, and three grinding stones. Bifaces and blanks collectively account for nearly half of the lithic manufacturing artifacts from the site. These are generally fragmented production failures and non-reducible material. Cores, manuports, and Hammer stones account for the remainder of the manufacturing group of artifacts. Only four artifacts may be assigned to the *personal ornamentation/ceremonial* category from the Rockmaker Site, and these artifact identifications are tenuous. Three possible beads are included in this group. The fourth artifact is a small concretion pot which may have been used for mixing pigments. These account for less than 2% of the total formed artifacts.

In comparison, a lower percentage (33%) of the recovered artifacts from Zone 4 at the Mogan Site was associated with *lithic manufacturing* (Table 3). *General utility* artifacts accounted for 10% of the formed artifacts, compared to 15% at Rockmaker. *Subsistence procurement* artifacts represent 20% of the total formed artifacts at Mogan, and *subsistence processing* accounts for 37% in contrast to the 3% at Rockmaker. No *personal ornamentation/ceremonial* artifacts were recovered from Zone 4 at the Mogan Site. As at Rockmaker, the subsistence procurement category was comprised solely of projectile points. In contrast to Rockmaker, however, none of the projectiles from the Mogan Site could be considered discarded production failures, and several show extensive blade resharpening.

Table 3. Relative Percentages of Functional Groups-Rockmaker and Mogan Sites

	Rockmaker	Mogan
Subsistence Procurement	5	20
Subsistence Processing	3	37
General Utility	15	10
Lithic Manufacture	76	33
Ornamentation/Ceremonial	2	0
Totals	100%	100%

These figures show that the Rockmaker Site most closely corresponds to the lithic workshop site type as defined by the New York data, with non-subsistence processing figuring somewhat higher than the comparable sites in that model. The Mogan Site, however, clearly resembles that of a short-term residential camp. The difference in artifact patterning is largely attributable to the greater presence of ceramics in the Mogan assemblage, and a reduced emphasis on the early stages of lithic bifacial reduction. The relative frequencies of the Zone 4 (Early Woodland) artifact groups at the Mogan Site suggest a more balanced range of activities than at Rockmaker, including a greater emphasis on food procurement and preparation. The small samples of formed artifacts from each site, and the lack of preservation of bone and other organic materials, preclude a reliable estimate of the relative importance of food preparation at either site. Such activities are represented only by large, heavy or bulky, and generally non-transportable objects, such as pestles and nutting stones, the nut remains themselves, and ceramics. Non-subsistence processing activities were indicated at both sites by scrapers and drills. However, the scrapers and drills at Mogan are more expertly formed and may have been curated tools, compared with the expedient nature and probable "one-time" use of the flake tools found at Rockmaker.

Other Sites

The differences between the Rockmaker and Mogan sites illustrated by artifact patterning is apparent at other Early Woodland sites within the constricted Ohio River Valley. The Mary Ann Cole Site (12Cr1) is located in Crawford County, Indiana, upriver from the Mogan Site. The Cole Site has been interpreted as a workshop site, yielding manufacturing waste and production failures associated with a lithic industry known as the "hinge flaking technique" employed in the manufacture of Turkey-tail points and Woodland cache blades (Myers 1981).

Two distinct cultural zones were noted at this site. The first was buried by 1 m of sterile alluvial overburden, and was approximately 1 m thick. This zone, with features and temporally diagnostic artifacts, was assignable to the Terminal Archaic/Early Woodland transitional period (Myers 1981:154-156). A lower occupation zone, ca 3 m deep, was also noted. The lower zone was comprised only of a few flakes and some burned rock and charcoal flecks, indicating a transient habitation in relation to the much denser materials of the upper zone.

The artifactual frequency of the upper zone at this site consisted of a few flakes near the top of the zone, increased consistently toward the middle of the zone, and then tapered off near the bottom to a few flakes (Myers 1981:78). Myers attributes this to differential intensity of habitation during repeated occupations (Myers 1981). From evidence at the Cole Site, Myers suggests that the presence of fire-cracked rock in this portion of the Ohio River bottom lands may indicate a winter occupation period, and he argues for a year-round preoccupation with the bottom land resources (Myers 1981:158).

For the purposes of comparison, the artifacts from the Cole Site were assigned to the functional artifact groups, as were those of Rockmaker and Mogan. The artifact distribution for this site reveals a pattern that most closely resembles that of Rockmaker (Table 4). *Lithic manufacturing* artifacts account for 90% of the total formed artifacts from the site. The *general utility* group is represented by 3%, *subsistence procurement* by 1%, and *subsistence processing* by 6%. No *personal ornamentation/ceremonial* artifacts were recovered from the site.

The recently excavated Yellowbank Site, 15Bc164, lies on a natural levee paralleling the Ohio River at an elevation of 121 m above mean sea level. This site, which lies ca 250 m north of Rockmaker, was excavated in 1993 by ARCS, Inc. of Louisville (Evans et al. 1994). The site yielded Turkey-tail, lobate based, and contracting stemmed projectile points of the Dickson Cluster consistent with those at Rockmaker and Mogan. At the Yellowbank Site, *lithic manufacturing* accounts for only 40% of the total formed artifacts recovered. *General utility* activities are represented by 35% of the artifacts. Seven percent of the artifacts are associated with *subsistence procurement*, and all are projectile points. Eighteen percent of the artifacts relate to *food preparation*, or subsistence processing. Again, no artifacts were recovered that were associated with *personal ornamentation/ceremonialism*. This pattern more closely conforms to that of the Mogan Site than to Rockmaker and Cole (Table 4).

Table 4. Relative Percentages of Functional Groups-Other Ohio Valley Sites

	Cole	Yellowbank
Subsistence Procurement	1	7
Subsistence Processing	6	18
General Utility	3	35
Lithic Manufacture	90	40
Ornamentation/Ceremonial	0	0
Totals	100%	100%

Aside from these sites, others in the Paradise Bottoms of Meade County, Kentucky (Granger et al. 1989), have also yielded significant evidence of lithic reduction activity, with few formed artifacts and only occasional small, isolated features. The Carver's Lake Site (15Md318) is located upon a north-south trending linear ridge of the Ohio River at an elevation of 128 m above mean sea level (Figure 1). The site produced material similar to the nearby Early Woodland sites of Rockmaker, Mogan, and Yellowbank. Although only a small sample of artifacts was recovered , artifact patterning at the site is similar to the Mary Ann Cole and Rockmaker sites, with artifacts relating to lithic manufacture. The site has been interpreted as a lithic workshop (Granger et al. 1989).

Few mortuary Early Woodland sites have been noted in the region. Human remains have been reported from the Mary Ann Cole Site (James A. Mohow, personal communication 1993), but interments are largely known only from amateur "excavations" in the rockshelter sites. However, an accidental discovery of a crematory pit two years before the 1990 Phase II investigations provides data on the artifacts associated with other aspects of the Early Woodland in the area. In 1990, the Kentucky Department of Fish and Wildlife excavated adjacent to Rockmaker for borrow dirt in order to create a dike that would contain the flood waters within a nearby swale. The area was situated in a low-lying swale between the Rockmaker and Yellowbank sites. During the excavation operations, a dark black circular area of soil was revealed. The feature was ca 1 m in diameter, and contained dense amounts of charcoal. The top of the feature was observed at a depth of approximately .6-.75 m below the ground surface. As the dozer scraped the top of the feature, fire-cracked rock and burned sandstone were observed, along with the fragmented remains of a prehistoric pot. Most importantly, the fragmented pieces of human long bone (fibula) and cranium were also located with the pot. These were white and calcined, and exhibited desiccation cracks.

Not surprisingly, this feature contained artifacts of the *personal ornamentation/ ceremonial* group, including a barite bar gorget, another badly fragmented gorget made from a granitic stone, and a broken "boatstone". Three broken celts or axes, a piece of a bone awl, charred nutshells, several pieces of animal bone, and nodules of fired clay were also found within the pot.

This feature appears to represent an off-site burial event. The dense deposits of charcoal and the badly burned and incomplete representation of the bones, along with the inclusion of artifacts that were all damaged by heat, suggest a cremation. At least some of the remains appear to have been placed within a ceramic pot. The pot itself is a flat-bottomed, grit tempered vessel, that appears to be bowl-shaped. The exterior surface of the pot is plain, with at least a double row of incised triangular zoned pendants with punctations around the rim (Figure 5). The interior of the pot has been smoothed to a lesser extent, and along the interior basal curve, pronounced cordmarking can be seen. The temper consists predominantly of fired clay and sand. Consultations with R. Berle Clay (personal communication 1991) and Stephen T. Mocas (personal communication 1991) determined the pot is assignable to the Zorn Punctate type. This type of pottery exhibits pinching and punctation (Mocas 1988:121).

Chronology

In any attempt to define the settlement system of a given prehistoric population, the problem of site contemporaneity exists. Dating of the sites in the study area was inferred generally from diagnostic projectile point typology and, more specifically, from radiometric dating. Two radiocarbon dates were obtained from the Rockmaker Site, and one radiocarbon date was obtained from the Early Woodland zone of the Mogan Site. Charcoal from Feature 66 at Rockmaker was dated at 2840 ± 80 years: 890 B.C. (Beta-49085), and charcoal from Feature 74 was dated at 2450 ± 60 years: 500 B.C. (Beta-49086) (uncalibrated). A span of 390 years is therefore indicated at Rockmaker. The dates, if accurate, likely represent recurrent occupations because the low density and narrow range of artifacts do not indicate an occupation of this duration. The sole Mogan Site radiometric date attributable to the Early Woodland period was obtained from wood charcoal from Feature 2, and resulted in a date of 2760 ± 100 years: 810 B.C. (Beta-49081), 80 years from the latest date at Rockmaker Site (Table 5).

Table 5. Radiometric Dates

Site	Date	
Rockmaker (15Bc138)	2840 ± 80	(Beta-49085)
	2450 ± 60	(Beta-49086)
Mogan Zone 4 (12Pe839)	2760 ± 100	(Beta-49081)
Mary Ann Cole (12Cr1)	None	
Yellowbank (15Bc164)	2310 ± 80	(Beta-70923)
Crematory Pit(Chenaultt)	2495 ± 60	(Beta-49084)

The charcoal and nuts associated with the ceramic pot in the crematory pit near Rockmaker had been saved at the time of its discovery. A sufficient amount was collected for an accelerated date, which resulted in a date of 2495 ± 60 years: 545 B.C. (Beta-49084 ETH-8901), placing it somewhat earlier than other dated Early Woodland pinched ceramics of the region. However, the date differs by only 40 years from a radiocarbon date from the Rockmaker Site, lending credibility to the ceramic date. Finally, a single radiocarbon date was obtained from the Yellowbank Site. Charcoal from Feature 1 yielded a date of 2310 ± 80 years: 360 B.C. (Beta 70923). No absolute dates are available from the Mary Ann Cole Site, which was dated by temporally diagnostic artifacts to the Early Woodland period.

As indicated by these dates, Early Woodland use of the sites in this portion of the constricted Ohio River Valley spans a range of at least 530 years from 890 to 360 B.C. Generally, the earliest Early Woodland sites in the lower Ohio Valley date to 600 B.C., although some sites relating to the similar Adena culture to the northeast may be as early as 1000 B.C. (Muller 1986:91-92). The Early Woodland Baumer and Crab Orchard complexes have been defined in the lower Ohio River Valley, however, the relationship of the two remains unclear. While Baumer is said to be characterized by limestone tempered ceramics and Crab Orchard characterized by grit

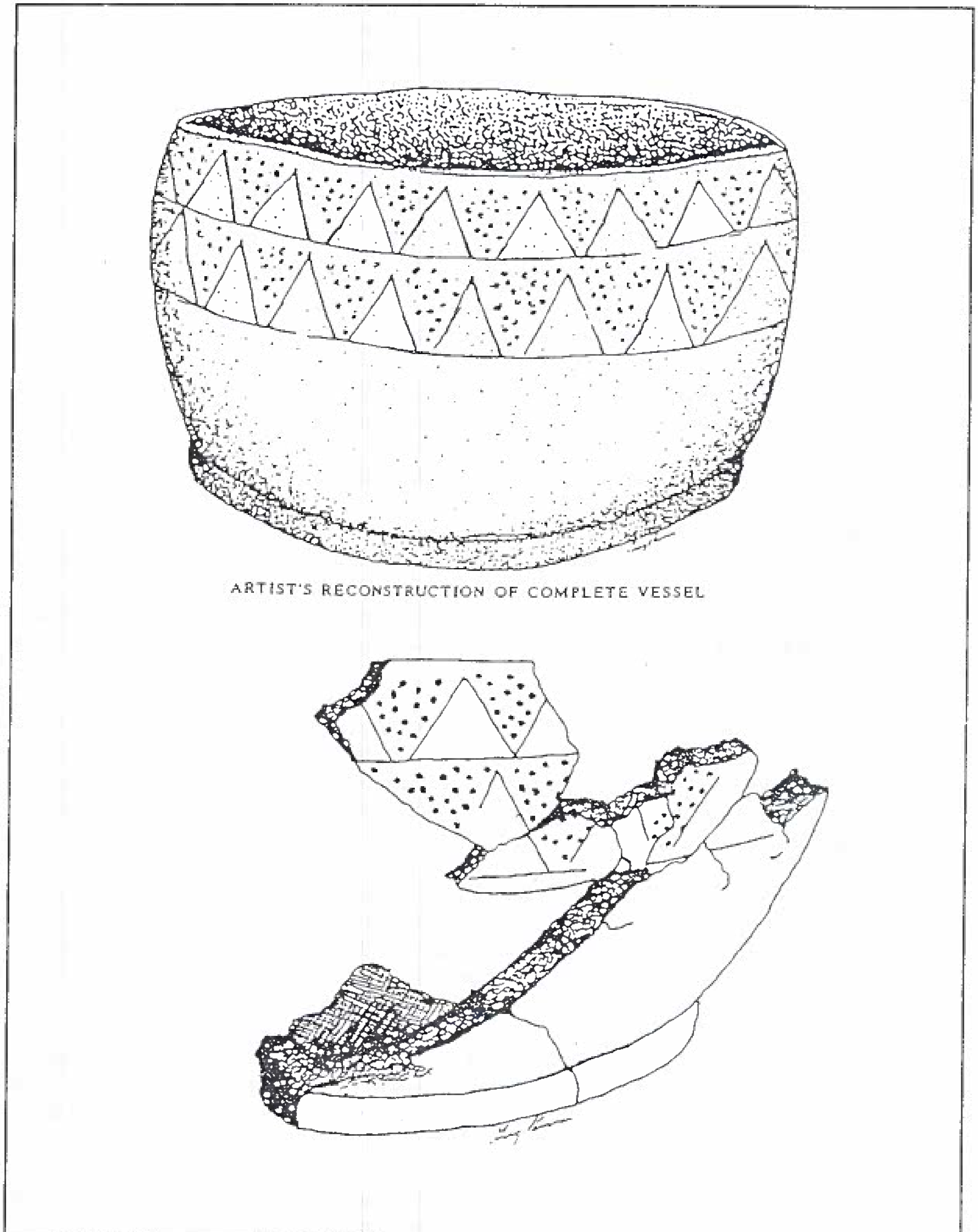

Figure 5. Pot from Crematory Pit, Chenaultt Bottoms.

tempered pottery, it is actually difficult to distinguish between the two types of sherds (Muller 1986:94-95). The temporal distinctions between these two are also ambiguous at the present, although some have suggested an Early Woodland affiliation for Baumer, and a Middle Woodland assignment for Crab Orchard (Muller 1986:94-95). Baumer sites are typical of the lower Ohio Valley, near the Tennessee-Cumberland Rivers, while Muller reserves the use of the term Crab Orchard for those sites in the Carbondale, Illinois area (Muller 1986). Crab Orchard is thought to reflect more Hopewellian influences than Baumer. Early Woodland sites in the area between Evansville, Indiana, and Louisville, Kentucky (corresponding to the constricted Ohio River Valley as discussed above), are not well known (Muller 1986:118). It has been suggested that there may be a gradation in the Early Woodland sites from Adena in the north to Baumer downstream (Muller 1986:118). For this reason, the Rockmaker and Mogan sites are of particular interest.

FEATURE ANALYSIS

The feature analysis for the Rockmaker and Mogan sites supports the notion that the two sites functioned differently. The features from each site were categorized into four types based on their morphology and contents, and then compared. A total of 25 features were recorded at Rockmaker. Phase III investigations at the Mogan Site identified 23 features, only five of which were assignable to the Early Woodland zone.

Feature Type 1 is characterized by the presence of large amounts of burned sandstone and fire-cracked rock that was concentrated in shallow, saucer-shaped basins. Feature definition is generally not well-defined, with subtle, if any, soil color change between the feature fill and the soil of the surrounding occupation zone. Little to no charcoal was observed within these rock concentrations. When present, it was in the form of diffusely scattered, small flecks. No actual in situ burning appears to have occurred within the rock concentrations, judging from the paucity of charcoal, ash, and fired earth.

Feature Type 2 is a shallow, saucer-shaped basin, with generally less rock content than Feature Type 1. More importantly, the features are distinguished by a central, darkly stained area of reduced fill that fades near the periphery of the pits. Significant concentrations of charcoal, charcoal stained soil, and flecks of fired clay have been found within the stained central area, leaving no doubt that these features were loci of in situ burning. These features produced numerous flakes.

Feature Type 3 is comparatively deep with steeply sloping sides and a rounded to flat bottom. This pit type is stratified, with evidence of multiple fill episodes, and at least one stratum containing dense amounts of charcoal. The pit type contains burned sandstone and some fire-cracked rock, but in small quantities. Feature Type 3 is also a locus of intense burning. As with the previous features, the prevalent artifact type recovered from this pit was lithic debitage.

Feature Type 4 contained very dense concentrations of lithic debris. No fire-cracked rock or charcoal is associated with this feature type, and no soil color change or easily defined pit outline is apparent. These features appear to be part of a larger activity area of flint working, as seen by the heavy concentration of flakes in adjacent units.

At Rockmaker, a total of seventeen Type 1 rock piles were recorded, along with six Type 2 hearths. Type 3 stratified pits and Type 4 lithic manufacturing pits were represented by one feature each. The lithic manufacturing pit feature yielded 2,615 chert flakes, 99% of which were derived from Wyandotte chert. The Type 2 hearth was the only feature type represented in the Early Woodland zone at the Mogan Site. Significantly, no storage pits or refuse accumulations containing faunal remains were present within the excavated portions of either site. The feature distribution indicates that specialized activities associated with the rock piles were conducted at Rockmaker, but not at the Mogan Site. Hearths were less common at Rockmaker.

Features similar to the shallow rock concentrations at Rockmaker have been noted on other Early Woodland sites in Kentucky and the region. Clay suggests that similar features at the Peter Village Site in central Kentucky may have been used for "hot rock cooking", possibly in ceramic vessels, in which the food was slow-cooked or steamed (Clay 1985:19), as opposed to cooking or roasting over an open fire. Pottery, bone fragments, flakes, and an isolated projectile point have been found in association with the Peter Village pits (Clay 1985:20). With the exception of bone, a similar assemblage was associated with the Rockmaker rock concentrations. Clay notes, furthermore, that the pits at Peter Village were probably used briefly and not recurrently.

A second interpretation for the function of these rock concentrations suggests that they were used for the intentional thermal alteration of chert prior to bifacial tool reduction (Bader and Clarke 1990; Bennett and Porter 1987:47). However, judging from a lithic analysis conducted on a sample of the chert debitage from the sites, this does not appear to have been the case. The primary two chert types used at the sites, Wyandotte and Haney, possess good knapping qualities that would not require heat pretreatment. Although some successful experiments have been performed in heat pretreatment of Wyandotte chert, most show that heating the chert detracts from the overall quality of the stone (Myers 1981:135). In its pure form, Haney is also a finely grained chert. Less than 20% of each type of chert debitage recovered from the two sites exhibits thermal alteration. It is probable that this material was altered by accidental inclusion in fires.

Aside from the processing of nutmeat or other floral resources, one of several plausible interpretations for the Type 1 features, suggested from the northeast fishing stations, is that they were used to smoke and/or dry fish (Granger 1978). The deeper pits with less rock and more intensive charcoal deposits may have been used to heat the rock, while the heated rock was then placed within the shallow basins, covered with herbs and leaves. Support for this interpretation is, of course, constrained by the lack of bone, fish scales, and other faunal remains from the site. It is, however, consistent with the wetland resource base present in the Chenaultt and Dexter Bottoms. The late season flooding of the sites would have trapped fish within the low-lying flood plain swales, and, as the water receded, allowed for easy capture. In any case, the high density and predominance of this feature type indicates some sort of specialized activity.

In terms of fire-cracked rock and burned sandstone recovered from both feature and midden, the amounts vary between Rockmaker and Mogan. The rock count at Rockmaker exceeds 400 per m^2, as opposed to 105 per m^2 at Mogan. The excavations at Rockmaker revealed a large areal extent of rock outside of feature context that probably represents scatter from the numerous shallow rock piles.

SITE TYPES

Based on these observations, two possible site types are indicated and a third is suggested. These must be considered preliminary, pending the study of additional data from a larger number of sites from the period and the region. The first type, represented at the Rockmaker and Mary Ann Cole sites, is that of a specialized lithic manufacturing station. At this type of site, debitage and production failures comprise the majority of artifacts recovered. Projectile points are rare, except for those rejected during manufacture. However, the presence of a few groundstone tools, charred nuts, and general utility, but expediently made, artifacts (scrapers, drills) suggests the ancillary processing of nuts and other minor activities. Ceramics are a minor artifact type. Few hearths and no storage pits are present. Shallow rock piles which may have been used for drying, steaming, or the hot rock cooking of food are numerous. Fire-cracked rock and burned sandstone are abundant.

The second site type, apparent at Mogan and Yellowbank, likely represents a short-term residential camp and yielded a more equitable distribution of functional artifact types. The remains of lithic manufacturing are present but diminished in importance, with less debitage and fewer cores and rejected bifaces. Well-made and resharpened projectile points are present. Ceramics and groundstone tools are common artifact types. Processing artifacts, including scrapers and drills, also occur, but, in contrast to Rockmaker, they are well-made and represent formal types (end scrapers, thumbnail, hafted, and side scrapers, etc.). Hearths are the dominant feature type and storage features have not been observed. Fire-cracked rock is present, but in lower densities than at the manufacturing/processing sites.

A third possible site type is mortuary, and is suggested by a single example, the crematory pit located between Rockmaker and Yellowbank. Artifacts of a personal or ceremonial nature, specifically gorgets, are predominant in the small assemblage associated with the burial. Groundstone celts, ceramics, faunal and floral remains are also associated items.

Intensive base camps have not been identified and investigated to date in the immediate study area, and data on these sites must await further survey. Early studies and data from local collectors suggest that these sites may be found in and near the numerous rockshelters in the region (see below for more discussion).

GEOMORPHOLOGICAL CONSIDERATIONS

The two site types suggested by artifact patterning and supported by feature differentiation may possibly be correlated to geomorphological variation within the bottom lands. The lithic manufacturing or processing sites, including Rockmaker, Mary Ann Cole, and Carver's Lake, are situated at the higher elevations in the bottom lands, from between 128-131 m above mean sea level. Rockmaker and Carver's Lake are located on terraces, while the Cole Site lies on a severely eroded ridge adjacent to the Ohio River. In contrast, the short-term residential camps of Mogan and Yellowbank are located at the lower elevations of the flood plain at 121-123 m above mean sea level. The Mogan Site lies on a flood plain swell, and the Yellowbank Site on a natural levee paralleling the Ohio River (Table 6).

Table 6. Comparison of Elevation and Site Type

	121-123 AMSL	128-131 AMSL
Processing/ Manufacture Station		Rockmaker Site Mary Ann Cole Site Carver's Lake Site
Residential Camp	Mogan Site Yellowbank Site	

Myers has postulated that the large presence of fire-cracked rock at Mary Ann Cole may indicate a cold weather exploitation of the bottom lands site (1981:158). Yet, the seasonally wet nature of the flood plain would have precluded a year-round occupation. Because of the winter and spring flooding, the lower elevations would have been inhabitable only during the driest months of the year, namely late summer and early fall. With the onset of the rains in late fall and early winter, the bottom lands would have been abandoned by necessity. The few botanical remains from the bottom land sites confirm a late summer to fall occupation. Two scenarios are therefore possible. First, the sites at higher bottom land elevations (Rockmaker and Cole) may have been occupied simultaneously with those sites at lower elevations (Mogan and Yellowbank). Alternatively, the former may represent movement to the adjacent terraces and higher flood plain ridges with the onset of the seasonal rains. In the first case, a settlement model involving a logistical mobility pattern is suggested, in which resources were obtained and processed away from the established residential camp. In the second case, a residential mobility strategy is indicated, in which Rockmaker and Cole would have served as very briefly occupied late season processing/manufacturing stations which were loci for winter preparation activities prior to the abandonment of the bottom lands. Because of the few hearths and even fewer habitation related artifacts, the former model is more probable.

CONCLUSIONS

Bottom land Early Woodland sites in the region have been documented on the basis of projectile point styles, including Turkey-tail, lobate-based, and contracting stemmed projectile point types of the Dickson Cluster (Justice 1987). Grit tempered cordmarked and plain pottery with fingernail incising and triangular zoned punctations are associated with sites of this period. Large Early Woodland residential sites, or "base camps", are not known within the bottom land pockets of the constricted Ohio River Valley. Rather, the settlement patterning along the Ohio during this period appears to include a seasonal exploitation of the bottom lands. Sites dating to this period are characterized by a predominance of lithic manufacturing debris, with few formed artifacts. Large amounts of fire-cracked rock and burned sandstone are observed. No evidence of structures, storage facilities, or deep middens are found on these sites. Data on burial practices are rare.

Considering the large amounts of lithic debitage found at these sites, it is tempting to categorically assign a lithic manufacturing function to many, especially on the evidence of surface collections. This is particularly true considering the presence of high quality chert resources in the immediate area. However, the recent excavations at the Rockmaker and Mogan sites have shown that lithic manufacturing was not the only activity conducted at these sites. Early Woodland period sites in the lower Ohio Valley are commonly believed to be associated with wetland adaptation (Muller 1986:91). Aside from the presence of ceramics and groundstone tools, non-artifactual evidence from Rockmaker and Mogan, including features, botanical remains, and site placement, especially along small first order stream valleys, demonstrates an interest in bottom land resources aside from lithic raw material availability. The use of artifact patterning also suggests that there exists a variation in bottom land sites that is masked by the predominance of debris associated with bifacial tool reduction. In particular, the processing of late fall floral resources, especially nuts, appears to have been important. Other bottom land resources, possibly fishing, may also be indicated at some sites by the large amounts of shallow fire-cracked rock basins.

Prehistoric occupation of the uplands along the narrow Ohio River Valley has not been adequately investigated. The short-term nature of upland exploitation in the Mississippian Plateau region of Kentucky is suggested, however, by the recently excavated Beech Fork Site (15Bc168) in Breckinridge County (Bader and Atwell 1992). This site is similar to other lithic scatters in the uplands of this hilly, dissected region in that it exhibits little evidence of intense occupation, a lack of significant midden deposition, and few features. Only one feature, dating to the Early Woodland period, was identified at this site (Bader and Atwell 1992). A preponderance of lithic remains and a high percentage of projectile points were found at the site, with a poor representation of such artifacts as ceramics and groundstone tools. Some processing is indicated by the presence of scrapers. The location of the Beech Fork Site on a narrow, upland hogback situated between two intermittently dry streams, allowed for the exploitation of a poor, but locally available chert exposed by the stream cuts.

It may be within the tributary valleys intermediate to the uplands and the bottom lands that the more intensively occupied sites during the Early Woodland period will be found in this region. Archaeologically productive rockshelters have been reported by amateurs and professionals from these locations in Breckinridge and Perry counties of Kentucky and Indiana respectively (Jobe et al. 1979:30-34; Smith 1982; Thomas et al. 1990; Webb and Funkhouser 1932:53). The narrow entrenched stream valleys provided three important aspects favorable to prehistoric habitation. The first of these is access between the flood plains and the uplands through the bluff line, which is often abruptly steep, and rises ca 200 m above the flood plain. Secondly, the stream cuts exposed valuable bedrock chert resources of the Haney limestone strata, providing numerous quarry opportunities for chert extraction. Thirdly, shelter in the form of cliff faces and overhanging rock ledges was present in the exposed sandstone bluffs overlooking and adjacent to the stream valleys. It is in these rockshelters that the most intensive prehistoric occupation may be found in the region. Rockshelters along Beech Fork, Yellowbank Creek, and Rough Creek are said to contain deep midden deposits replete with a full range of artifact types, including "kitchen debris", ceramics, and faunal material (Jobe et al. 1979; Webb and Funkhouser 1932). Human interments are also reported from these contexts. To date, none of these have been professionally excavated, but they are a source of collecting for the locals.

It is only with the systematic examination of more sites, especially within the transitional valleys and the uplands, that critical data on the settlement of the area during the Early Woodland within the constricted Ohio River Valley will be forthcoming. The observance of artifact patterning in assemblages from these sites will allow site diversity to become more visible.

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MISSISSIPPIAN SETTLEMENT IN SOUTHEASTERN KENTUCKY: A PRELIMINARY ASSESSMENT

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ABSTRACT

Although more than 100 Mississippian sites have been documented along the Upper Cumberland River in the southeastern Kentucky mountains, no systematic analysis of their spatial, temporal, or social contexts has ever been conducted. Based on literature review, artifact analysis, and preliminary field work, this paper investigates the nature and distribution of these sites in the Upper Cumberland River region. Comparisons are made with contemporary cultures in adjacent portions of Kentucky, as well as in northwestern Tennessee, southwestern Virginia, and western North Carolina.

INTRODUCTION

During the past 40 to 50 years, considerable debate has raged over the "origin" and spread of Mississippian culture in the eastern United States (Smith 1984). Some archaeologists have proposed that the Mississippian cultural tradition developed within a heartland or core area such as the central Mississippi Valley. According to this model, about A.D. 900, people from this region migrated to other parts of the eastern United States, establishing colonies and replacing or assimilating indigenous Woodland groups (Caldwell 1958; Fairbanks 1956; Lewis and Kneberg 1946; and Willey 1966). In recent years, as archaeologists have realized that Mississippian development was a very complex process that cannot be explained by such a simple model, the "heartland migration" model has been questioned (Smith 1984, 1990). Smith (1990:2) recently stated:

> Late Woodland populations on the brink of the Mississippian emergence were similarly organized and similarly armed in terms of quivers of alternative adaptational responses to both internal and external events.

To better understand the complex processes by which Mississippian cultures emerged, many archaeologists have turned their attention away from issues of cultural chronology and the ultimate origin of Mississippian culture and toward the investigation of the organization, adaptive strategies, and functioning of regional Mississippian groups (Milner 1989; Smith 1990). Examples of research projects addressing these issues include Milner's (1989, 1990) work in the Cahokia area of Illinois, Peebles' (1986, 1987a, 1987b) research at Moundville in Alabama and Angel Mounds in Indiana, Lewis's (1990a) investigations in western Kentucky, and

Anderson's (1990) work along the Savannah River in Georgia and South Carolina. Eventually, long-term research projects like these will permit researchers to compare and contrast development of regional Mississippian societies.

As a means of learning more about the regional variation of Mississippian cultures, the Upper Cumberland River Archaeological Project was initiated in 1991 to investigate the nature of Mississippian groups that once inhabited the Upper Cumberland River drainage of southeastern Kentucky. This paper presents a preliminary assessment of Mississippian adaptation in this region based on existing site file data, museum collections, and limited field investigations. These findings are the results of the initial stages of a long-term research project designed to provide a better understanding of the emergence of Mississippian culture in the Upper Cumberland region and how these groups adapted to the region's physical and social environment, as well as how their adaptive responses compare with those of other Mississippian groups that lived in northern Tennessee, western Kentucky, western North Carolina, and southwestern Virginia, as well as contemporary Fort Ancient groups living immediately to the north and east of the Upper Cumberland region (Jefferies 1990, 1991).

THE UPPER CUMBERLAND RIVER REGION

The Upper Cumberland River region of Kentucky is defined as the drainage of the Upper Cumberland River, from its origin in Harlan County in eastern Kentucky, to where it crosses the Kentucky-Tennessee state line. The region contains 12 counties, encompassing more than 13,000 km^2 (Pollack 1990) (Figure 1).

The western portion of the Upper Cumberland Region is known as the Lake Cumberland section, most of which lies within the Mississippian Plateau Physiographic Region (Figure 1). The Cumberland River has cut into this part of the plateau, creating a more rugged and dissected landscape than found in the karst plain to the north and west. The eastern portion of the Upper Cumberland region, known as the Southeastern Mountains section, lies in the mountainous region of extreme southeastern Kentucky (Pollack 1990:10-11). This project focuses on that portion of the Upper Cumberland drainage in the extreme eastern portion of the Lake Cumberland section (McCreary County) and the entire Southeastern Mountains section (Figure 2).

Much of the project area lies within the rugged Cumberland Plateau, a maturely dissected area underlain by Pennsylvanian sandstones, shales, and coal. In this part of the region, the Cumberland River flows through a narrow valley that contains sizeable pockets of bottom land suitable for human settlement. Along the Cumberland Escarpment, the river and its tributaries flow through deep gorges flanked by sandstone cliffs containing numerous rockshelters, many of which were used by prehistoric peoples. In the extreme southeastern corner of the project area, the elevation of the plateau increases. This area contains thrust-faulted Pine Mountain and the state's highest elevation of 1254 m on Black Mountain (Pollack 1990:10-11).

The Upper Cumberland River region is situated in one of the archaeologically least known parts of Kentucky (Lewis 1990b:440). Archaeological investigations have generally consisted of scattered surveys, supplemented by the findings of limited excavations. A few large-scale projects have been undertaken, but these are widely scattered throughout the region and generally have been poorly reported. The lack of any previous regionally-focused research program makes interpretation of the existing data base difficult and meaningful comparisons with other areas of the southeast nearly impossible.

The limited amount of research conducted in the Upper Cumberland region has yielded some evidence of Mississippian occupation (Blakeman 1971; Lewis 1990b). Sites producing diagnostic Mississippian artifacts, such as small triangular projectile points, shell tempered pottery, sandstone disks, chunky stones, and shell

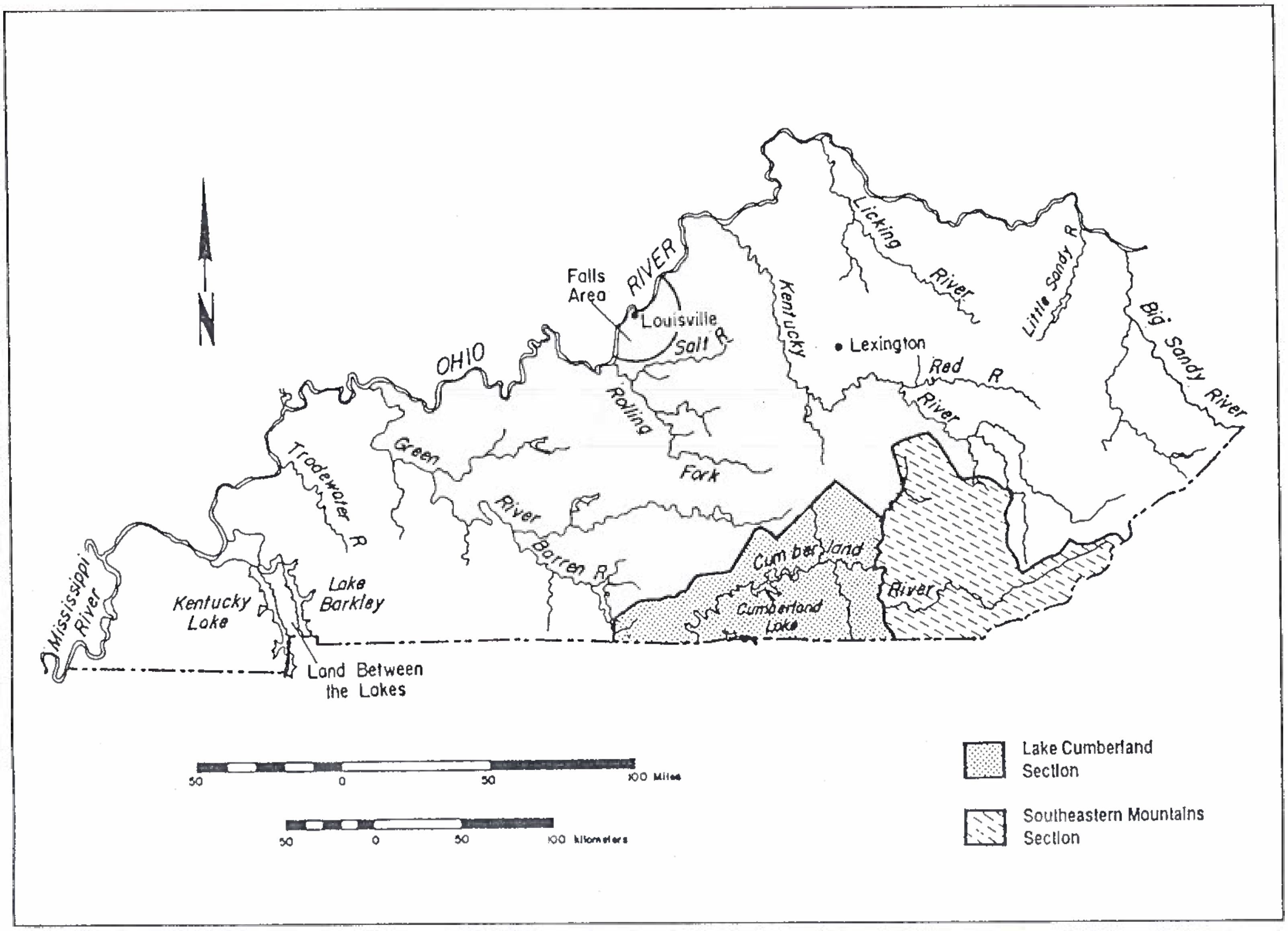

Figure 1. Lake Cumberland and Southeastern Mountains Sections of the Upper Cumberland River Region.

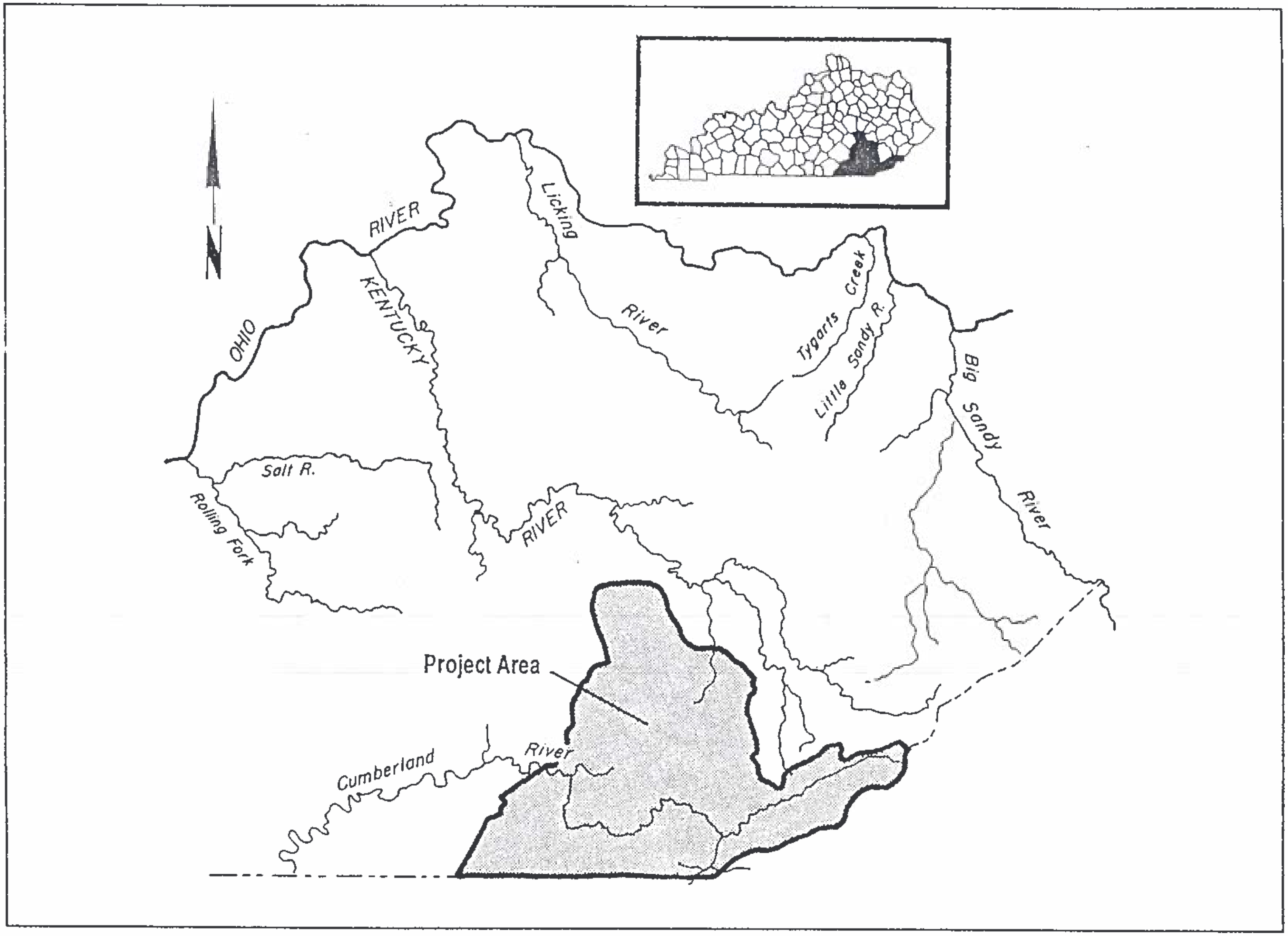

Figure 2. Upper Cumberland River Project Area.

gorgets, are known for the region (Hockensmith 1980), and many are represented in the Office of State Archaeology site files. Site types yielding these materials range from small upland sites to large floodplain sites with associated platform mounds. These data indicate that archaeological investigation of these sites offers an opportunity to gather important information on Late Prehistoric groups living along the northeastern margin of the Mississippian "world".

REGIONAL CONTEXT

Despite the limited information on southeastern Kentucky's Mississippian inhabitants, considerable data have been collected about contemporary cultures in surrounding portions of Kentucky, Tennessee, North Carolina, and Virginia. This information provides a cultural context for the Southeastern Mountains that can be used to evaluate the project area's archaeological potential for contributing new data on the development of Mississippian society and for further investigating the regional variation of Mississippian adaptation.

Archaeological investigations conducted farther down river in the Lake Cumberland section of Kentucky provide limited insights into the nature of Mississippian adaptation to the west of the project area (Figure 3). Fieldwork conducted by Haag (1947) prior to the construction of Lake Cumberland in the late 1940s resulted in the excavation of two Mississippian sites. The Rowena Site (15Ru10) consisted of three mounds and a habitation area located on the second terrace of the Cumberland River (Weinland 1980). Excavation of one of the mounds revealed at least three construction episodes, each one containing the remains of a large structure (Lewis 1990b:441). More than 50 % of the Rowena ceramic collection (6,400 classifiable sherds) consisted of Mississippi Plain sherds, with McKee Island Cordmarked, Dallas Cordmarked, and Wolf Creek Check Stamped sherds also present. Rowena has been characterized as a "small regional center" dating to late in the Mississippi period (Weinland 1980:97-117; Lewis 1990b:441). Haag's excavations at the Long Site (15Ru17) provided additional information on Mississippian adaptation west of the project area (Lewellyn 1964).

William S. Webb's investigations in the Norris Reservoir of northeastern Tennessee (Figure 3) provide information on Mississippian adaptation some 35 km south of the project area (Webb 1938). Webb described 11 sites in the Norris Basin that had platform mounds and associated habitation areas. The sites, located along the floodplains of the Clinch and Powell rivers and their tributaries, contained from one to three mounds, the largely plowed-down remains of which ranged from 10 to 40 m in diameter and from 1 to 3 m high. Excavations revealed multi-stage mounds containing the remains of rectangular structures. Plain and cordmarked shell tempered pottery with loop and strap handles, small and large discoidals, and other diagnostic Mississippian artifacts were associated with these sites (Webb 1938). Movement over the Cumberland Mountains separating the Norris Basin and the Upper Cumberland River region would have been facilitated by the presence of Cumberland Gap, located near the project area's southeastern edge.

Archaeological investigations conducted farther up the Clinch and Powell rivers in extreme southwestern Virginia have documented additional Mississippian sites (Egloff 1987; Holland 1970). The Carter Robinson Site (44LE10), located immediately east of the Kentucky border in Lee County, Virginia (Figure 3), contains a mound measuring 3-4 m high and 35 m in diameter. The site, 50 km north of the Norris Basin, yielded Dallas Plain and Dallas Cordmarked pottery with strap and loop handles, as well as Pisgah ceramics (Egloff 1987:17-18).

The Ely Mound, located less than 15 km east of Carter Robinson Mound, measures 90 m in diameter and ca. 6 m high. The mound was partially excavated in the early 1870s by Lucien Carr of Harvard's Peabody Museum (Carr 1877). This early archaeological endeavor revealed a series of cedar posts on the mound's summit that Carr interpreted as the remains of a building (Egloff 1987:18).

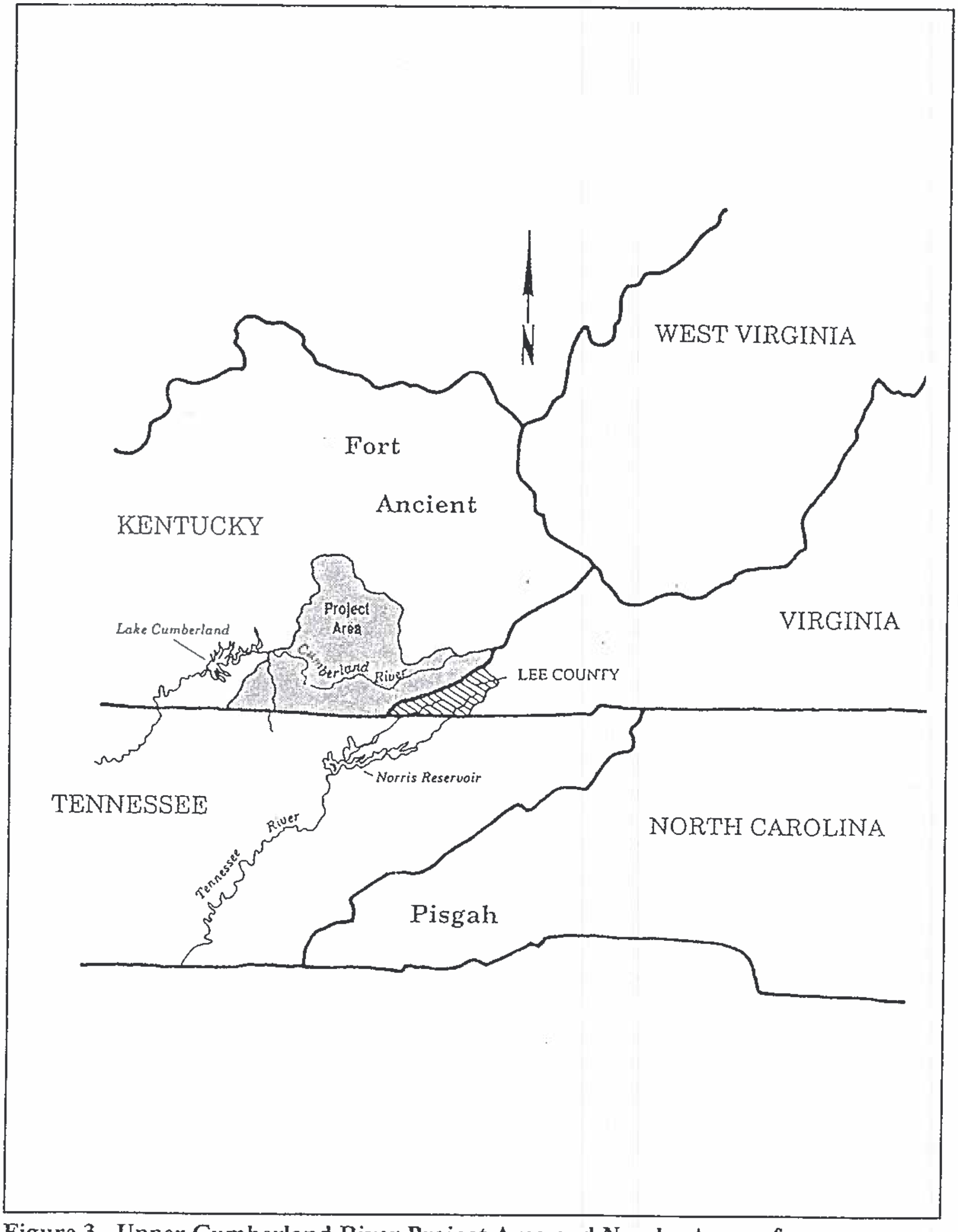

Figure 3. Upper Cumberland River Project Area and Nearby Areas of Archaeological Investigation.

The site (44LE17), located along the Powell River in Lee County, consists of a ca. 1 ha habitation area (Holland 1970:19). Reinterpretation of the excavation data from the site indicates that it may contain the remains of a substructure mound (Egloff 1987:18). The site yielded Dallas and Pisgah ceramics, as well as a radiocarbon determination of A.D. 1210 +/- 120. Other sites in this part of southwestern Virginia have yielded Dallas pottery, providing additional evidence of Mississippian cultural influence or interaction (Egloff 1987:18).

Excavation of stratified deposits at Daugherty's Cave (44RU14), located along a Clinch River tributary in Russell County, Virginia, generated additional data on Mississippi period adaptation in this region. Radiocarbon dates ranging from A.D. 900 to 1480 indicate that the cave was used throughout the period. Artifacts associated with the Mississippian component include shell tempered ceramics with plain, cordmarked and net-roughened exteriors, along with some limestone tempered and Pisgah-like sherds. Plant remains consist of a variety of nuts, as well as maize and beans. The faunal assemblage is dominated by deer (50 %) and black bear (10 %) (Gardner 1991).

Late Prehistoric occupation of western North Carolina (Figure 3) is associated with the Pisgah phase (Dickens 1976). The presence of Pisgah ceramics in the extreme eastern part of the project area (Schock 1977), as well as adjacent portions of Tennessee (Riggs 1985) and Virginia (Egloff 1987), provides additional evidence that Upper Cumberland River Mississippian groups interacted with contemporary societies living farther to the south and east.

Late Prehistoric sites located north of the project area, along the upper reaches of the Kentucky and Big Sandy rivers (Figure 3), are classified as Fort Ancient, not Mississippian (Sharp 1990). Fort Ancient adaptation resembles that of Mississippian groups in many ways, such as increased emphasis on food production, increased sedentism, and larger and more complex societies (Sharp 1990:538). In contrast, Fort Ancient settlement systems do not reflect the hierarchical structure characteristic of Mississippian settlement systems, and platform mounds were not constructed by Fort Ancient groups. The Upper Cumberland River project area lies along the interface or transition zone between the Mississippian tradition to the south and west and the Fort Ancient tradition to the north and east.

As this discussion has illustrated, the Upper Cumberland River region was not isolated from other Mississippian groups and is, in fact, bordered on the west, south and east by well documented examples of Mississippian society and on the north by Fort Ancient groups. The location of the Upper Cumberland region thus provides an opportunity to examine the origin and development of a Late Prehistoric group that lived along the northern edge of the Mississippian world and to compare the nature of their social, economic and political relationships with other Mississippian groups inhabiting the surrounding regions. It offers an excellent opportunity to investigate the real and perceived differences between Mississippian and Fort Ancient societies.

THE UPPER CUMBERLAND ARCHAEOLOGICAL PROJECT

Based on the presence of Mississippian sites in the Upper Cumberland River drainage, along with the location of the region with respect to other Late Prehistoric societies in the upper Southeast, the Upper Cumberland River Archaeological Project was initiated in 1991 to investigate the extent and intensity of Mississippian settlement in the region. Funding provided by a University of Kentucky Summer Research Fellowship was used to conduct a pilot project designed to assess the potential of different parts of the Upper Cumberland River region for providing the kinds of archaeological data required to investigate Mississippian adaptation. A three stage research plan was developed to collect the information needed to make that assessment. Stage 1 consisted of an examination of the archaeological site files and records maintained by the Office of State

Archaeology and the Kentucky Heritage Council pertaining to the counties comprising the Upper Cumberland River region. Stage 2 involved examining artifact collections curated at the University of Kentucky Museum of Anthropology (UKMA) from sites identified in Stage 1 as having Mississippian occupations. Stage 3 consisted of limited field investigations in portions of the Upper Cumberland River drainage that appeared to have a high research potential based on the results of Stages 1 and 2. The results of the research conducted in each stage of the 1991 project are presented below.

STAGE 1 RESEARCH

Most of the information on Mississippian sites in the Upper Cumberland River area was obtained from the site files maintained by the Office of State Archaeology in Lexington, and from files at the Kentucky Heritage Council in Frankfort. Other sources that provided limited site and bibliographic information included the Tennessee Valley Authority in Norris, Tennessee, the National Park Service office at the Big South Fork National River and Recreation Area in Oneida, Tennessee, the Tennessee Division of Archaeology in Nashville, and the Daniel Boone National Forest in Stanton, Kentucky.

Examination of archaeological site files for the 12 counties comprising the Upper Cumberland River region, plus several additional bordering counties, identified approximately 135 archaeological sites containing probable evidence of Mississippian activity. This evidence included the recovery of shell tempered pottery, small triangular projectile points, and other kinds of diagnostic Mississippian artifacts, as well as the presence of stone box graves or flat-topped platform mounds, both known to be diagnostic of Mississippian culture.

Further examination of the data collected during the early phases of this research clearly indicated that the entire Upper Cumberland River region was much too large to serve as a suitable research area. Based on the kind, number, and distribution of sites recorded, the project area for subsequent phases of research was reduced to include only the eight counties in the uppermost part of the drainage. This part of the Upper Cumberland drainage, consisting of the extreme eastern part of the Lake Cumberland section and all of the Southeastern Mountains section, extends from McCreary County eastward to Harlan County (Figure 2). It contains more than 73 % of the 135 Mississippian sites identified in the Upper Cumberland drainage, including many of the larger sites with flat-topped mounds.

A variety of information was collected from the site files for each site including: site number; name; name of USGS quadrangle map on which the site is located; UTM coordinates; name of landowner; site type; general location; site description; description of artifacts collected; and any bibliographic references to the site. In addition, a list of bibliographic references on Mississippi period archaeology in the region was compiled.

Mississippian sites in the eight-county project area were grouped by site type, then plotted on topographic maps as a means of investigating their distribution and diversity. Sites were assigned to one of five general site types: 1) rockshelters; 2) open habitation; 3) mortuary; 4) mound; and 5) other. Figure 4 shows the distribution of these sites by type. As is often the case in using site file data, the number, kind, and distribution of sites illustrated in Figure 4 probably reflect the history of archaeology in the region as much as prehistoric settlement, but it does provide some insights as to the kinds of Mississippian sites in the study area.

Forty-seven percent of the Mississippian components were found in rockshelters. Most of these sites occurred along the rugged Cumberland Escarpment near the project area's western margin. The greater visibility of rockshelters in this rugged terrain compared to other site types and the ease of finding artifacts in prehistorically utilized shelters probably has contributed to their high representation in the site files. Mississippian artifacts found at these sites usually consisted of a few shell tempered sherds and triangular projectile points, suggesting rather ephemeral occupations. Evidence of more frequent or intensive rockshelter use has been found at several sites in this area, reflected by midden accumulation and larger quantities of shell tempered pottery.

Although chronometric dates are rare for Mississippian components represented at these rockshelters, a few do exist. A radiocarbon date (uncalibrated) of A.D. 1210 ± 50 (Beta 28204) was obtained from a burial associated with shell tempered pottery at site 15McY414, located near the Kentucky/Tennessee border in McCreary County. A second sample collected from the same site yielded a radiocarbon determination (uncalibrated) of A.D. 980 ± 50 years (Beta 33099) (Office of State Archaeology site files for McCreary County:File 1).

Archaeological investigations conducted by the University of Tennessee along the Big South Fork of the Cumberland River, just south of the project area, provides additional evidence for the limited use of this area by Mississippian groups. Survey of more than 1600 ha identified 248 prehistoric sites consisting of rockshelters and upland lithic scatters. Of these, only seven components yielded evidence of Mississippian occupation, all of which were characterized by rockshelters containing small quantities of shell tempered plain and cordmarked pottery (Ferguson and Gardner 1986:Table 7). Other surveys in this part of the Cumberland Plateau have reported similar evidence of Mississippian activity (Pace and Kline 1976; Wilson and Finch 1980).

Investigations at the Forbus Site (40FN122), an open-air site located on a narrow alluvial terrace just south of the project area in Tennessee, provides additional insights about Mississippian adaptation in the rugged western part of the project area (Bradbury 1991). Lithic artifacts from the site's Mississippian component reflect tool manufacturing/maintenance and hunting/butchering tasks. The lack of pit features, midden, and structural remains, as well as the few sherds, suggests short-term, limited occupation by a few individuals. The kind and intensity of Mississippian activity at the open-air Forbus Site resembles that found at most Cumberland Plateau rockshelter sites (Bradbury 1991:14-15).

Based on data from the project area, as well as from adjacent areas, Mississippian use of this rugged western portion of the project area is characterized by components representing small, temporary campsites largely within rockshelters or on upland ridgetops and benches (Bradbury 1991; Ferguson and Gardner 1986; Pace and Kline 1976; Wilson and Finch 1980). Mississippian activity seems to have been of very limited intensity, perhaps reflecting exploitation of this area's natural resources by small Mississippian groups on a short-term or seasonal basis (Pace et al. 1986:42).

Rockshelters containing evidence of Mississippian activity have been documented in other parts of the project area, but compared with the Cumberland Escarpment area, these sites are widely scattered and few in number. Whether their number and distribution represent trends in Mississippian site selection, variation in local geology, or an artifact of selective archaeological survey and excavation remains to be determined.

Twenty-seven percent of the Mississippian components are characterized as open habitation sites (Figure 4). This site type occurs in all parts of the project area, but is most common (based on existing site file data) in the central portion, where the Cumberland River floodplain broadens and extensive stretches of alluvial soils occur. Open habitation sites range in size from less than one to more than six ha. Numerous examples of this site type are found along the Cumberland River between Williamsburg and Pineville. A particularly high density occurs in an area of broad floodplains in Knox County, where more than 15 Mississippian components have been identified (Delorenzo and Weinland 1980; Hockensmith 1980).

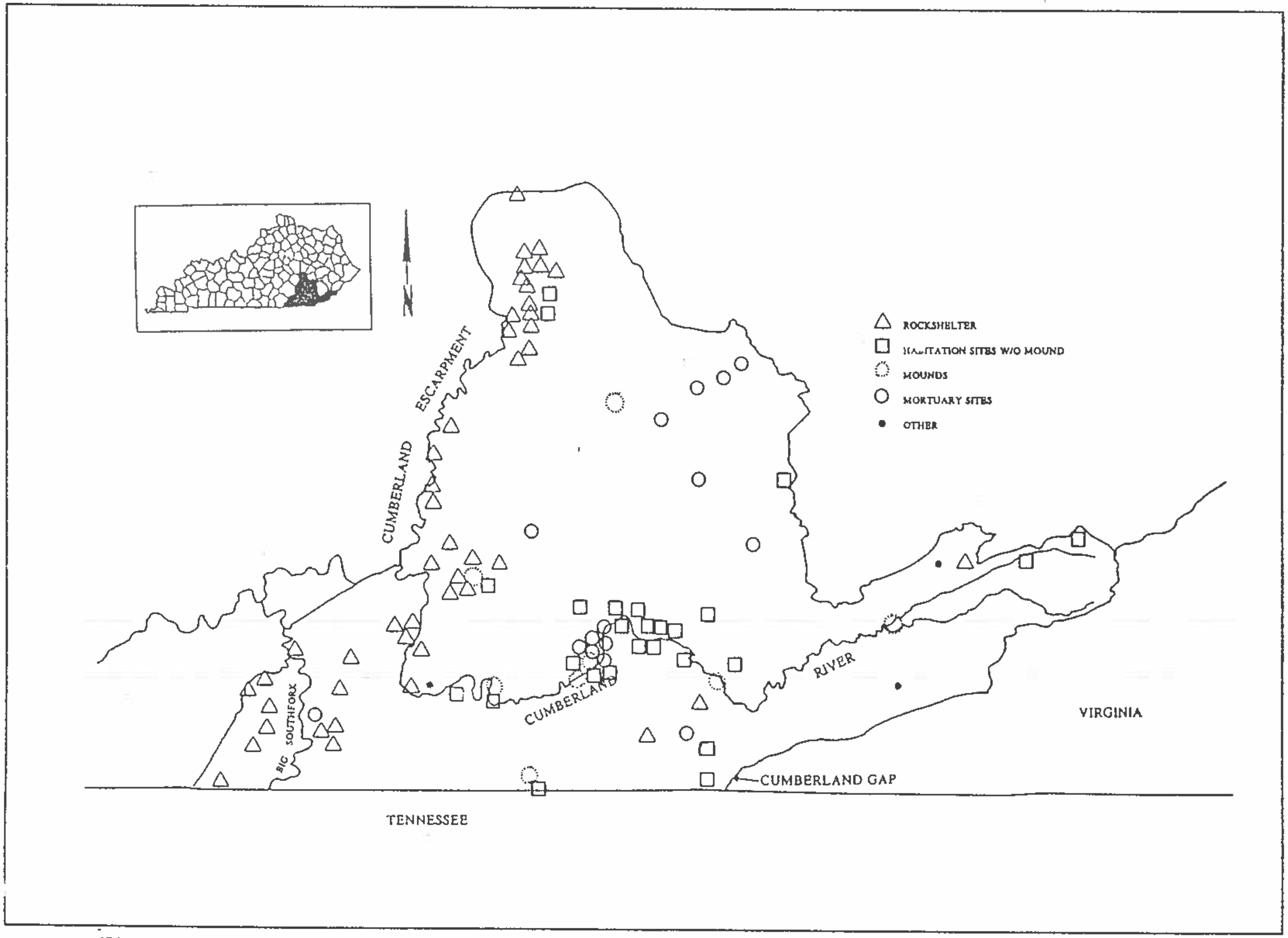

Figure 4. Distribution of Previously Recorded Mississippian Sites in the Project Area (by site type).

Open habitation sites in the Knox County area have yielded a wide variety of Mississippian artifacts, including shell gorgets, chunky stones, small sandstone disks, and large quantities of plain, cordmarked, check stamped, and cord roughened shell tempered pottery. The size of some floodplain habitation sites, combined with high artifact density, the presence of daub, and the dark organic staining of the soil, suggests that they represent intensive, long-term occupations by large Mississippian groups.

Excavations conducted at an open habitation site (15Hl304) located in Harlan County, in the extreme eastern portion of the project area, provide limited information on Mississippian community organization (Schock 1977). The component has been interpreted as a small Mississippi period hamlet consisting of two houses built on a low knoll in the floodplain. Excavation of one house revealed a square semi-subterranean structure measuring 5 by 5 m. Charcoal from the structure yielded radiocarbon determinations (calibrated) of A.D. 1345±120 (UGa-1139) and 1355±90 (UGa-1140). Ceramics from this site were classified as Pisgah, and resemble pottery found at the Lee County, Virginia sites just to the south (Schock 1977; Lewis 1990b:441).

Mortuary sites represent the third type of Mississippian site in the project area. Fifteen mortuary sites were identified, most of which are represented by single stone slab-lined (stone box) mortuary features without associated habitation debris (Lewis 1990b). A cluster of six of these sites is located on a "mountain terrace" situated above one of the mound sites in Knox County (Hockensmith 1980). Stone slab-lined graves are commonly associated with Mississippian sites located farther downstream in the vicinity of Nashville, Tennessee (Brown 1981:8).

The fourth Mississippian site type in the project area consists of open habitation sites with associated platform mounds. These sites are generally located in the southern portion of the project area along broader portions of the Cumberland River floodplain. These types of sites are thought to represent regional or local centers of political and ceremonial activity, and therefore, have the potential to provide information about higher levels of social, political and economic integration of Mississippian society. Although eight sites of this type have been recorded in the study area, the quality of data on each site is highly variable. Several mound sites were reported by local residents or visited by professional archaeologists in the 1930s and 1940s, but have never been further investigated. In some cases, the mounds have been well documented in recent years. Excellent examples of this site type are the Bowman Site (15Wh14) in Whitley County (Railey 1985a), the Croley-Evans Site (15Kx24) in Knox County (Railey 1985b), and the Hodge Mound (15Bl5) in Bell County (Dorwin 1970).

The Bowman Site is situated on approximately 2 ha of alluvial bottomland in southern Whitley County, roughly 2.5 km northeast of Jellico, Tennessee (Figure 4). The mound consists of a two-stage substructure platform and an associated habitation area (Figure 5). The mound is approximately 45 m long and 20 m wide. The smaller construction stage forms the southern portion of the mound, and presently is about 1.5 m high. The larger stage, which forms the mound's northern portion, stands approximately 2 m high. To the south of the mound, an associated habitation area is marked by a dark surface midden stain containing a high density of artifacts and faunal remains. Ceramic material from the site (Figure 6) includes exclusively shell tempered sherds having plain, cordmarked, fabric impressed, or check stamped exterior surfaces (Railey 1985a). Also present are painted sherds, loop handles (Guthe 1976), and a zoomorphic applique (Figure 7) (Railey 1985a).

The Croley-Evans Site, also consisting of a platform mound and an associated habitation site, is located in Knox County, 20 km up river from the Bowman Site (Figure 8). The Croley-Evans Site, covering approximately 6 ha, is situated directly on the Cumberland River floodplain. The mound, which is approximately 30 m in diameter and 3 m high, is located in the south-central portion of the site. Examination of pothunters' pits revealed two layers of charcoal separated by mottled loam and clay, suggesting several construction episodes (Railey 1985b).

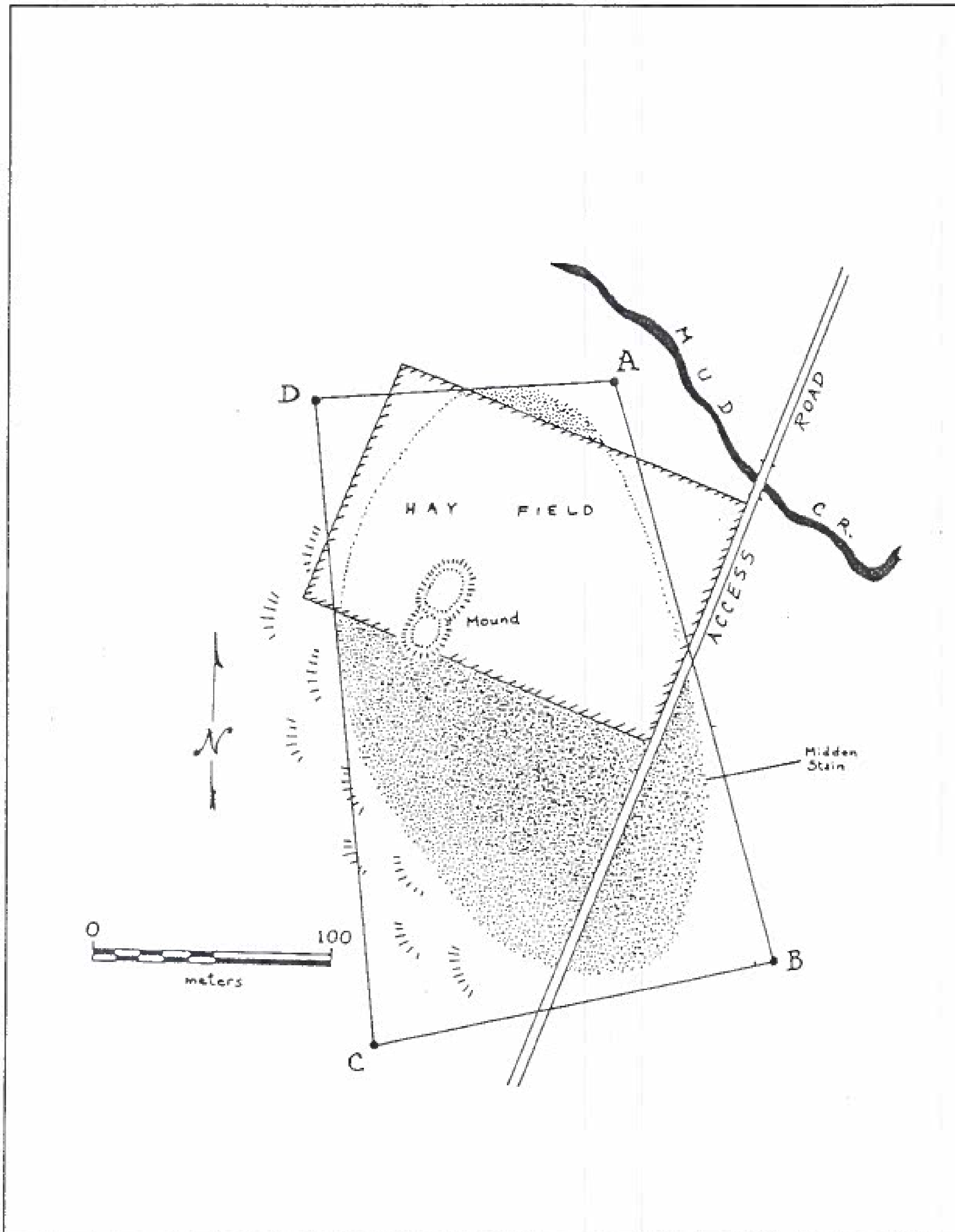

Figure 5. Site Plan of the Bowman Site (15Wh14), Whitley County (after Railey 1985a).

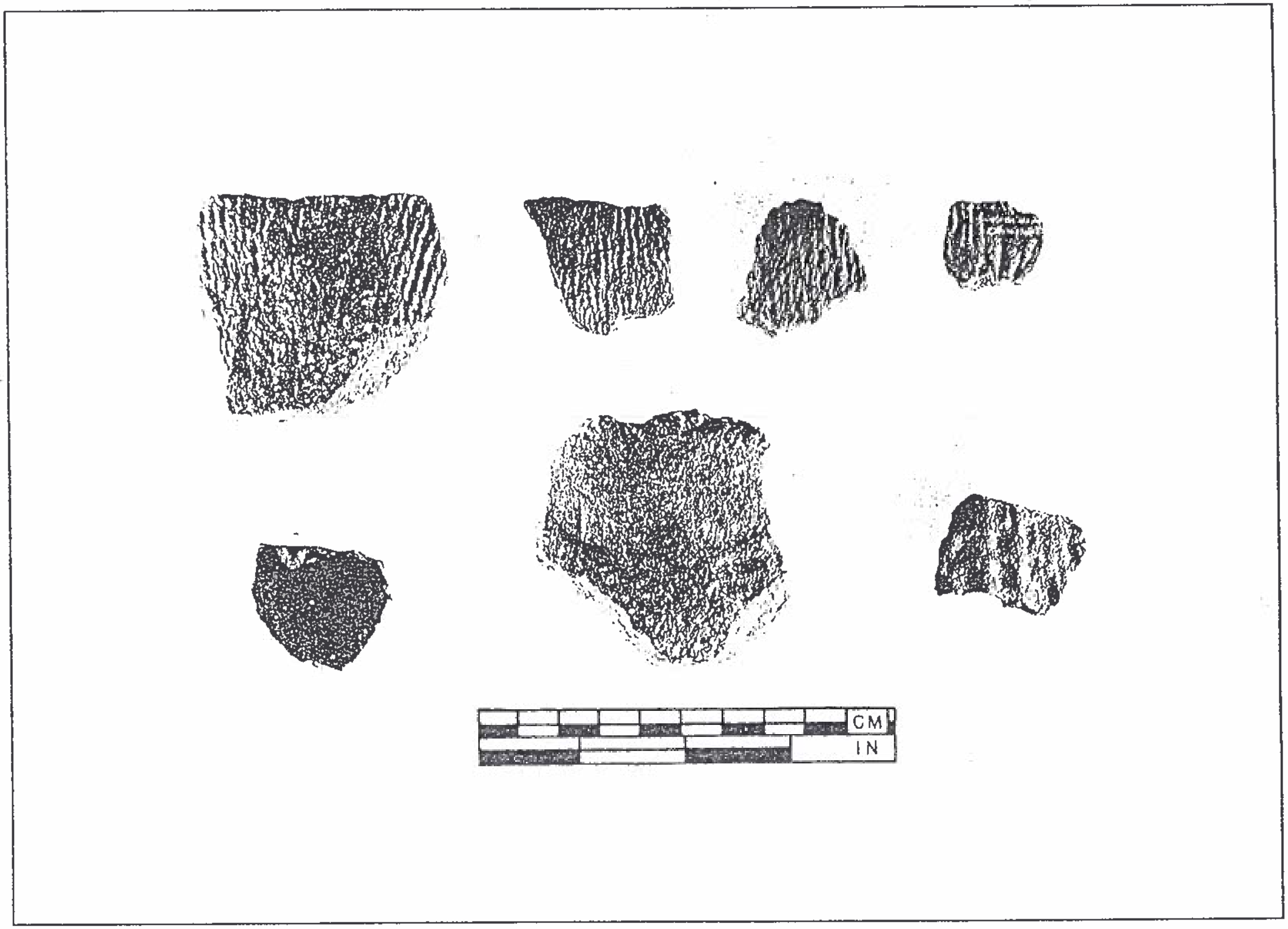

Figure 6. Bowman Site Ceramics.

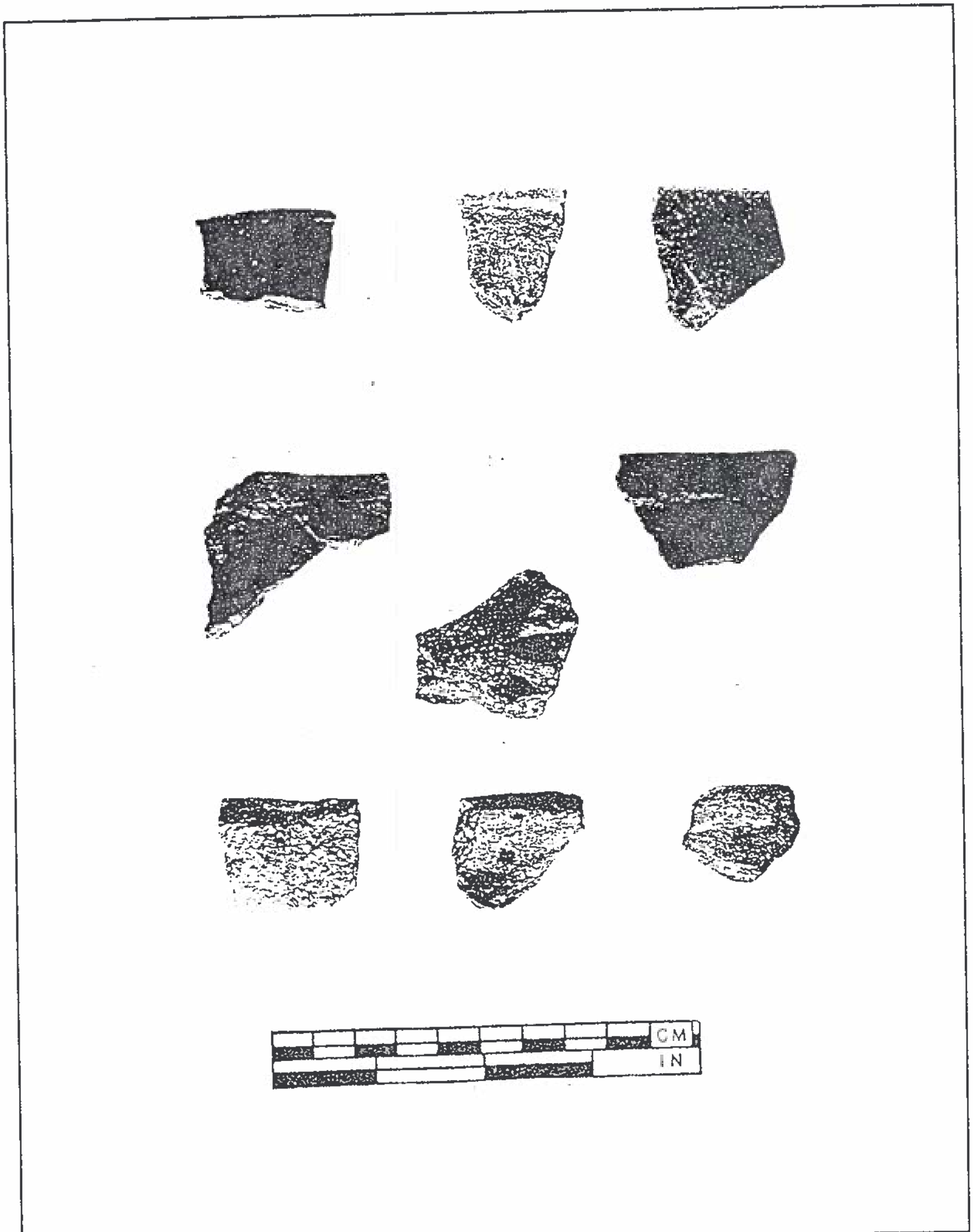

Figure 7. Bowman Site Ceramics.

In 1991, limited surface reconnaissance at the site revealed dark midden staining and a high density of ceramics and lithic artifacts, as well as faunal remains. Surface artifact concentrations and scattered daub suggest the presence of structural remains. The ceramic collection from the Croley-Evans Site includes plain, cordmarked, check stamped, and fabric impressed shell tempered sherds, some with loop handles (Figure 9). The relative frequencies of these surface treatments are comparable to those of the assemblage from the Rowena Site located farther down river in the Lake Cumberland section of the Upper Cumberland River (Lewis 1990b:441). Other diagnostic Mississippian artifacts (Figure 9) include sandstone, hematite and ceramic discoidals, and small triangular projectile points (Railey 1985b).

A second Knox County mound, the Cobb Mound (15Kx17), is located downstream from the Croley-Evans Site. The mound measures approximately 50 m in diameter and 3 m high (Railey 1985c). Although the mound was initially classified as a Middle Woodland burial mound, local informants report the recovery of Mississippian ceramics from the site.

The Hodge Mound, located in downtown Pineville, served as a Civil War cemetery and the site of a nineteenth century house before being completely destroyed in 1970. Fortunately, University of Kentucky archaeologists were able to visit the site during its demolition, collecting data on the mound's internal structure (Dorwin 1970). The Hodge Mound was approximately 25 m in diameter and 3 m high. A series of profile drawings made at the time of the mound's demolition indicates it was built in at least two stages. The first stage was a 1.5 m high flat-topped structure. The investigators reported that Stage 2 was constructed soon after Stage 1, based on the similarity of the shell tempered pottery. Oxidized soil at the interface between Stages 1 and 2 indicates that the surface of Stage 1 and its contents were burned prior to the construction of Stage 2 (Dorwin 1970). Although little is known about the Hodge Mound, it is clear that it represents another example of a Mississippian multi-stage platform mound.

Mississippian mound sites in the project area resemble town-and-mound sites in adjacent parts of the upper Southeast, at least in the size and number of mounds represented (Egloff 1987; Webb 1938). Obviously, considerable research must be conducted at the Upper Cumberland River mound sites before more meaningful comparisons can be made.

STAGE 2 RESEARCH

Reserch during Stage 2 involved examining artifact collections stored at the University of Kentucky Museum of Anthropology from sites identified in Stage 1 as having Mississippian components. The purpose of the Stage 2 efforts was to further assess the potential of these sites for providing insights about Mississippian activity in the project area. Unfortunately, this stage of investigation did not contribute much new information. For the most part, collections were few in number, contained few artifacts, and provided little new information with which to assess a site's research potential.

Most of the collections contained a few projectile points, small pieces of Mississippian shell tempered pottery, or both. Almost all of the collections were picked up from the ground surface during brief visits to the sites. Very few of the collections came from excavated contexts, at least partially accounting for the pottery's poor state of preservation. For the most part, these collections provide little information other than that the site was occupied during the Mississippi period. The few "extensive" collections that do exist, largely coming from sites in Knox County, contained a variety of plain or cordmarked shell tempered pottery, along with a few highly decorated sherds. These collections were briefly described and representative sherds were photographed. An attempt was made to locate collections from sites in the project area that might have been held by other agencies and institutions, but these attempts were largely unsuccessful.

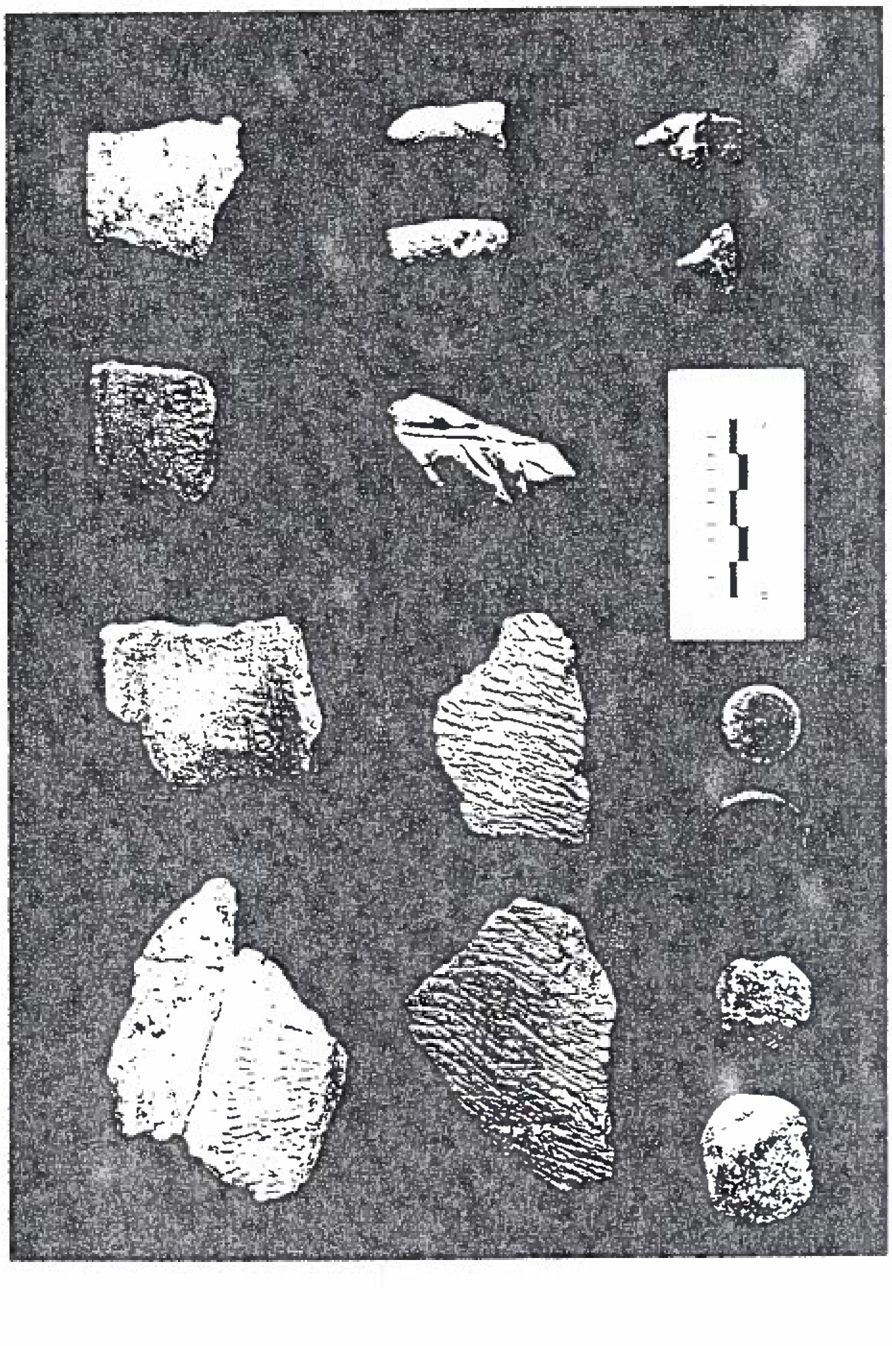

Figure 9. Croley-Evans Site Ceramics and Miscellaneous Artifacts

STAGE 3 RESEARCH

Stage 3 research consisted of making several field trips to various sections of the project area that appeared to have a high potential for contributing data on Mississippian adaptation. Because Stage 1 and 2 investigations indicated that the greatest concentration of Mississippian sites in the project area was in Whitley, Knox, and Bell counties, Stage 3 efforts focused on this area.

Information recorded during the field trips included the nature of previous ground disturbance in the area and its impact on locating and/or disturbing Mississippian sites, the extent of cultivation, ease of access to site and possible site locations, and landowner attitudes toward conducting future archaeological investigations in the region. Several previously recorded archaeological sites were visited and small artifact collections were made.

Field investigations revealed that the natural and modern cultural characteristics of the Upper Cumberland River valley were quite varied. In some sections, the floodplain was quite narrow, bordered on both sides by steep hills or ridges. These conditions were particularly prevalent in the western portion of the project area. Similar conditions also were observed in portions of the eastern part of the project area. In contrast, sections of the river in eastern Whitley County, Knox County, and parts of Bell County are characterized by a broad valley in which extensive areas of level floodplain occur. Due to the importance of cultivated plants in the Mississippian diet, sites are commonly associated with areas of rich floodplain soils. Almost all large Mississippian town and mound centers are found in this topographic setting. Not surprisingly, the larger Mississippian sites that are known to exist in the project area are found along this part of the river.

In view of the results of the three stages of investigation, the limits of the research area were further reduced to include eastern Whitley County, and all of Knox and Bell counties. This area contains approximately 65 km (40 miles) of the Upper Cumberland River drainage and appears to offer the highest potential for yielding the information needed to investigate the nature of Mississippian adaptation in southeastern Kentucky. Twenty-one sites containing evidence of Mississippian activity already have been recorded in Knox County, including at least one with an associated platform mound. Many other Mississippian sites exist that have not been officially documented.

FUTURE UPPER CUMBERLAND RESEARCH

In his discussion of the Mississippi period in Kentucky, Lewis (1990b:440) describes the counties drained by the Upper Cumberland River as among the archaeologically least known parts of the state. The little that is known about Mississippian adaptation in this part of the Commonwealth comes from the Lake Cumberland section (Haag 1947; Lewellyn 1964; Weinland 1980). Very little is known about the Southeastern Mountains section (Delorenzo and Weinland 1980; Hockensmith 1980; Schock 1977). Because of the limited nature of archaeological investigations, even basic data on the regional chronological sequence are lacking.

The 1991 research verified the presence of Mississippian occupations in the project area and identified those parts of the Upper Cumberland River drainage having a high potential to provide the kind of archaeological data needed to investigate Mississippian adaptation. The program of survey, excavation, and analysis proposed for the Upper Cumberland Archaeological Project should further clarify the nature of Mississippian adaptation in the project area by better documenting the number, location, and type of Mississippian sites in the Whitley-Knox County area. Ultimately, this research will lead to a characterization of Mississippian adaptation in the Upper Cumberland River drainage, reflecting how these people adapted to the specific conditions of the region. Information from the Upper Cumberland River project can then be compared with that from other regions around the Southeast and Midwest, providing new insights into the cultural processes and adaptive responses responsible for the development of Mississippian culture in the eastern United States. Of particular interest will be the relationship of the Upper Cumberland River Mississippian groups to the better documented Mississippian groups that lived in western Kentucky, northern Tennessee, and western North Carolina. Information from the Upper Cumberland River region may also provide new insights into the relationship between Mississippian groups that inhabited southern Kentucky and contemporary Fort Ancient groups that once lived in eastern and northern Kentucky.

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ARCHAEOLOGICAL SURVEY AND TESTING OF UPPER CUMBERLAND MISSISSIPPIAN SITES IN KNOX AND WHITLEY COUNTIES, KENTUCKY

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ABSTRACT

Archaeological investigations conducted in the Upper Cumberland River valley of southeastern Kentucky during 1992 are discussed. Research efforts focused on surveying portions of the project area to locate previously undocumented Mississippian (A.D. 1000-1600) sites and to collect additional data from previously recorded sites. Testing of three sites containing Mississippian components provided additional information on the character and intensity of occupation at these sites.

INTRODUCTION

The Upper Cumberland River Archaeological Project was initiated in 1991 to learn more about the development of Mississippian society in the southeastern United States and the nature of regional variation among Mississippian groups that once inhabited southeastern Kentucky and adjacent portions of Tennessee, North Carolina, and Virginia. In addition, the position of the project area along the apparent interface between Mississippian and Fort Ancient societies offers an excellent opportunity to investigate the real and perceived differences between these two Late Prehistoric manifestations (Jefferies 1996). For the purposes of this project, the Upper Cumberland River region was defined as that portion of the Cumberland River drainage extending from Harlan County, in extreme eastern Kentucky, westward to where the river crosses the Kentucky-Tennessee state line (Figure 1).

Prior to the initiation of this project, our understanding of Mississippian society along the Upper Cumberland River was based on reports of scattered archaeological sites that yielded small triangular projectile points, shell tempered ceramics, and other diagnostic Mississippian artifacts, supplemented by limited excavations (Blakeman 1971; Hockensmith 1980; Lewis 1990). Also, several platform mounds were reported

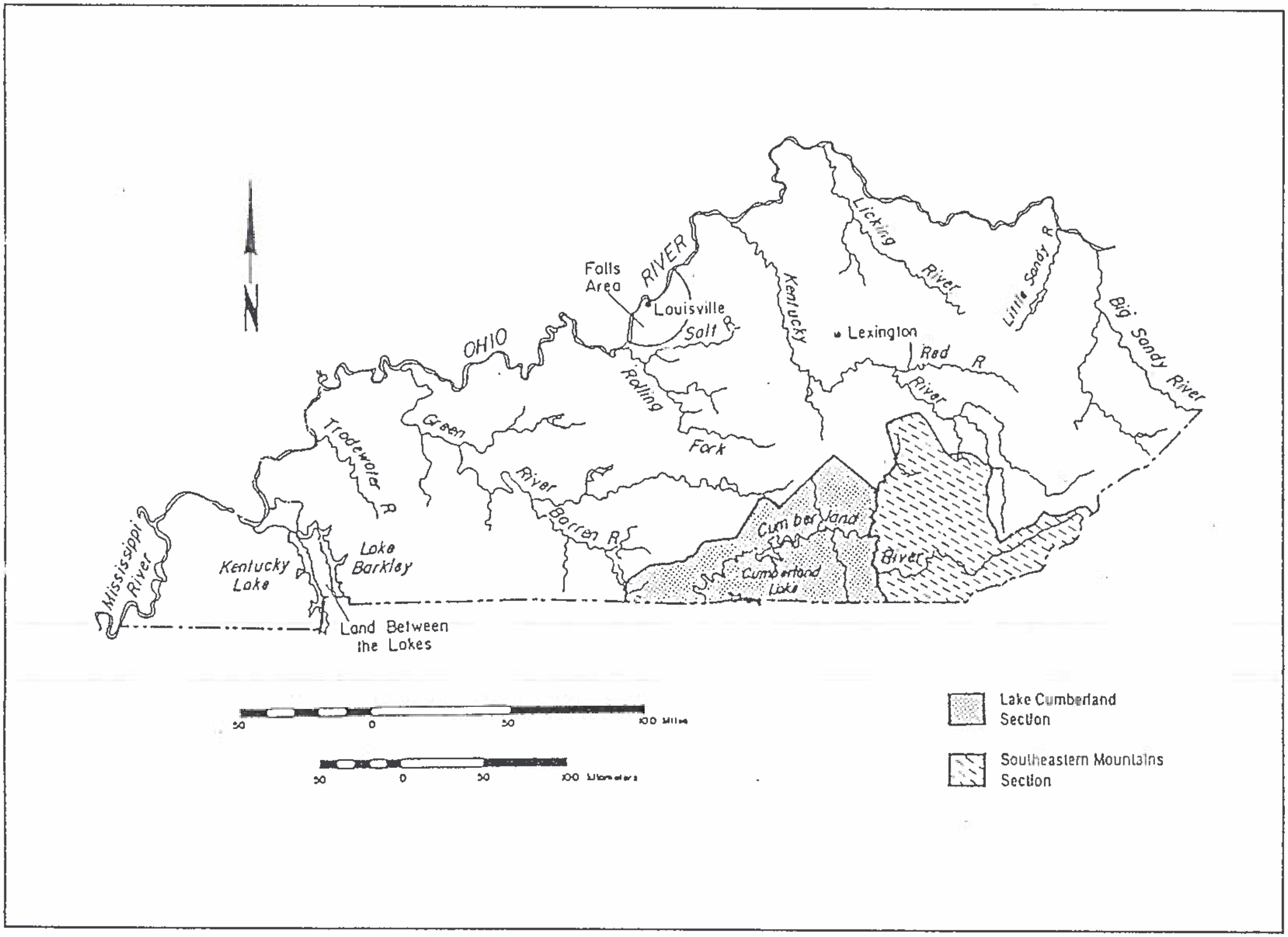

Figure 1. Location of the Upper Cumberland Region in Southeastern Kentucky.

in the region (Railey 1985a; 1985b). The lack of any previous regionally-focused research program made interpretation of the existing data base difficult and meaningful comparisons with other areas of the Southeast nearly impossible.

The first phase of the Upper Cumberland Project, conducted in 1991, used state site file data to determine the number, type, and location of previously recorded Mississippian or Late Prehistoric sites in the eight county project area. The review of site file data yielded in excess of 100 rockshelter and open sites containing Late Prehistoric artifacts (Figure 2). Sites coded as "open habitation sites" were distributed along the Cumberland River valley, but a particularly high density occurred in the southcentral part of the project area. Based on these findings, the initial phases of the project are centering on the Knox-Whitley county area. These two counties contain approximately 65 km (40 miles) of the Cumberland River drainage, including sizeable pockets of bottomland that would have been suitable for prehistoric agriculture. In addition, 22 sites containing evidence of Mississippian activity were already recorded for Knox County, including at least one having an associated platform mound. Numerous other sites yielding Mississippian artifacts are known to local artifact collectors (Jefferies 1996).

SUMMARY OF 1992 FIELD INVESTIGATIONS

In view of the results of the 1991 research, the 1992 investigations, funded by a Survey and Planning Grant awarded by the Kentucky Heritage Council, were designed to better assess the nature of Mississippian settlement in the Knox - Whitley county area. The 1992 investigations, conducted between May 15 and August 30, consisted of two stages of field work. Stage 1, largely conducted from late May to early July, was an archaeological survey of portions of the Cumberland River floodplains and adjacent uplands designed to locate previously undocumented Mississippian sites and to revisit several previously recorded sites to collect additional data. Field efforts were concentrated in cultivated portions of the project area where excellent ground surface visibility helped ensure the detection of most surface sites. Although the surveyed areas do not comprise a representative sample of all environmental zones in the project area, floodplains were considered to be a high priority this year because of the likelihood of large Mississippian sites being concentrated in this zone. Also, floodplain sites generally have a higher potential than most upland sites for having vertically stratified deposits, ceramics, and charcoal for radiocarbon dating needed to develop the basic cultural-historical sequence for the region. Once the regional cultural framework for the Late Prehistoric period is developed, survey efforts will be expanded to investigate the nature of Mississippian activities in areas away from the floodplain.

The 1992 field investigations resulted in the intensive examination of between 400 and 450 ha of floodplain and adjacent areas, and less intensive coverage of another 100 ha. The surveyed areas were distributed along the Cumberland River from just east of Artemus, near the Knox-Bell county border, westward to the Knox-Whitley county border, a distance of approximately 40 river kilometers. Twenty different tracts of land, ranging in size from less than 1 ha to more than 50 ha, were intensively surveyed in this portion of the valley (Figure 3). Selection of areas to be surveyed was largely based on the extent of ground surface visibility and the ability to obtain landowner permission to access the property. Survey strategy normally consisted of field workers walking a series of parallel transects across the field, with individual transects spaced from 3 to 5 m apart. Once artifacts were observed, the interval between transects was reduced to two meters. Since artifact density was generally low on most sites, all surface artifacts were normally collected. On the few sites having a high artifact density, an attempt was made to collect a representative artifact sample.

Twenty-five new sites were recorded as a result of the 1992 survey effort. Four of these were located in Whitley County and the remaining 21 were in Knox County, reflecting the concentration of field efforts in the

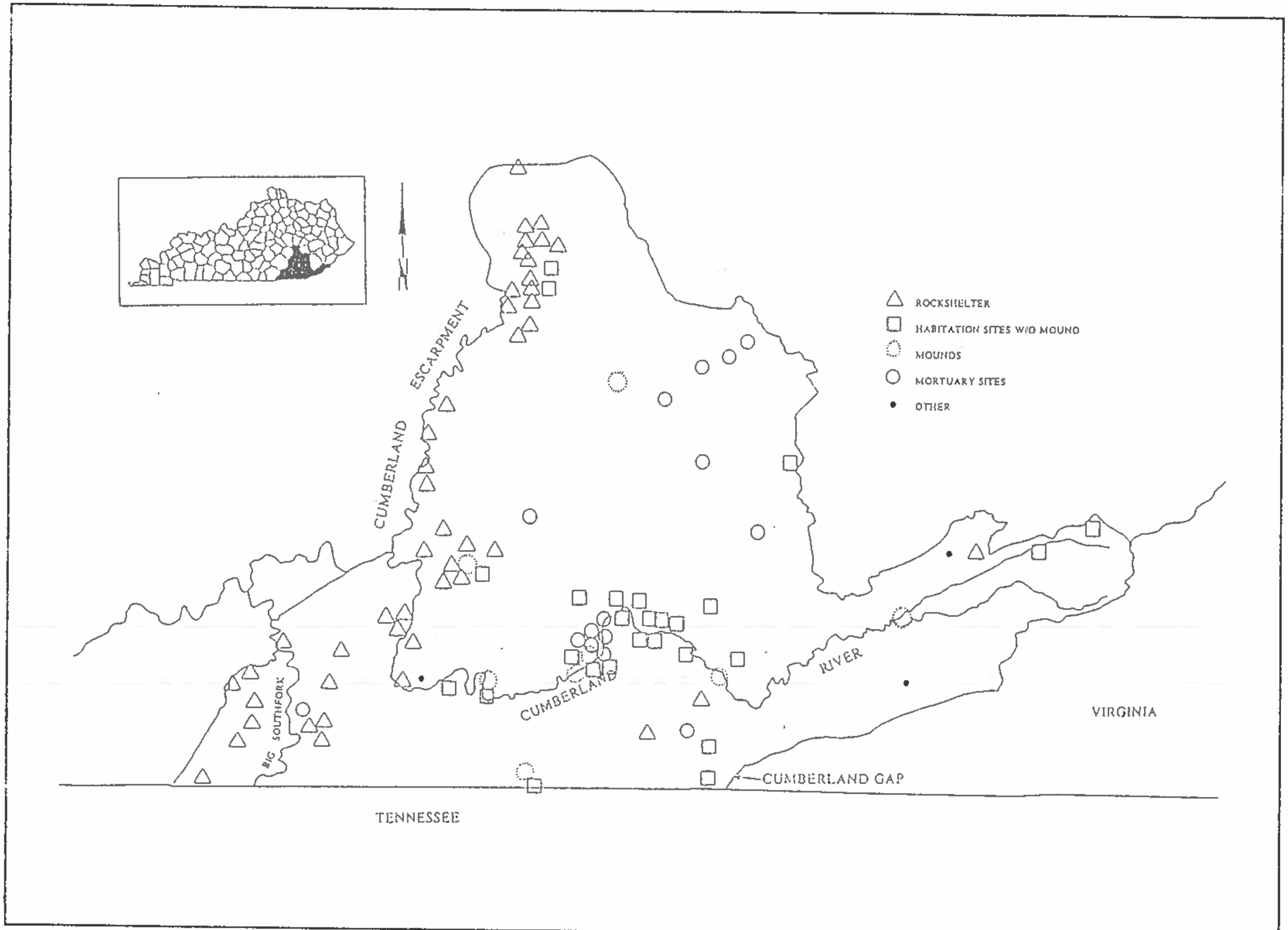

Figure 2. Location of Mississippian Components in the Eight County Upper Cumberland River Project Area.

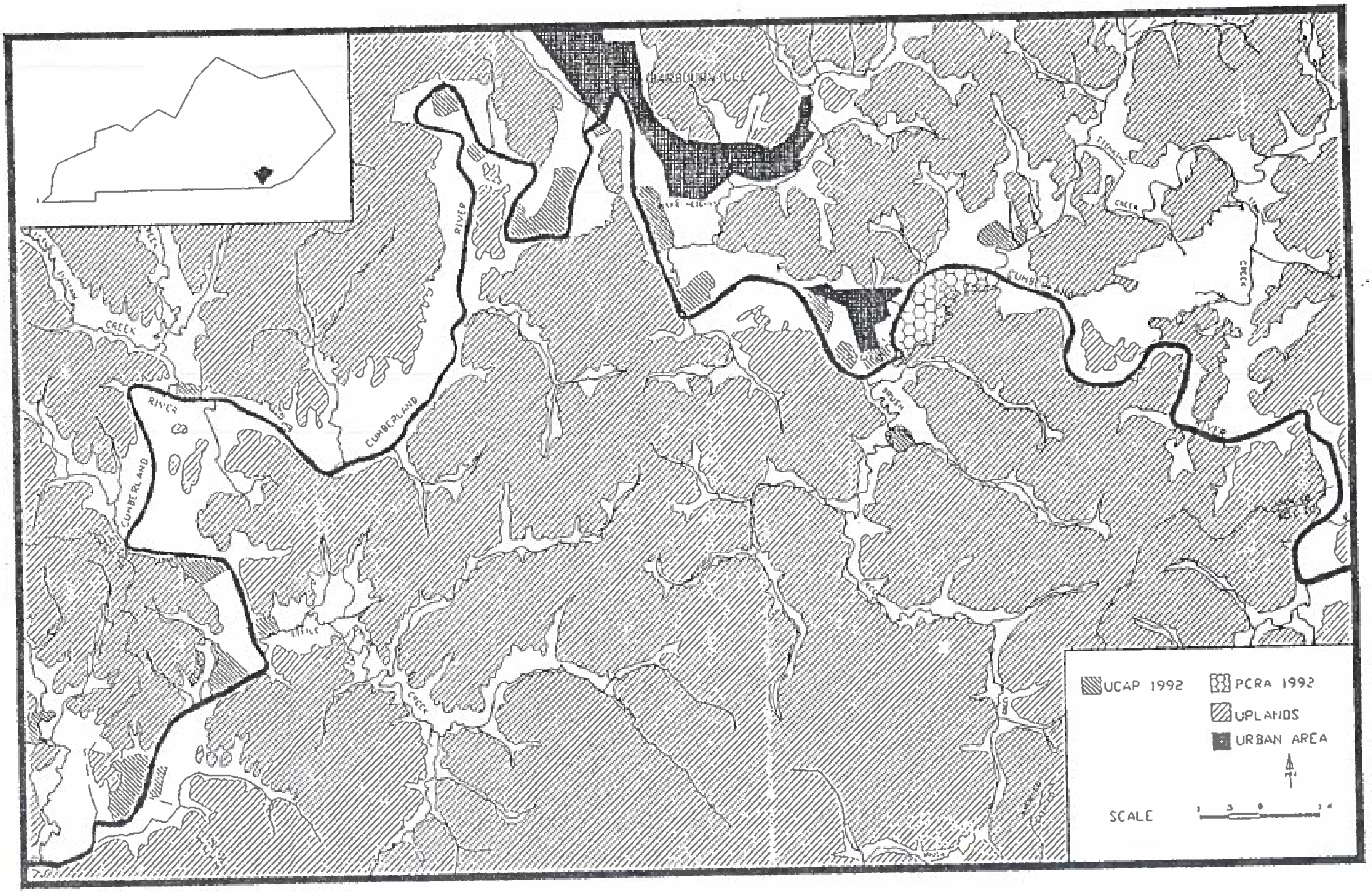

Figure 3. Surveyed Portions of the Barbourville and Artemus Quadrangles, Knox-Whitley Counties, Kentucky.

Knox County area. All sites located during the survey were recorded on Kentucky Archaeological Site Survey Forms and reported to the Office of State Archaeology and the Kentucky Heritage Council.

Twelve of the 1992 sites contained Mississippian artifacts, bringing the number of recorded Mississippian components in the project area to more than 30 (Table 1). Figure 4 shows the distribution of Mississippian sites in the project area that were located by the 1992 survey as black dots and those recorded prior to 1992 as black triangles. Sites containing Mississippian components that were located in 1992 ranged in size from 225 to 7,500 m^2, generally conforming to the size range of reported Mississippian sites (Table 1). Although the kind and distribution of surface artifacts can be used only as an approximation of the extent, nature, and intensity of Mississippian activity at these sites, differences in site size and contents suggest that a variety of site types are represented. For example, a small Mississippian component (ca. 1,000 m^2) at site 15Kx92, located on a floodplain ridge just down river from Barbourville, yielded eight small triangular projectile points, chert debitage, and three small sherds, but no midden stain was evident (Figure 4; Table 1). Larger sites, such as 15Kx96 (ca. 5,000 m^2), located near the confluence of Indian Creek and the Cumberland River (Figure 4), yielded hundreds of shell tempered sherds, small discoidals, and triangular points, as well as exhibiting a dark midden stain. The largest recorded Mississippian site in the project area, the Croley-Evans Site (15Kx24), covers more than 35,000 m^2 and contains an extensive midden and a platform mound (Figure 4). In addition, small scatters of Mississippian artifacts in floodplain settings (15Kx103 and 15Kx104), and stone box graves, and rockshelters in the adjacent uplands (15Kx18 - 15Kx22) have been reported, reflecting additional Mississippian site types and associated activities.

1992 TEST EXCAVATIONS

The second stage of the 1992 investigations consisted of mapping and testing three sites to evaluate their potential for providing cultural and chronological data on Mississippian adaptation in the project area. Of specific concern were sites having stratified cultural deposits containing features, faunal and botanical material, pottery, and charcoal for radiocarbon dating. The final selection of sites to be tested was based on this criterion, as well as being able to get landowner permission to excavate.

CROLEY-EVANS SITE (15Kx24)

The first site tested, the Croley-Evans Site, consists of a platform mound and an associated midden deposit located along a 300 m section of a low rise running parallel to the Cumberland River in western Knox County (Figure 5). The 1992 field investigations consisted of making a controlled surface collection, excavating a series of 36 deep shovel probes, and producing a contour map of the mound and surrounding habitation area.

The controlled surface collection was conducted using a transect collection strategy. Since the site was planted in tobacco, collections were made by walking between every other tobacco row, a distance of approximately three meters. The transects, which were oriented parallel to the river, were subdivided into three sections reflecting three low ridges separated by swales that drained runoff from the field into the river.

The results of the surface collection revealed that the highest artifact density occurred between the mound and the river, and that artifact density decreased from south to north. The highest density of surface material occurred on the southernmost ridge, designated as Area 1 (Figure 6). Cultural material collected included shell tempered pottery, daub, faunal material, chert tools and debitage, charcoal, and sandstone (Table 2). Artifact

Table 1. Sites Containing Mississippian Components Located during the 1992 Field Season.

Site No.	Site Type	Landform Type	Soil Type	Site Area(m^2)	Diagnostic Items
15Kx92	habitation w/o mound	terrace	Huntington silt loam	1000	8 small triangular points
15Kx96	habitation w/o mound	floodplain	Huntington silt loam	5000	shell tempered pottery, loop and strap handles
15Kx97	habitation w/o mound	floodplain and hillside	Whitley silt loam	7500	2 small triangular points
15Kx99	habitation w/o mound	terrace	Whitley silt loam	2700	2 small triangular point, 1 small triangular drill
15Kx100	habitation w/o mound	hillside	Allegheny silt loam	7500	1 small triangular point
15Kx101	habitation w/o mound	terrace	Allegheny silt loam	4200	2 small triangular points
15Kx102	habitation w/o mound	dissected uplands	Allegheny silt loam	6000	1 small triangular point
15Kx103	habitation w/o mound	floodplain	Huntington silt loam	225	1 shell tempered sherd
15Kx104	habitation w/o mound	floodplain	Huntington silt loam	314	1 small triangular point
15Kx106	habitation w/o mound	terrace	Cotaco silt loam	1500	1 small triangular point
15Kx108	habitation w/o mound	floodplain	Whitley silt loam	3500	2 small triangular points
15Kx111	habitation w/o mound	floodplain	Shelocta silt loam	1250	1 small triangular point (more than 100 triangular points in possession of the landowner)

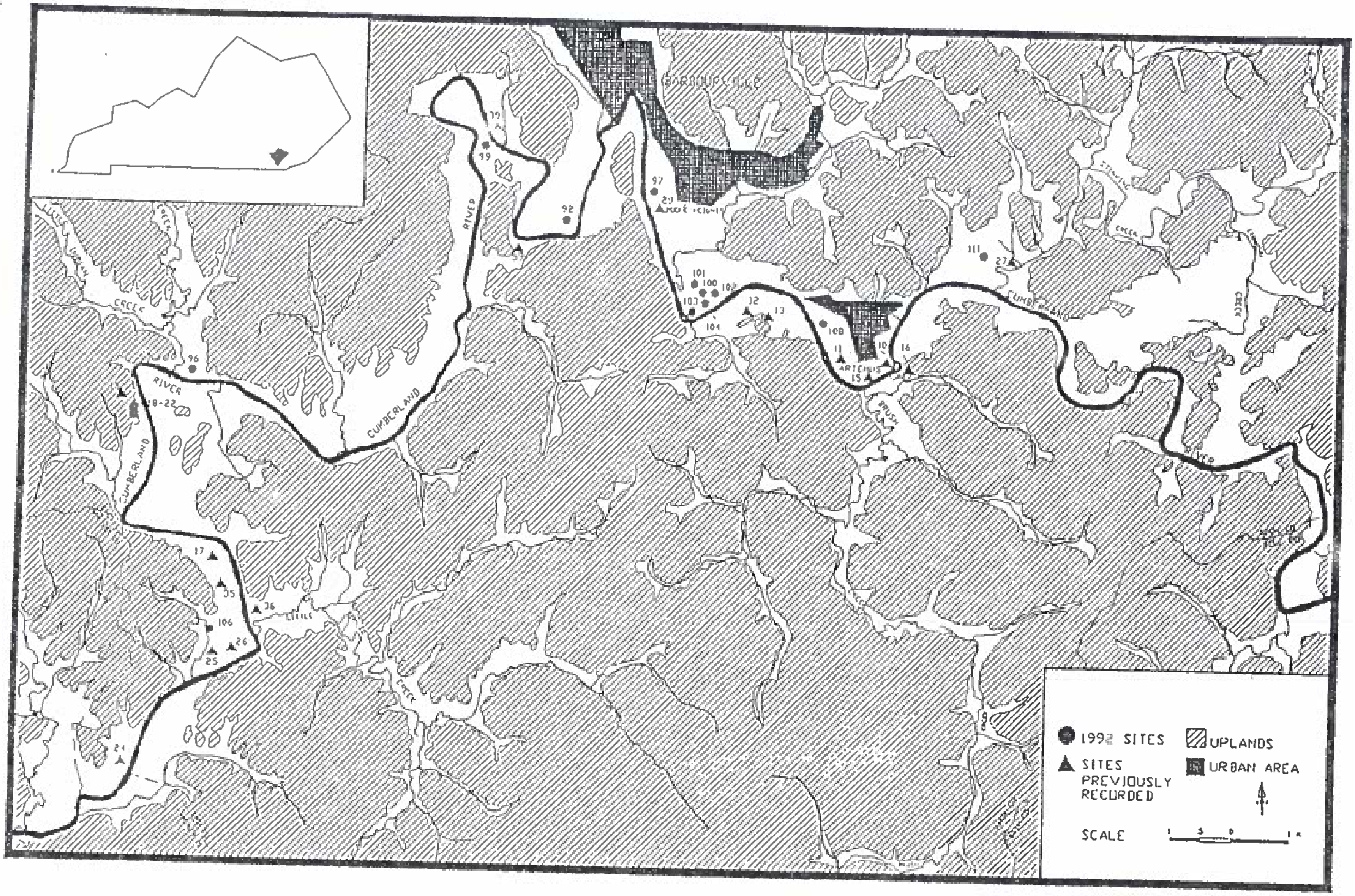

Figure 4. Location of Mississippian Components Along the Upper Cumberland River, Knox County, Kentucky.

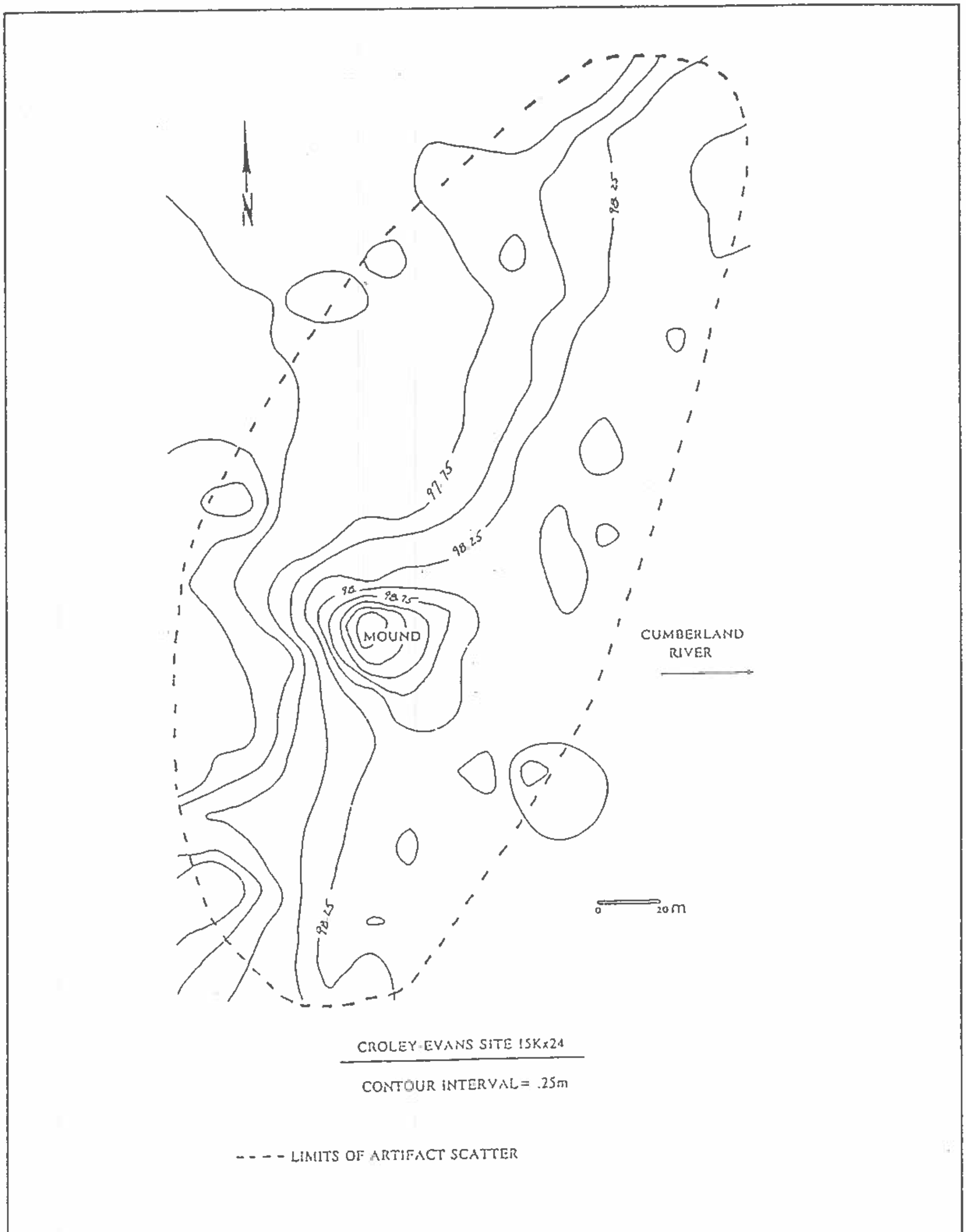

Figure 5. The Croley-Evans Site (15Kx24).

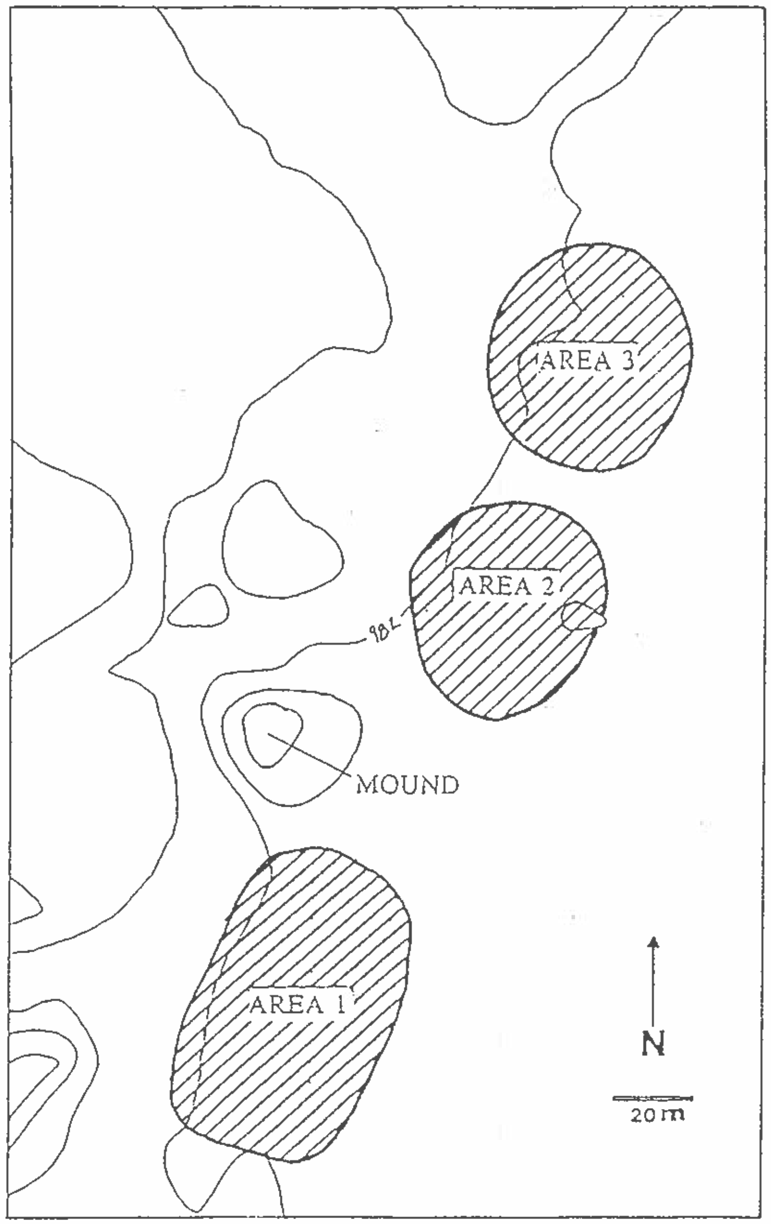

Figure 6. Approximate Locations of Surface Artifact Concentrations at the Croley-Evans Site.

Table 2. Croley-Evans Site Surface Artifacts.

	Provenience				
	General Surface	Area 1	Area 2	Area 3	Total
Flaked Stone					
Debitage	41	49	42	12	144
Biface	15		2	2	19
Utilized Flake	3		6		9
Ground Stone	1				1
Shell	3	2	9		14
Bone	25	30	12	2	69
Ceramic					
Shell Tempered					
Rim	23	5	1		29
Body					
Plain/Eroded	78	21	18	8	125
Cordmarked	23	17	17	3	60
Check Stamped	5				5
Handles	5				5
Grit Tempered Complicated Stamped		1			1
Steatite Vessel Fragment	1				1
Discoidal					
Sandstone	1				1
Ceramic	1				1
Hematite	2				2
Daub	3				3

density in Area 2 was somewhat lower than in Area 1, but the types of artifacts were very similar. Artifact density in Area 3 was substantially lower than in Areas 1 and 2, reflecting the overall trend of decreasing surface material from south to north across the site. Few artifacts were collected from the western portion of the site (west of the mound), possibly due to the lower elevation and wetter conditions in that area.

Ceramic material represented in the surface collection largely consisted of shell tempered sherds having cordmarked, plain, or eroded exteriors, with the combined plain/eroded category outnumbering the cordmarked sherds by a ratio of roughly 2:1 (Figure 7). Although virtually all sherds are shell tempered, some sherds also contain minor amounts of sandstone or other material mixed with the shell. The temporal significance of these mixed-temper sherds, if any, is unclear at this time. Most of the rim sherds represented in the surface collection are examples from flared rim jars having rounded lips and thick vessel walls. A small number of direct and incurvate rim forms also occur. Other rim sherds exhibit castellations associated with tongue-shaped and U-shaped lugs (Figure 8). Five shell tempered, check stamped sherds resembling Wolf Creek Check Stamped pottery (Weinland 1980) were collected, along with one quartz tempered, complicated stamped sherd resembling Pisgah Rectilinear Complicated Stamped (Dickens 1976:172-183) pottery from the Appalachian Summit area (Figure 8). In addition to body and rim sherds, several loop handles and miscellaneous appendages were also recovered. Although the ceramic material provides little useful chronological information, some of the attributes of the Croley-Evans Site shell tempered pottery are similar to attributes associated with Fort Ancient ceramics dating to pre-A.D. 1200. Unfortunately, an explanation for the similarity of Fort Ancient ceramic trends and those of Upper Cumberland Late Prehistoric ceramics is unclear at this time (Gwynn Henderson, personal communication 1993).

Based on the results of the Croley-Evans surface collection, it appears that the areas of most intensive Mississippian activity are situated in the higher eastern part of the site between the mound and the Cumberland River. The large size and excellent preservation of animal bone and sherds in this area suggest that recent plowing has disturbed the upper portions of previously intact cultural deposits.

As a means of exploring the character and distribution of subsurface cultural deposits, a series of screened shovel probes was excavated along transects oriented parallel to the Cumberland River (Figure 9). Because of the ground disturbance associated with testing, shovel probe locations had to be restricted to tractor paths that ran the full length of the site. Using this strategy, probes were excavated along seven transects spaced approximately 20 m apart. Shovel probes measuring 35 cm in diameter, and ranging from 50 to 111 cm deep, were spaced from 20 to 40 m apart along each transect. Shovel probes were excavated using a trowel and shovel and all soil matrix was screened through 6.25 mm (.25 in) mesh hardware cloth.

Analysis of the Croley-Evans shovel probe artifacts indicates that artifact frequency and density vary considerably across the site (Table 3). Probes encountering the thickest midden deposits, the highest frequency and density of sherds, and the highest frequency of flakes occurred in two parts of the site. The first area of deep midden, which generally coincides with the Area 1 surface artifact scatter, is located 20 to 50 m southwest of the mound and covers roughly a 3,000 m^2 area (60 x 50 m). Midden in this area ranged from 40 to 91 cm deep, including that portion contained in the ca 25 cm thick plowzone (Figure 10). Examination of shovel probe profiles revealed a dark midden matrix having a high organic content. Zones of charcoal and burned clay were observed in the walls of several probes, suggesting the possibility of burned structures or other kinds of features. Shovel probes yielded a variety of cultural material (Table 3), including burned and unburned bone, shell tempered cordmarked and plain pottery (Figure 11), chert debitage and tools, sandstone and daub. Shovel probe sherd densities in this part of the site ranged from approximately 200 to 800 sherds per m^3 of excavated soil. High frequencies of daub and bone also occurred in this area (Figure 12).

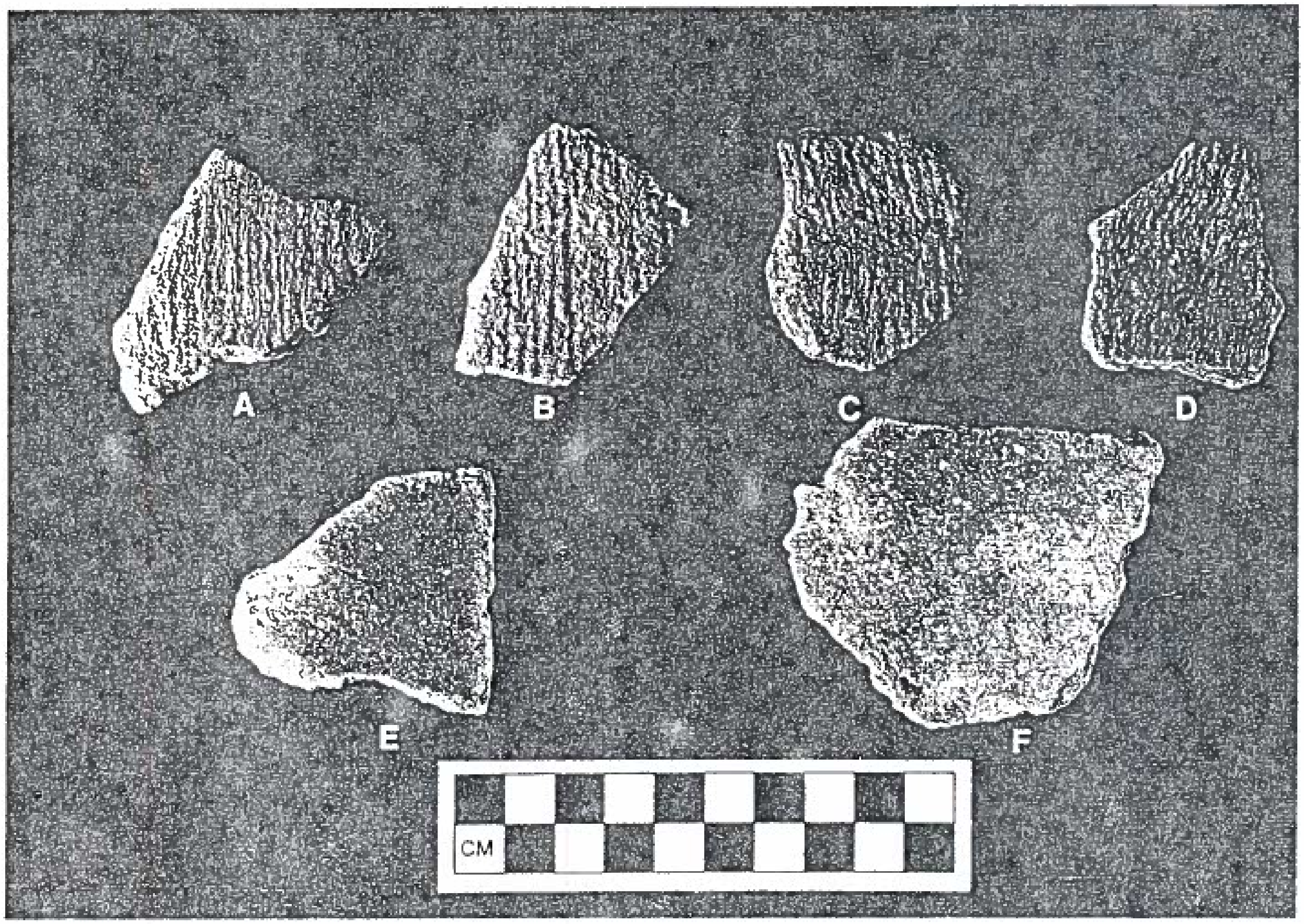

Figure 7. Croley-Evans Site Cordmarked and Plain Shell Tempered Sherds.

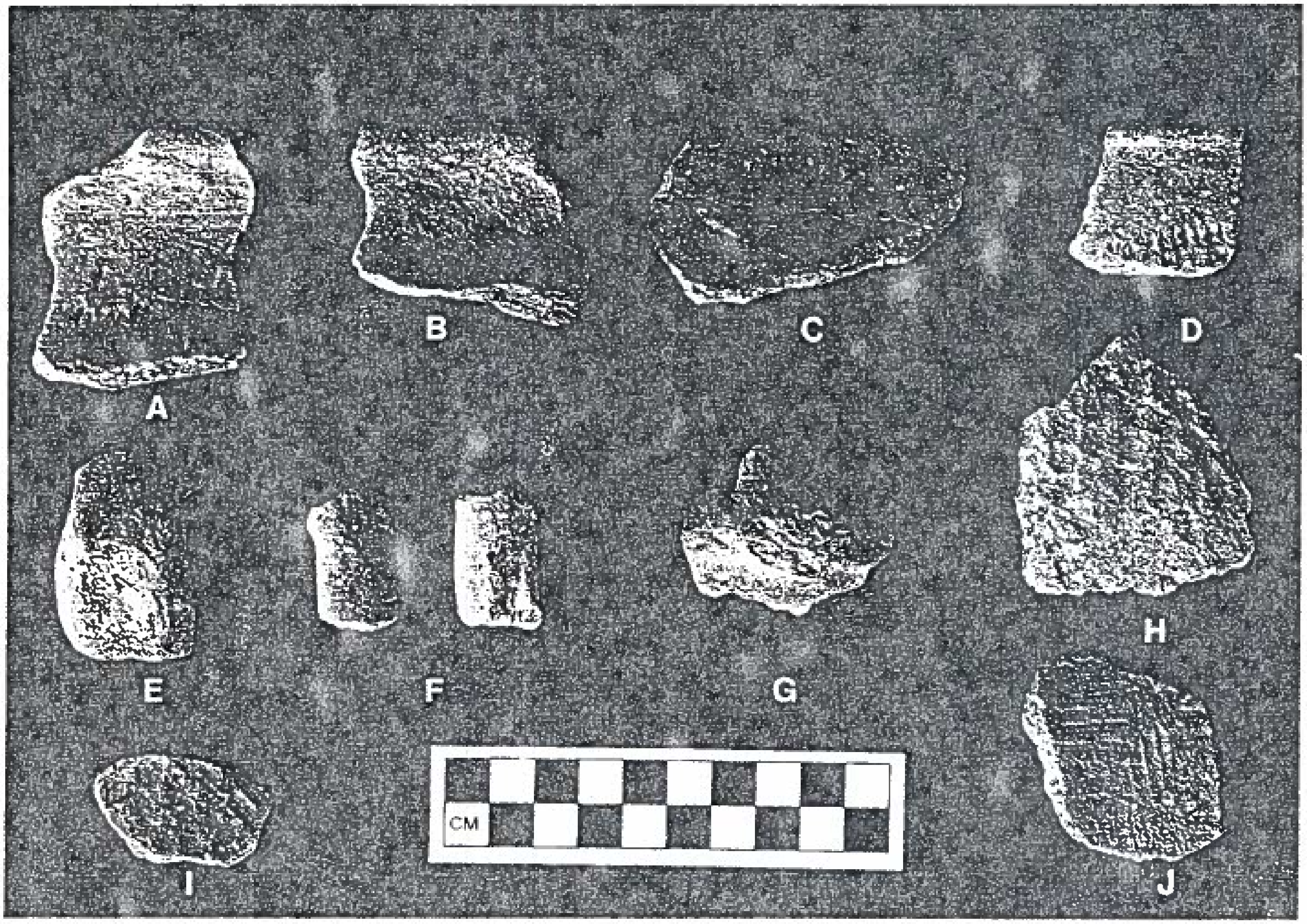

Figure 8. Miscellaneous Shell Tempered Body Sherds, Rims, and Appendages.

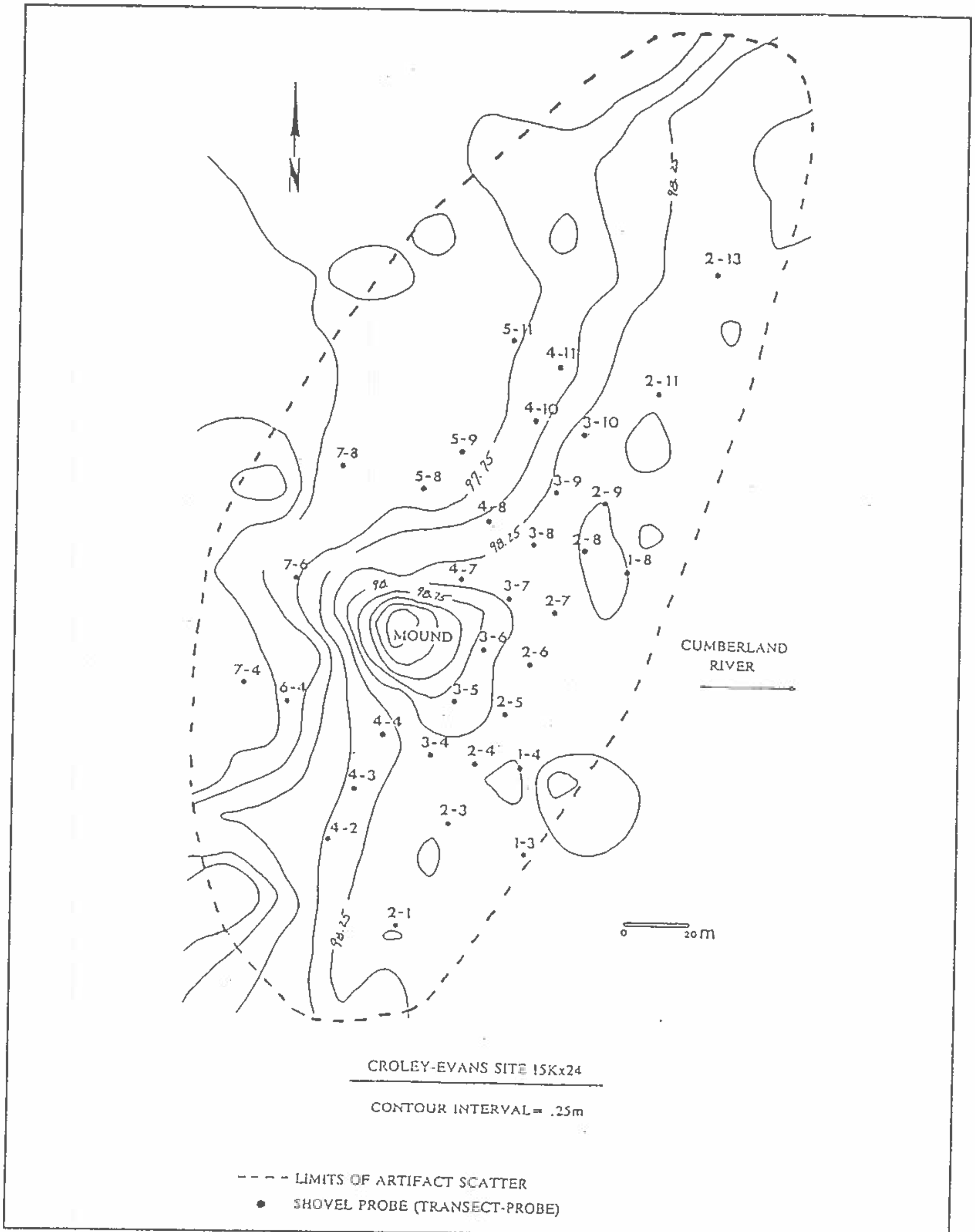

Figure 9. Location of Shovel Probe Holes.

Table 3. Croley-Evans Site Shovel Probe Data.

	Probe											
	1-4	**1-8**	**SB**	**2-1**	**2-3**	**2-4**	**2-5**	**2-6**	**2-7**	**2-8**	**2-9**	**2-11**
Depth (cm)	76	111	70	90	80	95	80	90	70	75	81	75
Volume (m³)	.073	.107	.067	.087	.077	.091	.077	.087	.067	.072	.078	.072
<u>Artifact Type</u>												
Sandstone	28	39	118	67	29	37	23	14	17	44	53	12
Flaked Stone												
Debitage	6	14	78	12	11	17	10			19	37	1
Uniface										1		
Biface		1		1						1		
Other		2										
Ground Stone			1							2		
Shell	2	4				3				5	2	
Bone	51	25	47		3	95	3			104	53	3
Ceramic												
Shell-Tempered												
Rim	2					2					3	
Body												
Plain/Eroded			10		2	4				11	1	1
Cordmarked			3			1	2			3	1	1
Sherdlets	24	24	39	5	13	39	4		3	36	30	2
Daub			7			7	1		3	1		

Table 3 (continued). **Croley-Evans Site Shovel Probe Data.**

	Probe											
	2-13	**3-4**	**3-5**	**3-6**	**3-7**	**3-8**	**3-9**	**3-10**	**4-2**	**4-3**	**4-4**	**4-7**
Depth (cm)	60	135	90	95	80	80	72	70	68	69	65	65
Volume (m³)	.058	.130	.087	.091	.077	.077	.069	.067	.065	.066	.062	.062
Artifact Type												
Sandstone		62	41	27	6	20	45	69	62	51	47	34
Flaked Stone												
Debitage	21	13	6	4	19	9	9	5	5	19	12	
Uniface												
Biface						1				1	1	
Other												
Ground Stone		1										
Shell												
Bone		73	22			24	14			1	7	14
Ceramic												
Shell Tempered												
Rim		1					2				1	1
Body												
Plain/Eroded		8					2					
Cordmarked	1											
Sherdlets		32	31		2	7	19	8	3	2	23	5
Daub		18	12			4	5				2	3

Table 3 (continued). Croley-Evans Site Shovel Probe Data.

	Probe											
	4-8	**4-10**	**4-11**	**5-3**	**5-9**	**5-11**	**5-13**	**6-4**	**6-8**	**7-4**	**7-6**	**7-8**
Depth (cm)	50	71	65	51	70	60	50	123	100	80	63	80
Volume (m^3)	.048	.068	.063	.049	.067	.058	.048	.118	.096	.077	.061	.077
<u>**Artifact Type**</u>												
Sandstone	42	9	12	4	22	4		3	4		5	
Flaked Stone												
Debitage	9		4	1	2				1	1	1	
Uniface												
Biface												
Other												
Ground Stone												
Shell												
Bone	3				1							
Ceramic												
Shell Tempered												
Rim												
Body												
Plain/Eroded	1				1							
Cordmarked					1							
Sherdlets	8	1	1		12							
Daub	5											

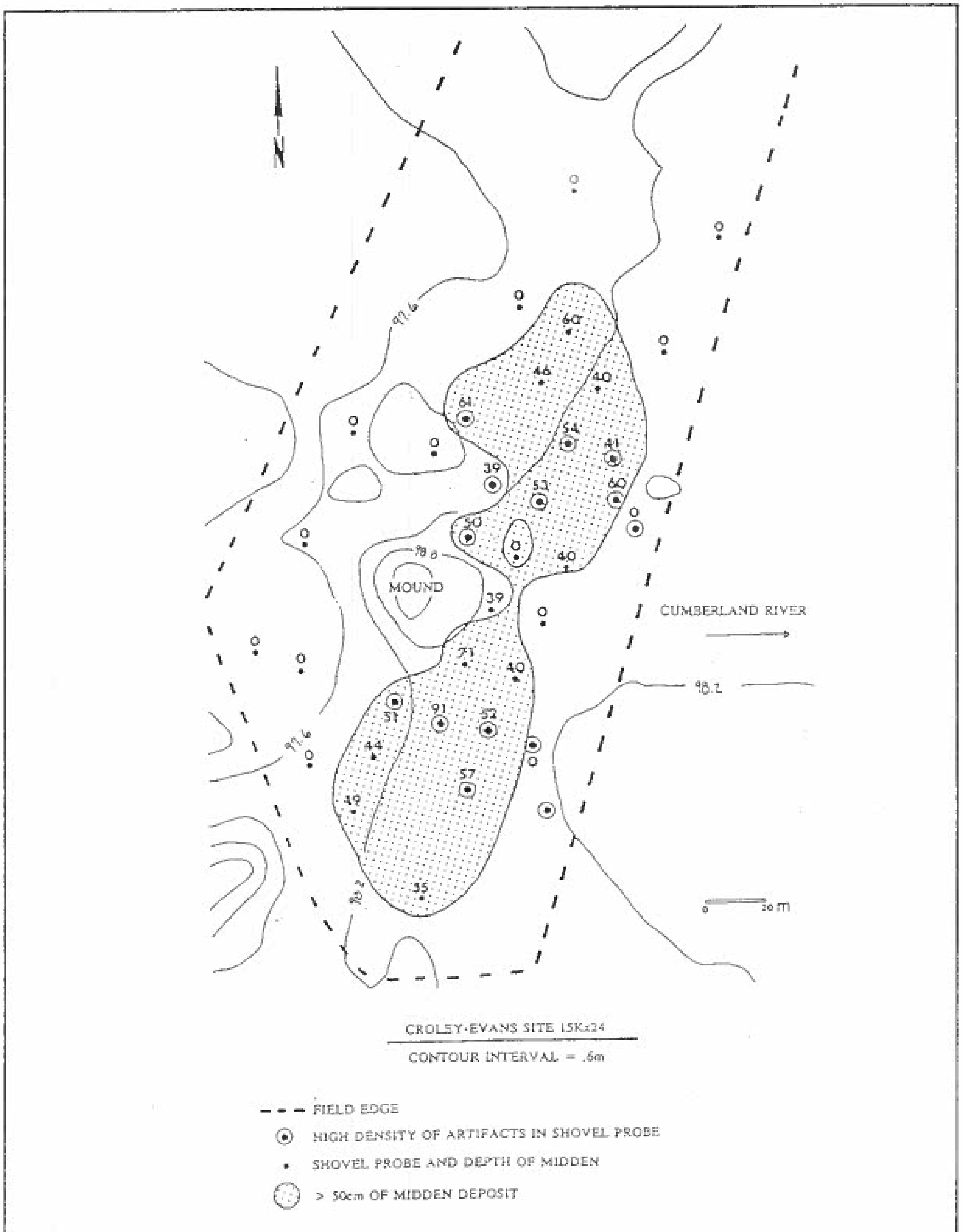

Figure 10. Location of Midden Deposits Exceeding 50 cm in Depth.

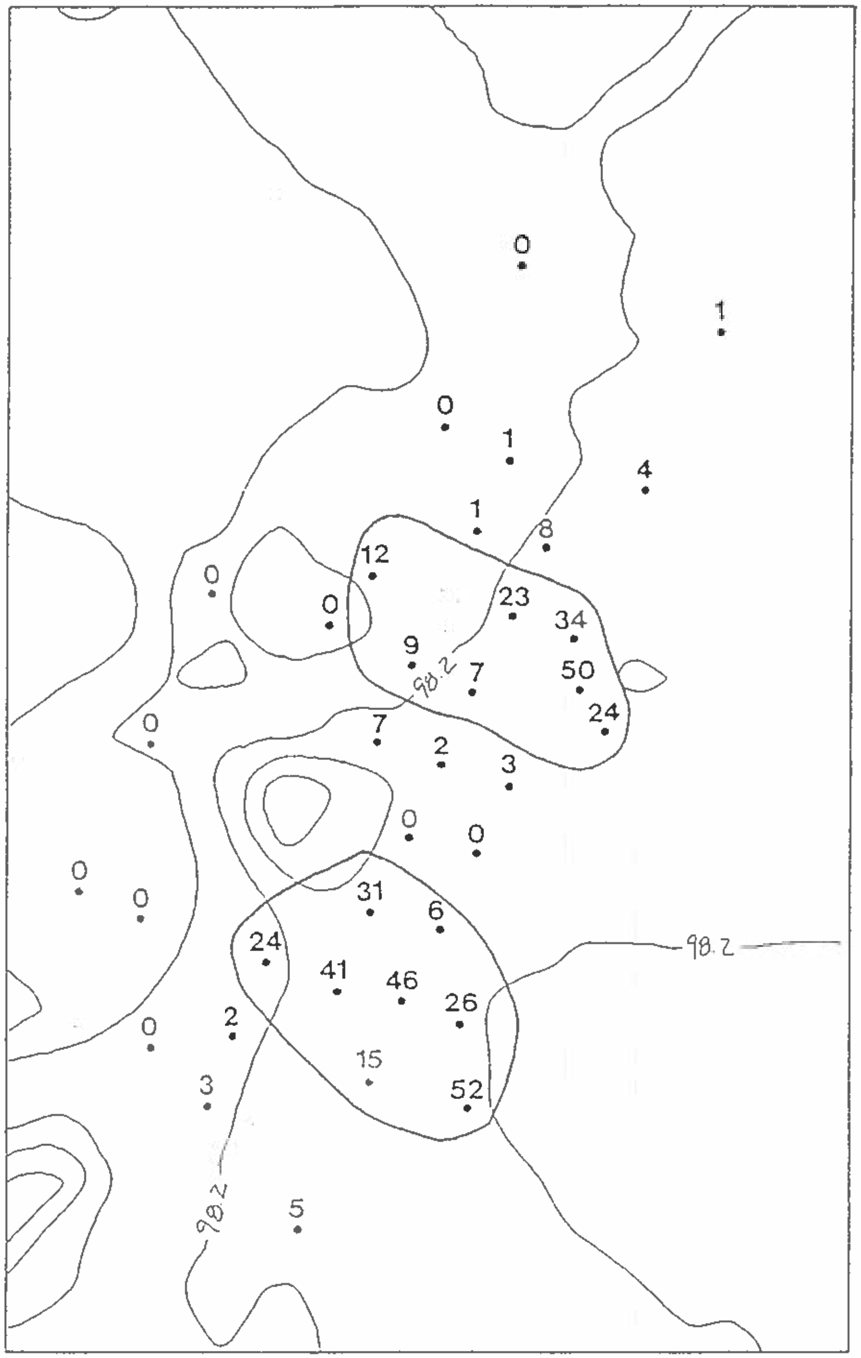

Figure 11. Frequency of Shell Tempered Pottery from Shovel Probes.

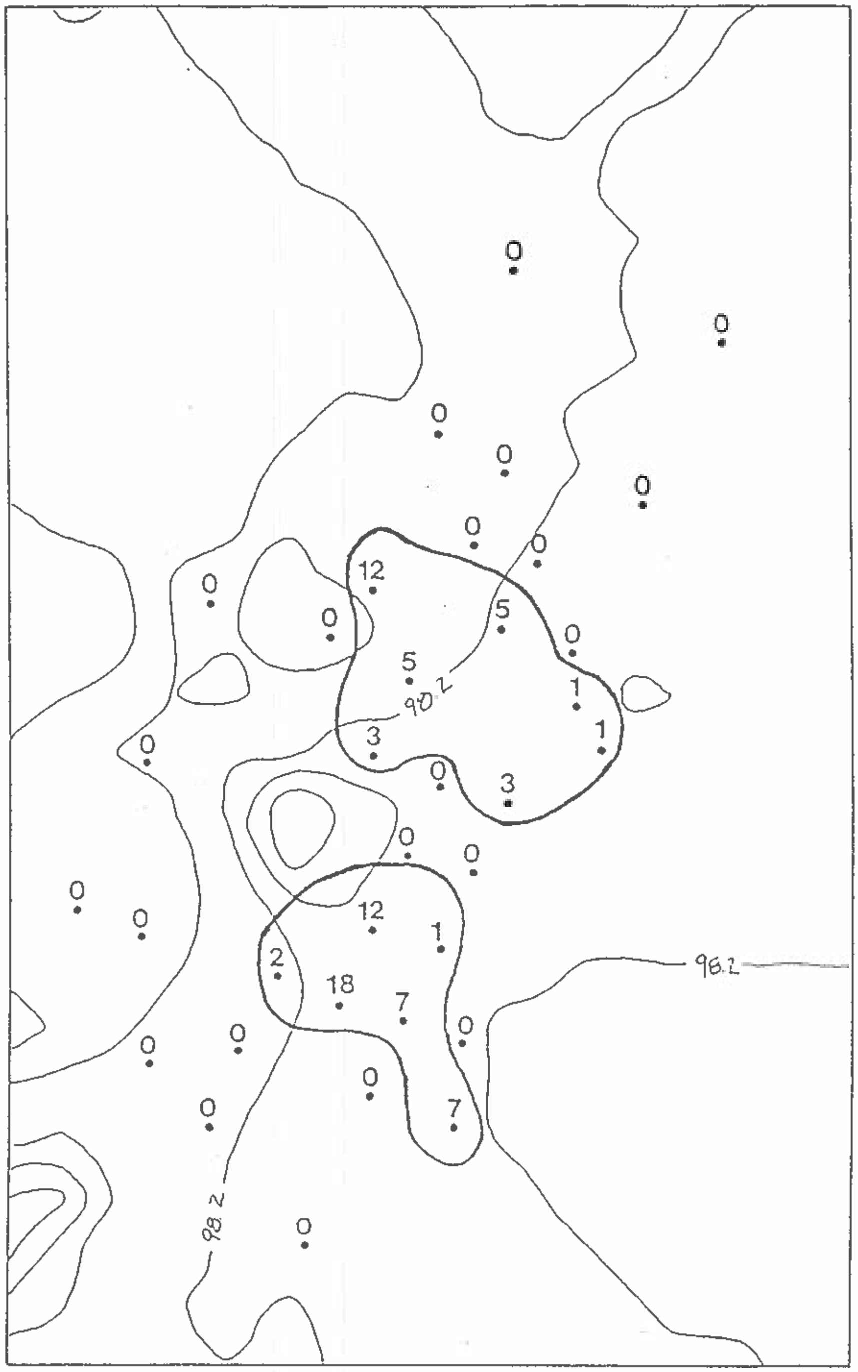

Figure 12. Frequency of Daub from Shovel Probes.

The second part of the site containing substantial subsurface cultural deposits is located 20 to 60 m northeast of the mound, between the mound and the river (Figure 10). This area generally coincides with Area 2, as defined by the distribution of surface material, and appears to be about the same size as the area to the southeast of the mound. Midden deposits extend as deep as 61 cm below surface in this part of the site (Figure 10). Although the density of surface material was lower in Area 2 than in Area 1, the density of subsurface artifacts seems to be generally comparable to that found to the southeast of the mound. For example, sherd densities ranged from 100 to 700 sherds per m^3 in the northeastern area. Examination of shovel probe profiles revealed zones of burned clay and charcoal, presenting the possibility of burned structures. The presence of daub from this part of the site also suggests the possibility of burned structural remains (Figure 12).

Shovel probes placed to the west of the mound generally yielded few artifacts, reflecting the low number of surface artifacts. The soil was very compact and had a low organic content and a high silt content, clearly differentiating it from soils to the east of the mound. An interview with the landowner revealed that this part of the site commonly floods when the Cumberland River is high, possibly contributing to differences in the soil profiles and artifact contents (Glen Croley, personal communication 1992). If this wet condition existed prehistorically, it would have made this portion of the site less suitable for habitation than the higher eastern part. Soil profiles also suggest that some of the sediments found west of the mound had washed down slope from the slightly higher, eastern part of the site. A comprehensive geomorphological analysis is needed to fully understand the nature of the site formation processes.

In addition to the habitation area, the Croley-Evans Site also contains a platform mound associated with the Mississippian occupation (Figure 9). Although the mound has been extensively disturbed by pothunters, limited soil coring revealed alternating layers of charcoal and clay, suggesting that parts of the mound structure are still intact. More extensive excavation is needed to better assess the mound's age and construction history.

In summary, the 1992 investigations at the Croley-Evans Site identified extensive areas of intact cultural deposits containing cultural and environmental information. This site has the potential to yield important new insights concerning the nature of Mississippian cultural development in the Upper Cumberland River area.

SITE 15Kx25

The second site tested during the 1992 field season was 15Kx25. This site is situated along the crest and back slope of a terrace that rises 4 to 5 m above the Cumberland River floodplain (Figures 4 and 13). Previous investigations at this site in 1980 yielded triangular projectile points, shell tempered plain and cordmarked pottery, celt fragments, and animal bone, along with chert debitage and sandstone (Hockensmith 1980). Site 15Kx25 provided an opportunity to examine an Upper Cumberland Mississippian site having a less intensive occupational history than the Croley-Evans Site.

The 1992 field investigations consisted of conducting a controlled surface collection, excavating a series of shovel probes along transects crosscutting accessible parts of the site, and mapping the site. Ground cover at 15Kx25 included both agricultural crops (corn and tobacco) and pasture. Due to the height and density of the corn crop and the thick pasture grass, the surface collection was restricted to the portion of the site planted in tobacco. The tobacco bed covered approximately one-half of the site, extending 125 m to the northwest from the top of the terrace to the base of the back slope.

As at the Croley-Evans Site, the surface collection employed a transect survey strategy that involved collecting artifacts from alternate rows in the tobacco field. Collected artifacts largely consisted of chert debitage and projectile points, including three small Mississippian triangular points (Table 4).

Table 4. Surface Artifacts from Site 15Kx25.

Flaked Stone	
Debitage	166
Biface	16 (3 Mississippian Triangular Points)

Table 5. Albert Bennett Site Surface Artifacts

Flaked Stone	
Debitage	141
Biface	16 (4 Mississippian Triangular Points)
Ground Stone	
Discoidal	1
Pitted Cobble	1
Ceramic	
Shell Tempered	
Body	
Plain/Eroded	4
Grit Tempered	
Plain/Eroded	16
Cordmarked	4
Historic	
22 ca. bullet	1
die	1

Following the completion of the surface collection, a series of 16 shovel probes was excavated along four northwest-southeast oriented transects to determine if intact cultural deposits existed (Figure 13). Shovel probes were place 20 m apart and ranged from 30 to 58 cm deep. In contrast to the Croley-Evans Site shovel probes, the probes excavated at 15Kx25 revealed little in the way of cultural deposits or artifacts. Scattered pieces of sandstone and a few chert flakes were recovered from the shovel probes, but artifact frequency was surprisingly low, considering the number of artifacts found on the surface. Soil profiles were characterized by a 25 cm thick plowzone overlying a yellow or orange clay subsoil. Stains suggesting postmolds were encountered in a couple of the probes, but larger scale excavations will be required to determine if they are prehistoric cultural features.

In retrospect, the subsurface characteristics of site 15Kx25 are consistent with what would be expected for a short-term occupation, such as a farmstead. This site has the potential to provide information on Mississippian adaptation if a sufficient area is excavated to reveal structure(s) and associated features. More field work will be required to determine the appropriate location for these excavations.

ALBERT BENNETT SITE (15Kx36)

The third site tested in 1992 was the Albert Bennett Site, located on the east side of the Cumberland River approximately 4 km upstream from the Croley-Evans Site (Figures 4 and 14). Previous archaeological investigations indicated that the Bennett Site, which extends more than 300 m along a floodplain ridge, contains prehistoric components dating from the Paleoindian through the Mississippi periods (OSA Site Form).

As with the first two sites, the Bennett Site was investigated using a controlled surface collection in combination with the excavation of systematically placed shovel probes. At the time of the survey in early June, the northern part of the site was in pasture, but the southern part had been recently cultivated and planted in corn, providing excellent ground surface visibility. Previous survey of the site indicated that a high artifact density occurred on the southern one-half of the site (OSA site file for Knox County). Surface collection transects were spaced approximately 2 m apart and all artifacts observed along those transects were collected.

The surface collection yielded a variety of Mississippian artifacts, including small triangular projectile points, a fragment of a large chunky stone, and several pieces of shell tempered pottery (Table 5; Figure 15). The highest density of cultural material came from the ridge crest and the back slope of the north-south oriented ridge on which the site is situated. In the two months between the completion of the surface collection and initiation of shovel probe excavations, the corn on the southern one-half of the site grew to a height of 2 to 3 m, creating a virtually impenetrable jungle. Because of the thick vegetation, shovel probing in this part of the site was impossible. Sixteen shovel probes, measuring 35 cm in diameter and from 40 to 62 cm deep, were placed along transects crossing the northern one-half of the site that was in pasture (Figure 14). In several cases, a soil corer was used to investigate soil characteristics below the base of the probes, extending their depth to in excess of one meter. Examination of the shovel probe contents and profiles revealed that at least 10 probes encountered midden. In one case, a probe (Probe 16) intersected a feature consisting of a large concentration of sandstone and charcoal. Probes containing the thickest midden deposits and the most artifacts were located along the ridge crest, as well as on the east-facing slope. Artifacts recovered from shovel probes included grit tempered pottery, chert flakes, and projectile points, as well as sandstone and fire-cracked rock (Table 6).

Unfortunately, despite the presence of Mississippian artifacts on the surface, shovel probing provided no indication of a Mississippian component at the Bennett Site. A likely explanation for this is that Mississippian activity largely took place in the southern part of the site where shovel probing could not be done. Future plans call for returning to the Bennett Site as soon as possible to place additional shovel probes in the southern part of the site.

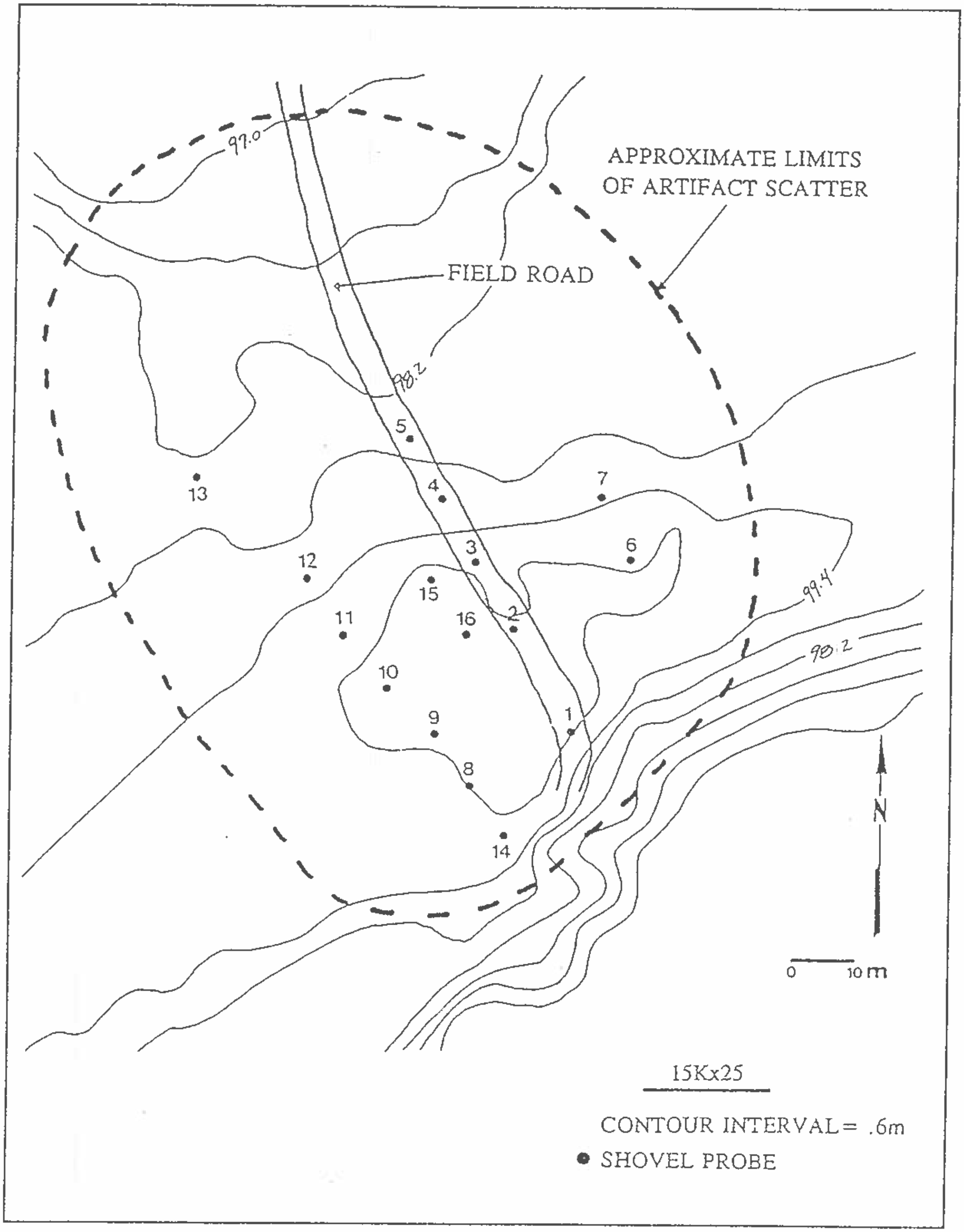

Figure 13. Location of Shovel Probes 1 - 16 at Site 15Kx25.

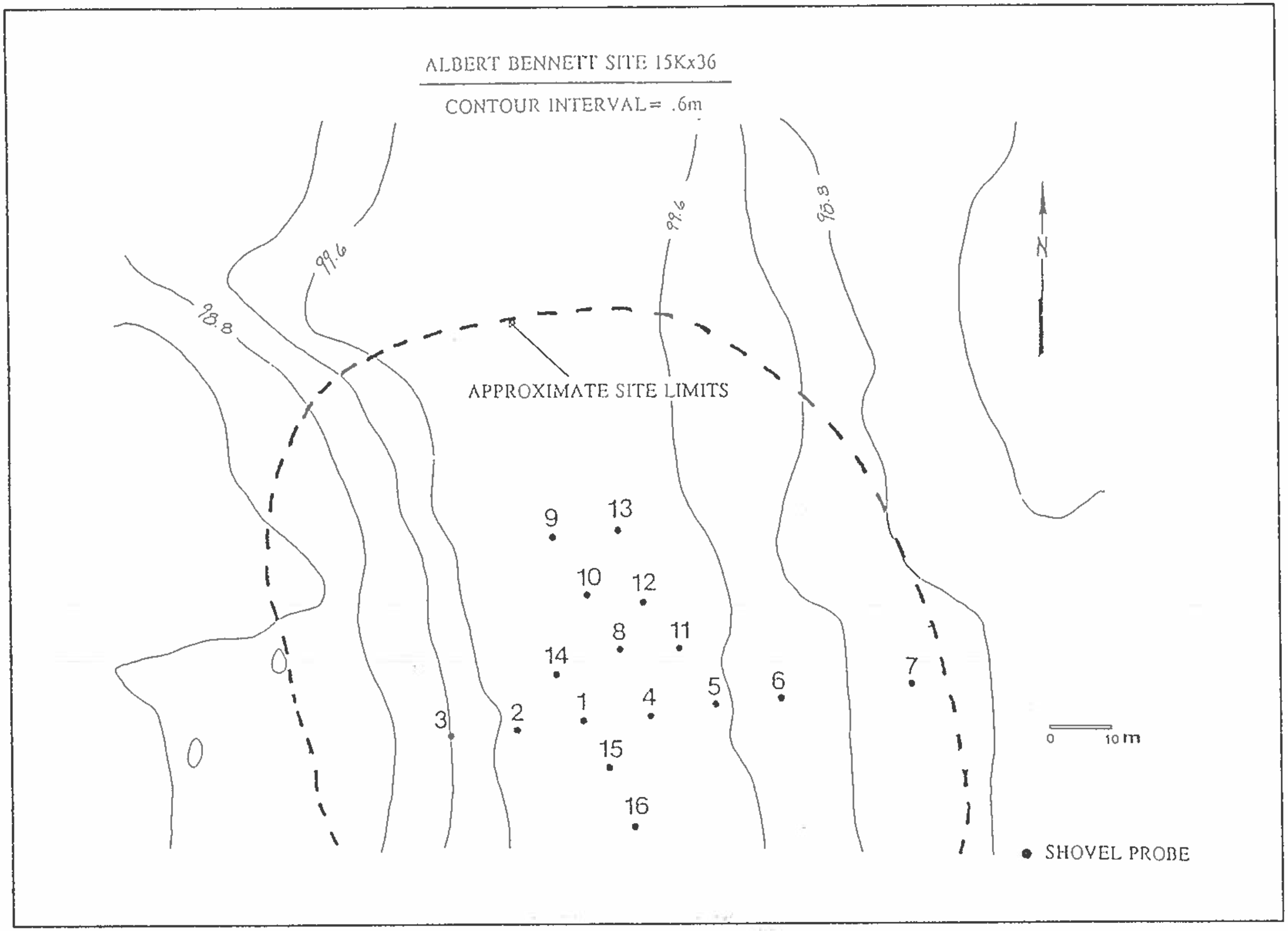

Figure 14. Location of Shovel Probes 1 - 16 in Western Portion of Albert Bennett Site (15Kx36).

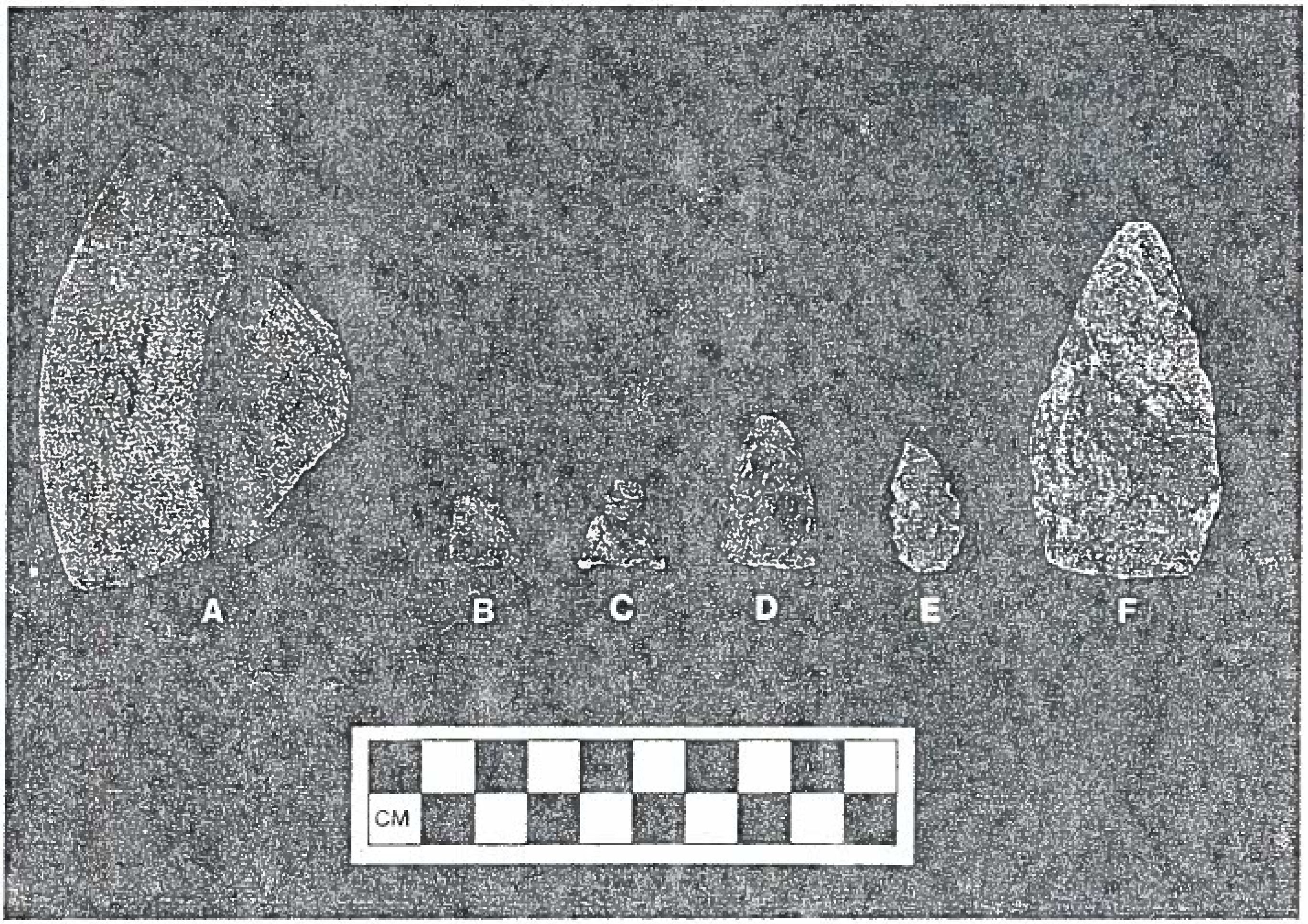

Figure 15. Surface Artifacts from the Albert Bennett Site.

Table 6. Albert Bennett Site Shovel Probe Data.

	Probe											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Depth (cm)	60	50	53	62	66	70	50	52	40	40	55	55
Volume (m^3)	.057	.048	.051	.060	.063	.067	.048	.050	.038	.038	.053	.053
<u>Artifact Type</u>												
Sandstone	96	108	84	74	43	59	45	120	157	56	31	64
Flaked Stone												
Debitage	1	4	3	5	4	6		7	2	5		1
Biface									2			
Ground Stone									1		1	
Ceramic												
Shell-Tempered												
Rim												
Body												
Plain/Eroded								1				
Cordmarked												
Grit-Tempered												
Rim												
Body												
Plain/Eroded												
Cordmarked			1					1				2
Limestone												
Rim												
Body												
Plain/Eroded					1							
Cordmarked												
Sherdlets	2	7		1	4				2			2

Table 6 (continued). Albert Bennett Site Shovel Probe Data.

	Probe			
	13	**14**	**15**	**16**
Depth (cm)	30	45	40	50
Volume (m^3)	.029	.043	.038	.048
<u>Artifact Type</u>				
Sandstone	20	12	22	73
Flaked Stone				
Debitage	1	2		3
Biface				
Ground Stone				
Ceramic				
Shell-Tempered				
Rim				
Body				
Plain/Eroded				
Cordmarked				
Grit-Tempered				
Rim				
Body				
Plain/Eroded		1		
Cordmarked				1
Limestone-Tempered				
Rim				
Body				
Plain/Eroded				
Cordmarked				
Sherdlets	1			

SUMMARY AND CONCLUSIONS

The 1992 field investigations further clarified the nature of Mississippian settlement in the Upper Cumberland region by better documenting the number, location, and types of Mississippian sites in the Knox-Whitley county area. Survey of floodplain localities revealed a variety of Mississippian site types. These sites ranged in size and complexity from small, apparently limited activity sites to large, intensively occupied sites that served as residential areas and local or regional ceremonial centers. Since the 1992 survey efforts were able to investigate only a small portion of the Cumberland River floodplain, many other Mississippian floodplain sites are likely to be present in the project area. In addition, other types of Mississippian sites are represented in the upland portions of the Cumberland River drainage for which little information is currently available.

Test excavations conducted at the Croley-Evans Site, the Albert Bennett Site, and site 15Kx25 indicate that some of the Upper Cumberland River Mississippian sites have a high potential for providing information on how Mississippian groups adapted to the region's social and physical environment. The Croley-Evans Site has a particularly high potential for yielding data on Mississippian chronology, subsistence practices, community organization, technology, and trade and interaction with contemporary Late Prehistoric groups that lived in the surrounding regions.

Based on the results of the 1992 field investigations, plans were formulated to conduct excavations at the Croley-Evans and Albert Bennett sites in 1993. Ultimately, the continuation of this long-term research program will further clarify Mississippian adaptation in the Upper Cumberland drainage. Information from the Upper Cumberland River Archaeological Project can then be compared with that from other regions around the Southeast and the Midwest, providing new insights into the cultural processes and adaptive responses that led to the development of Late Prehistoric Mississippian and Fort Ancient societies in the eastern United States.

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NEW FIELD: AN EARLY MADISONVILLE HORIZON SITE IN BOURBON COUNTY, KENTUCKY

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ABSTRACT

The New Field Site contains the remains of an early Madisonville Horizon village that was occupied sometime during A.D. 1450-1550. Materials recovered during research at the site in the late 1970s and early 1990s include a high percentage of decorated Madisonville Plain ceramics; type 5, 6, and 7 Fine Triangular projectile points; a shell gorget engraved with a unique zoomorphic motif; and excellent preservation of subsistence remains. The distribution of features, structures, and graves at New Field suggests that the village consisted of several residential areas arranged around an open area or plaza.

INTRODUCTION

The New Field Site (15BB45) is located in northcentral Bourbon County about 3 km north-northwest of Paris, Kentucky in the Inner Bluegrass Section of the Bluegrass Physiographic Region (McFarlan 1961). It is situated in a bend of Stoner Creek, a tributary of the South Fork of the Licking River. The steep banks of Stoner Creek form the site's western and northern boundaries, while an unnamed permanent stream bounds the site on the east. A freshwater spring is situated southeast of the site. Prehistoric materials are scattered across about 16 ha of an undulating sinkhole-dotted terrace and adjacent floodplain, which range in elevation from 235 to 238 m above mean sea level. The area of densest surface materials covers an approximately 8 ha area on the terrace.

The site was recorded in 1977 by Wayne Estes, Charles D. Hockensmith, and Christopher A. Turnbow, who systematically collected the cultivated terrace fields. They determined that the site contained a major Fort Ancient component and a minor Archaic component (Bourbon County File: OSA Site Survey Form), with most of the Fort Ancient materials documented on the southern part of the terrace. In 1978, Estes returned to the site and made a limited, opportunistic surface collection of the terrace and floodplain. After this visit, the landowner placed the New Field Site locale in pasture.

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[1] with contributions by Emanuel Breitburg, Denise M. Lacy, Jack Rossen, William D. Updike, and Jo Ann Wilson

The locale remained in pasture until 1991, when it was plowed again. Over the course of one weekend, Estes, Nancy O'Malley, Phil Harlin, Terry Tune, and David Pollack identified the locations of and made surface collections from 20 "feature areas" and one grave in three of four plowed fields on the terrace. The "feature areas" (pits, house basins, or graves) consisted of dark soil associated with artifacts, charcoal, and limestone slabs; fire-cracked rock and charcoal concentrations; and an area of burned soil.

The information collected in 1991 corroborated the information collected in the late 1970s. The Fort Ancient artifacts were restricted mainly to about 5 ha located in the center and southern section of the terrace, and a single grave was documented near the general location of graves noted in 1978. Few Fort Ancient artifacts were identified in the northern part of the terrace or on the floodplain. Here, surface materials appeared to represent the Archaic period component. Other diagnostic projectile points recovered from the site indicated that a minor Woodland component also may have been located on the terrace. Despite the limited nature of the 1977, 1978, and 1991 investigations, characteristics of the Fort Ancient material culture assemblage (i.e., a high percentage of decorated ceramics, strap handles, bowls with notched rim strips, and Type 5 and 6 Fine Triangular projectile points) and the presence of "feature areas" on the terrace suggested that the site contained the remains of an early Madisonville horizon (A.D. 1400-1550) village (Henderson et al. 1992: 267-270; Turnbow 1988a).

Other Madisonville horizon sites located in the Inner Bluegrass region include Buckner Village 2 (Turnbow 1988a:280-293) and Larkin (Pollack et al. 1987) in Bourbon County; Johnson in Scott County (Hockensmith 1984); and Capitol View in Franklin County (Henderson 1992). Of these, Buckner and Larkin are closest physically to New Field. Buckner Village 2 is an early Madisonville horizon site, located about 17 km upstream from New Field. It consists of a circular village surrounding a central plaza. The authors' re-examination of the 1938 Buckner ceramic collection confirms Turnbow's (1988b:167-176) observation that it contains a large amount of check-stamped ceramics. Pans and bowls also are well-represented, and the collection also contains a few bottles and negative painted sherds (examination by Henderson and Pollack of 1938 WPA collections). Larkin is a large, late Madisonville horizon village located about 4 km downstream from New Field. It consists of a series of cemeteries and associated residential areas (Pollack et al. 1987). Jars, bowls, and pans make up the ceramic assemblage from this site, with decoration on jars confined mainly to notching on lips.

With respect to Johnson and Capitol View, the former clearly contains a Madisonville horizon component, although most of the diagnostic ceramics were recovered from the surface and little is known about the internal organization of the post-A.D. 1400 occupation of this site (Hockensmith 1984). The recently investigated Capitol View Site on the western edge of the Inner Bluegrass represents a very early Madisonville horizon community occupied by no more than eight or nine households for probably less than ten years (Henderson 1992). This community contains several clusters of houses, pits, and graves arranged in a "C" around a central plaza. Ceramics consist mainly of jars, many of which are decorated with incising along the neck.

In order to learn more about New Field and early Madisonville horizon community organization in the Bluegrass, additional research was initiated at the site in April 1992. These investigations focused on collecting information to confirm the age of the site's Fort Ancient occupation, to identify the village plan, and to document the subsistence practices of the village inhabitants. Archaeologists from the University of Kentucky's Program for Cultural Resource Assessment spent four days at New Field, aided by William S. Webb Archaeological Society volunteers. These investigations were supported in part by a Federal Survey and Planning Grant and a State of Kentucky Research Grant, both of which were administered by the Kentucky Heritage Council.

The 1992 research was carried out in two phases. The first phase consisted of a systematic controlled surface collection of the southern section of the terrace where previous work had shown Fort Ancient materials were concentrated. Participants flagged isolated artifacts, dark soil areas, an area of burned soil, and concentrations of flat limestone rocks considered to be potential grave locations. (Most of the flagged areas corresponded to the "feature areas" identified in 1991.) Diameters were estimated for smaller dark soil areas, and length/width measurements were taken for large amorphous areas of dark soil and the burned area. A split spoon soil core was used to estimate the thickness of intact subplowzone deposits. Dark soil stains considered to represent features were assigned feature numbers, and all surface artifacts associated with these features were collected.

Concentrations of human bone exposed on the surface were recorded as graves, regardless of whether limestone slabs or dark soil stains were present. These concentrations were collected and assigned feature numbers. Limestone rock concentrations, represented by slabs of limestone but lacking bone or dark soil stains, were considered potential grave locales but were not recorded as such. No graves were excavated.

During the second phase of research, five features (1-92, 2-92, 21-92, 28-92, and 32-92) were partially excavated. These features, located in different sections of the site, were selected based on their potential to contain diagnostic artifacts and subsistence remains. After soil coring determined the general boundaries of the feature, a 1 x 1 m unit was placed over it, oriented in such a way as to encounter the feature's edge. Both plowzone and feature matrix were screened through 6.35 mm mesh hardware cloth. No unit was expanded to encompass the entire feature. Flotation samples were collected from each feature. When excavation was completed, profile drawings were made and photographs were taken. The units then were backfilled.

This paper describes the results of the 1992 field investigations at New Field as well as the materials collected during all four seasons of research at the site. It is organized as follows. Descriptions of the materials recovered are presented first, followed by a summary of the human remains recovered from the site. Next, the radiocarbon dates are presented and evaluated, followed by a discussion of the results of the 1992 investigations. Finally, through an examination of the spatial distribution of features, structures, and graves, the organization of this Fort Ancient village is characterized.

MATERIALS RECOVERED

This section presents descriptions of the New Field Fort Ancient artifact assemblage recovered as a result of all investigations at the site: the 1977 systematic survey; the 1978 opportunistic survey; the 1991 general survey; and the 1992 survey and limited excavations. Temporal affiliation was assigned to non-diagnostic artifacts on the basis of morphology and/or provenience (i.e., their recovery from excavated features). Materials that could not be attributed to the Fort Ancient occupation, due either to their salient characteristics or their equivocal provenience, are only briefly describe here.

CERAMICS AND OTHER BAKED CLAY OBJECTS[2]

A total of 3,518 ceramic and other baked clay objects were recovered from the New Field Site. The assemblage consists of fragments of ceramic vessels; other baked clay objects, such as beads, pipe fragments, and discs; and fired clay fragments. Body sherds less than 4 cm^2 and fired clay fragments were not analyzed in detail. The former were simply counted (n=3,002), while the latter were weighed (n=643.8 g). All rims and decorated body sherds regardless of size, body sherds greater than 4 cm^2, and all modified sherds and non-vessel

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[2] The discussion of Ceramics and Other Baked Clay Objects was authored by Denise M. Lacy, University of Kentucky, Lexington, Kentucky

baked clay objects were analyzed. This resulted in information being collected on a total of 14.7% of the assemblage or 516 specimens (492 vessel fragments and 24 modified sherds and non-vessel baked clay objects). Analytical methods generally followed those outlined by Turnbow and Henderson (1992b:295-300).

Only five analyzed sherds (four cordmarked body sherds and one cordmarked rim) are limestone tempered. They were assigned to the site's Woodland component on the basis of their morphology and context of recovery (i.e., from the zone of brown silty clay loam below the stratified Fort Ancient deposits in Feature 28-92). The remaining vessel fragments (n=487) are tempered with shell. These specimens, as well as the modified sherds and non-vessel baked clay objects, were assigned to the site's Fort Ancient component. Exterior surface treatment could not be determined for six shell tempered specimens. The remaining sherds (n=481) were assigned to the Madisonville Plain and Madisonville Cordmarked ceramic types and are described below.

Madisonville Plain and Madisonville Cordmarked

All of the Madisonville series ceramics from New Field are tempered with fragments of crushed mussel shell. The paste of 4.4% of these specimens contains large quantities of hematite inclusions and very little shell temper. This suggests that the hematite may have functioned as temper in these specimens.

Most of the Madisonville series ceramics from New Field have a plain matte finish, but a few are well-smoothed. About one-quarter have cordmarked exterior surfaces (Table 1). The cordmarked type includes specimens with clearly defined cordage impressions; varying degrees of smoothed-over impressions; and areas of cord impressions and plain surfaces that represent sections of jars with plain necks and cordmarked bodies (Figure 1, 2a). For 74 cordmarked sherds, cord impressions were clear enough to discern twist: 98.6% (n=73) had been marked with S-twist cord, while only 1.4% (n=1) had been marked with Z-twist cord. The Madisonville series ceramics from the site range in thickness from 2.7 to 10.5 mm, with a mean of 5.7 mm.

Nearly all of the rims have plain exterior surfaces. The one cordmarked jar rim has a cordmarked body and a smoothed-over cordmarked neck. Most of the rims are slightly outflaring to outflaring (Figure 4), have rounded or pointed lips, and represent portions of jars (Table 1). Two direct and four slightly outflaring rims are portions of bowls (Figure 4i-j), and two rims are portions of pinchpots (classified as McAfee series ceramics in Henderson 1992, Turnbow 1988b, and Turnbow and Henderson 1992b). Jar orifice diameter ranges from 4 to 32 cm, with a mean of 26.1 cm. Bowl orifice diameter ranges from 4 to 28 cm, with a mean of 20.7 cm. Orifice diameter could not be determined for the two pinchpot rims.

Appendages include strap handles, rim strips, and small lugs (Figure 1, 3, 4, 5b-c). Handles are parallel-sided (n=3) or triangular (convergent-sided) (n=2) straps that have a mean thickness to width ratio of 4.38 cm. Rim strips are plain (n=3) or notched (n=2) and range in thickness from 5 to 13.6 mm, with a mean of 7.62 mm. The notched rim strips are associated with bowl rims (Figure 4i-j), while the plain rim strips are associated with jar rims. Of the two lugs, one is plain (Figure 5c) and one resembles a face (Figure 4d, 5b).

Decoration is present on almost a quarter of the assemblage (Table 1). It consists primarily of incising on vessel necks (Figure 1 and 2), and notching or punctation on vessel lips (Figure 3c-d). Incised lines range from narrow/deep impressions that may have been made with a pointed tool such as a small stick, to wide/shallow lines that appear as if an individual used a finger to form the design. Most of the incised lines represent portions of rectilinear motifs, but sherds with portions of curvilinear and recti-curvilinear designs are present as well (Table 1). The most common motif in the assemblage is a rectilinear guilloche.

Table 1. Characteristics of Madisonville Series Rims, Decorated Sherds, and Appendages.

	Madisonville Plain (n=375) Freq	Percent	Madisonville Cordmarked (n=106) Freq	Percent	Total (n=481) Freq	Percent
Rim Orientation						
Direct	2	2.9			2	2.9
Slight Outflaring	51	73.9			51	72.9
Outflaring	16	23.2	1	100.0	17	24.3
Total	69	100.0	1	100.0	70	100.1
Lip Shape						
Rounded	80	61.5	1	100.0	81	61.8
Pointed	37	28.5			37	28.2
Flat	10	7.7			10	7.6
Notched	3	2.3			3	2.3
Total	130	100.0	1	100.0	131	100.0
Vessel Form						
Jar	83	91.2	1	100.0	84	91.3
Bowl	6	6.6			6	6.5
Pinchpot	2	2.2			2	2.2
Total	91	100.0	1	100.0	92	100.0
Lip Decoration						
Notching	8	44.4			8	44.4
Punctation	4	22.2			4	22.2
Pie Crust	6	33.3			6	33.3
Total	18	99.9			18	99.9
Punctation (on vessel necks)						
Shallow	6	66.7			6	66.7
Deep	3	33.3			3	33.3
Total	9	100.0			9	100.0
Incising (on vessel necks)						
Narrow/Deep	26	25.5	3	37.5	29	26.4
Narrow/Shallow	10	9.8			10	9.1
Moderately narrow/deep	5	4.9			5	4.5
Moderately narrow/moderately deep	9	8.8	1	12.5	10	9.1
Moderately narrow/shallow	9	8.8	1	12.5	10	9.1
Wide/deep	1	1.0	2	25.0	3	2.7
Wide/shallow	32	31.4	1	12.5	33	30.0
General	10	9.8			10	9.1
Total	102	100.0	8	100.0	110	100.0
Incised Line Motif						
Rectilinear	75	83.3	5	71.4	80	82.5
Curvilinear	7	7.8	1	14.3	8	8.2
Recti-Curvilinear	1	1.1			1	1.0
Rectilinear Guilloche	5	5.6	1	14.3	6	6.2
Curvilinear Guilloche	1	1.1			1	1.0
Recti-Curvilinear Guilloche	1	1.1			1	1.0
Total	90	100.0	7	100.0	97	99.9

Table 1 (Continued). Characteristics of Madisonville Series Rims, Decorated Sherds, and Appendages.

	Madisonville Plain (n=375) Freq	Percent	Madisonville Cordmarked (n=106) Freq	Percent	Total (n=481) Freq	Percent
Appendage						
Parallel Strap Handle	3	5.4			3	5.1
Triangular Strap Handle	1	1.9	1	25.0	2	3.4
Handle Fragments	39	70.9	1	25.0	40	67.8
Handle Scar	5	9.0	1	25.0	6	10.1
Effigy Lug (Face)	1	1.9			1	1.7
Plain Lug	1	1.9			1	1.7
Plain Rim Strip	3	5.4			3	5.1
Notched Rim Strip	2	3.6			2	3.4
Other			1	25.0	1	1.7
Total	55	100.0	4	100.0	59	100.0

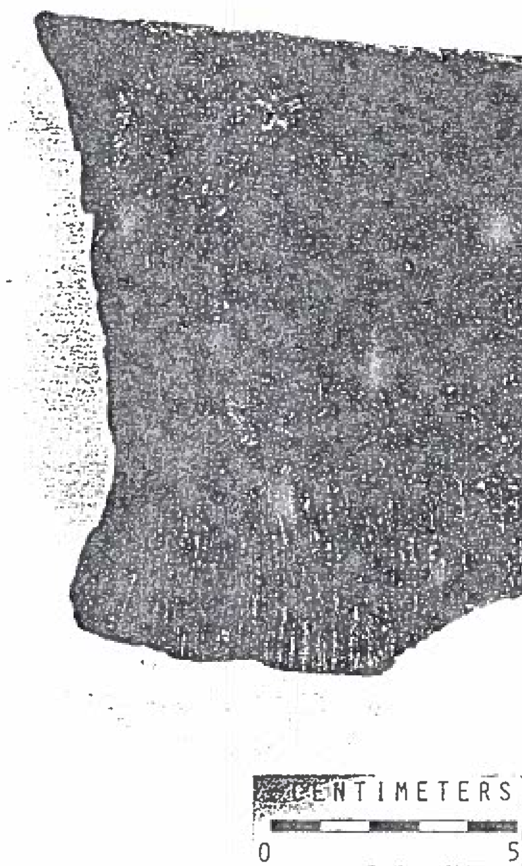

Figure 1. Decorated Madisonville Cordmarked Jar Rim with Parallel-sided Strap Handles and Rectilinear Incised Decoration on Neck.

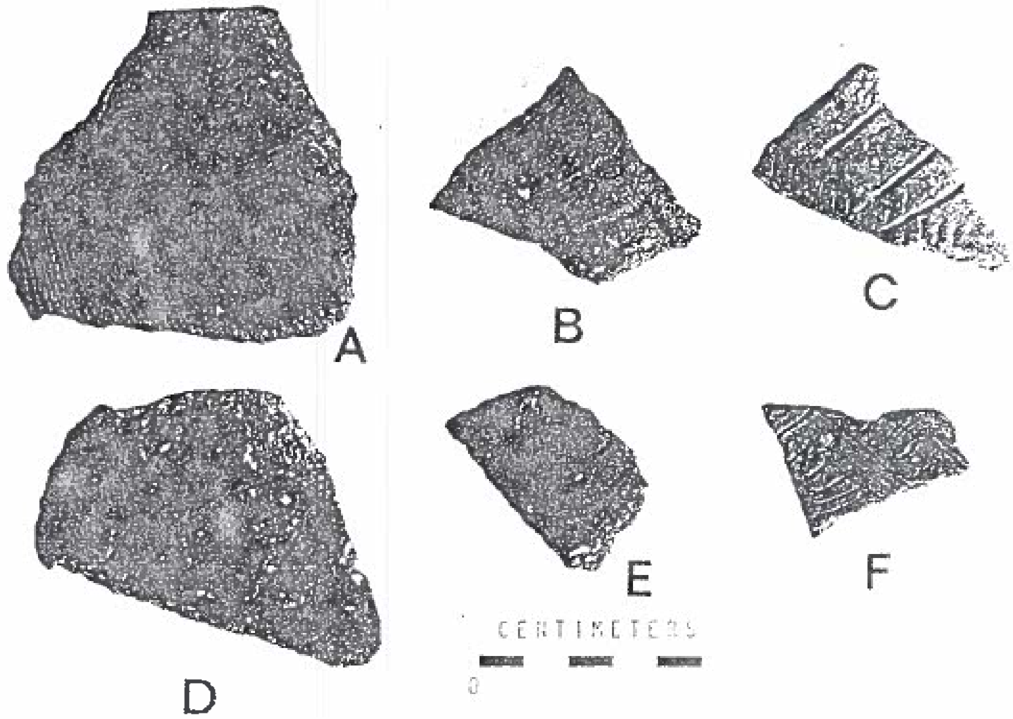

Figure 2. Decorated Madisonville Series Jar Rim and Jar necks: (a) Madisonville Cordmarked jar rim with rectilinear guilloche incised design on neck; (b and d) Madisonville Plain jar neck with rectilinear guilloche incised design; (c) Madisonville Plain jar neck with rectilinear incised design; (e) Madisonville Plain jar neck with curvilinear guilloche incised design; (f) Madisonville Plain jar neck with recti-curvilinear incised design.

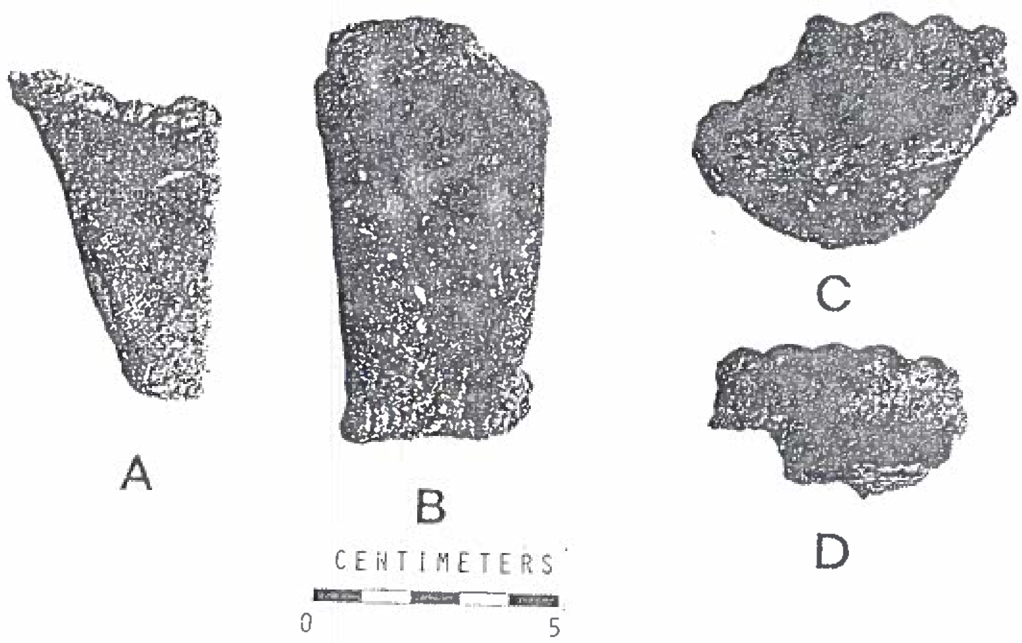

Figure 3. Madisonville Plain Strap Handles and Notched Jar Lips: (a) triangular strap; (b) parallel-sided strap; (c-d) notched jar lips and strap handle stubs.

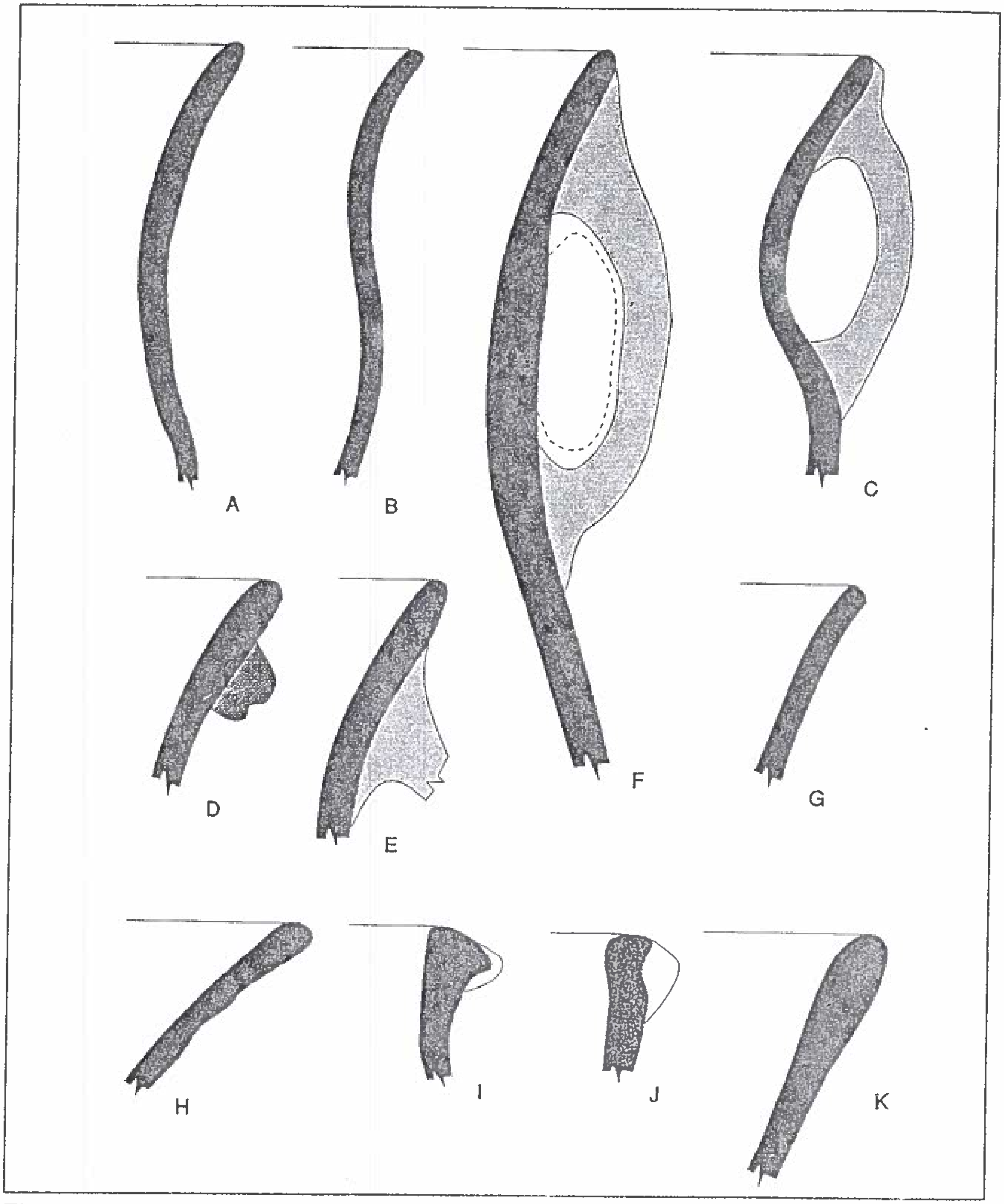

Figure 4. Madisonville Series Rim Profiles: plain (a, c-e, g-k); cordmarked body and plain neck (b,f). All are jars except i-j, which are bowls. Scale is 1:1. Handles are present on c, and e-f; d has an effigy lug; and i-j have rimstrips.

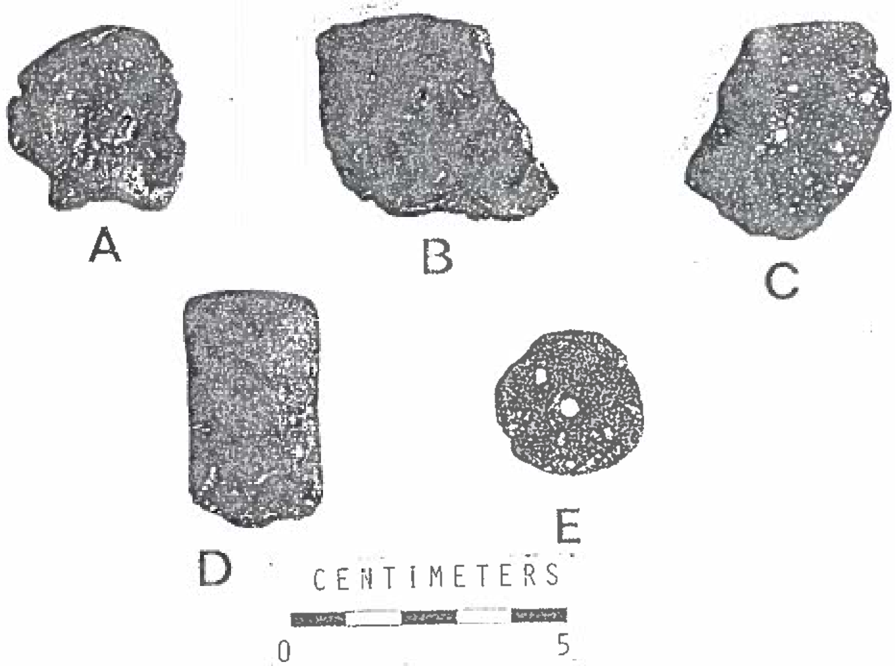

Figure 5. Miscellaneous Ceramic Objects and Decorated Madisonville Plain Jar Rims: (a) effigy face; (b) jar rim with effigy lug, punctated lip, and incised rectilinear design on neck; (c) jar rim with plain lug; (d) pipe stem; (e) sherd disc.

Punctation occurs either in combination with incising on vessel necks (n=9) or alone on vessel lips (n=4). As with incising, punctation is variable: it ranges from small/deep depressions that may have been made with a small stick or tool to large/shallow depressions that may have been made by a fingertip.

Other Baked Clay Objects

Specimens assigned to this category include eight beads, three discs, one worked sherd, three pipe fragments, a possible spoon or ladle fragment, an effigy, and seven miscellaneous baked clay objects. The clay beads are rather small and are egg-shaped in appearance. They range in length from 4.7 to 7.8 mm, with a mean of 6.6 mm, and range in width from 5.3 to 8.2 mm, with a mean of 6.3 mm. They have tiny holes pierced through them for suspension. Hole diameters range from 0.7 to 1.7 mm, with a mean of 1.2 mm.

Three ceramic discs were recovered from the site. One disc, with a diameter of 4.0 mm, was made from a shell tempered cordmarked sherd. Two other specimens represent intentionally manufactured discs (Figure 5e). They have diameters of 27 mm and each has a central perforation. The diameters of these perforations measure 2.8 and 3.5 mm, respectively. The edge of a fourth shell tempered cordmarked sherd is well-smoothed, suggesting that it was intentionally worked and possibly used as a smoothing tool.

Three pipe fragments also were recovered. One specimen is a portion of the stem and bowl of a pipe. It has a stem diameter of 17 mm and a hole diameter in the stem of 4.4 mm. It is decorated with a series of line-and-tick designs oriented parallel and perpendicular to the stem. The lines are deep and average 9 mm in length and 1.5 mm wide, while the ticks measure 2.2 mm in length. The other pipes are represented by stem fragments (Figure 5d). Stem diameters for these specimens measure 17 and 24 mm, respectively. Stem hole diameters measure 5.4 and 4.5 mm, respectively.

One of the baked clay objects is a fragment of a spoon or ladle. The section represented is the junction of the handle and the blade. The human head fragment may represent a portion of a clay figurine or an effigy attachment to a vessel (Figure 5a). Its right ear, the only ear present, is pierced in four places. The remaining baked clay artifacts (n=7) are small, fired clay items of varying shapes, the identity and function of which cannot be determined.

Discussion

The New Field ceramic collection is characterized by Madisonville Plain or Madisonville Cordmarked shell tempered jars that have slightly outflaring rims with rounded lips and parallel-sided or triangular strap handles. Bowls have plain exterior surfaces, and some have notched rim strips. A total of 78.0% of the ceramics have plain exteriors and 22.0% of the sherds have cordmarked exterior surfaces. Non-vessel baked clay objects present within this collection include beads, discs, and pipes.

The New Field ceramic collection compares favorably in most respects (e.g., globular jars with outflaring rims and thin strap handles) to other early Madisonville horizon site ceramic collections in central and northeastern Kentucky (Henderson 1992; Turnbow and Henderson 1992a). A total of 22.9% of the collection is decorated with incising (at the contemporary Capitol View Site, decoration accounts for over 19% of the assemblage [Henderson 1992]), compared to central Kentucky middle Fort Ancient collections, where incising is present on less than 5% of sherds (Carpenter Farm: Pollack and Hockensmith 1992; the Florence Site Complex: Sharp and Pollack 1992). Thus, the central Kentucky data support the trend, identified in northeastern Kentucky, of an increase in incising beginning around A.D. 1400 (Turnbow and Henderson 1992a).

A lack of pans and a small number of bowls, however, serves to distinguish the New Field ceramic collection from other early Madisonville horizon site collections (but see Henderson 1992 for Capitol View, where neither bowls nor pans were well-represented). Pans and bowls are well-represented in the early Madisonville horizon Buckner Site collection (Turnbow 1988b; examination by Henderson and Pollack of 1938 WPA collections). In contemporary northeastern Kentucky Gist phase collections, pans accounted for 11% and bowl rims accounted for 25-40% of identified vessels (Henderson et al. 1992:268). At the late Madisonville horizon Larkin Site, pans accounted for 6% of identified vessels, and bowls accounted for 30% (Pollack n.d.). Based on the presence of pans at Buckner and Larkin and their recovery from Gist phase sites, it was expected that several pan rims would be recovered from New Field. Likewise, and for the same reasons, it was expected that many bowl rims would be found at New Field. The absence of pans and the lower than expected number of bowls within the New Field ceramic assemblage may reflect different sampling strategies (i.e., structure versus trash pit contexts) or differences in site function or age.

The absence of check-stamped ceramics at New Field is somewhat surprising, given that it comprises at least 12% of the Buckner Village 2 assemblage (Turnbow 1988b:171) and is present in minor amounts at Capitol View (Henderson 1992). The absence of check-stamped ceramics at middle Fort Ancient sites and the New Field Site, coupled with their low frequency of occurrence at other Madisonville horizon sites (Turnbow and Henderson 1992b), suggests that the popularity of this surface treatment was short-lived in the Fort Ancient cultural area. The presence of negative painted sherds and bottle rims within the Buckner Site assemblage (Henderson and Pollack's examination of the 1938 WPA collections) also serves to distinguish the Buckner Village 2 collection from those of Capitol View and New Field.

One trait that serves to distinguish central from northeastern Kentucky Madisonville horizon collections is the preference for vessels with plain exterior surfaces in the former. Throughout the Madisonville horizon in central Kentucky, plain surfaced vessels increase in popularity, accounting for about 50% of the ceramics at Capitol View (Henderson 1992), 69% of those at Buckner Village 2 (Turnbow 1988b:171), 78% of those at New Field, and over 90% of those at Larkin (Pollack n.d.). In northeastern Kentucky, however, plain surfaced vessels never account for more than approximately 50% of a Madisonville horizon ceramic assemblage (Turnbow and Henderson 1992a:118-120), and at the late Madisonville horizon site of Hardin Village (Hanson 1966), Madisonville Plain accounts for only 25% of the ceramic assemblage.

CHIPPED STONE TOOLS AND DEBRIS[3]

The New Field chipped stone assemblage consists of debitage, modified flakes/chunks, bifaces, drills, and projectile points (Table 2). Analysis of these materials focused on describing and classifying the temporally diagnostic specimens: no attempt was made to analyze the debitage (unmodified flakes and chunks were simply weighed), and material type was no identified for any specimens.

Triangular projectile points from the site were sorted into types based on morphological attributes (<u>in sensu</u> Railey 1992). Only complete points or specimens with complete bases were analyzed in any detail. Measurements were recorded in millimeters for each specimen (length, maximum thickness, basal concavity/convexity, and width). Width was measured at three locations: the base, one-third the length of the point from the base, and one-third the length of the point from the tip. Only basal width was recorded on specimens missing tips, and no attempt was made to reconstruct these points for middle and upper measurements.

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[3] The discussion of Chipped Stone Tools and Debris was authored by William D. Updike, University of Kentucky, Lexington, Kentucky

Table 2. Chipped Stone Assemblage.

Fort Ancient Component	
Triangular Projectile Points	
Crude	13
Fine: Type 3	1
Type 4	8
Type 5	58
Type 6	18
Type 7	20
Type 8	5
Fragments	2
Total	125
Other Tools	
T-shaped drill	2
Drill fragment	1
Teardrop-shaped endscraper	1
Unifacial endscraper	6
Biface	2
Modified flake	2
Total	14
Other Components	
Projectile Points	
Dalton	1
Big Sandy	1
Kirk Corner Notched	1
MacCorkle Stemmed	1
St. Albans	1
Lecroy Bifurcated Stem	2
Kanawha Stemmed	1
Sykes	1
Brewerton	8
Lamoka	2
Merom-Trimble	3
McWhinney Heavy Stemmed	7
Adena Stemmed	3
Unassigned Notched/Stemmed	14
Fragments	16
Other Tools	
Drills and drill fragments	5
Scrapers	13
Biface/biface fragments	96
Spokeshave	1
Unifacial tool	1
Modified flakes/chunks	50

Other types of projectile points were classified with reference to Justice (1987), and the remaining tools were simply classified into morphological groups. No metric attributes were recorded for these specimens.

Projectile Points

Crude Triangular projectile points and six of the seven types of Fine Triangular projectile points described by Railey (1992) are represented in the New Field assemblage (Table 2 and 3; Figure 6 and 7). Crude Triangular points exhibit crude flaking, little edge retouch, and thick cross-sections. Type 3 Fine Triangulars have coarsely serrated lateral margins, while Type 4 Fine Triangulars are short with excurvate margins. Type 5 Fine Triangulars, with straight lateral margins and straight bases, are the most frequently occurring triangular point type in the assemblage. Type 6 Fine Triangulars, which have concave bases and excurvate or straight lateral margins, also are represented. Type 7 Fine Triangulars, which are the second most frequently occurring point type, exhibit markedly thick bases with strongly biconvex to diamond-shaped cross-section and retouched edges. These latter two characteristics distinguish them from Crude Triangulars.

The New Field triangular projectile point metric data compare favorably with data presented for specimens from northeastern Kentucky (Railey 1992:154). There is some variance, however, most notably with respect to length. The New Field points are somewhat smaller than those from northeastern Kentucky Fort Ancient sites. For instance, Type 5 Fine Triangular points from New Field are 10.87 mm shorter on average than similar specimens from northeastern Kentucky. The fact that triangular points from New Field tend to be shorter than northeastern Kentucky specimens suggests that these differences may reflect investigator sorting biases or site specific stylistic or function differences related to a local triangular projectile point manufacturing tradition.

A new type of Fine Triangular point not described by Railey (1992) was identified within the New Field assemblage. Type 8 Fine Triangular: Long, Concave Base specimens (n=5) exhibit deeply concave bases, extremely long lengths, and thin cross-sections (Figure 7f-g). No correlates were found for Type 8 Fine Triangulars in Justice (1987) or in the regional Fort Ancient literature (Hale 1981; Hanson 1963, 1966, 1975; Hemmings 1977; Hockensmith 1984; Pollack and Henderson 1984; Sharp 1984; Turnbow and Jobe 1984; Turnbow et al. 1983; Turnbow and Sharp 1988). The only correlate was Category 25, defined at the Toqua Site, a contemporary Dallas phase Mississippian village in Monroe County, Tennessee (Polhemus 1987:730).

Also recovered from the New Field Site were projectile points representing the Paleoindian (Dalton), the Early, Middle, and Late Archaic (Big Sandy, Kirk Corner Notched, MacCorkle Stemmed, St. Albans, Lecroy Bifurcated Stem, Kanawha Stemmed, Sykes, Brewerton, Lamoka, Merom-Trimble, McWhinney Heavy Stemmed), and the Woodland (Adena Stemmed) periods. Most of these specimens (n=41) were collected from general surface contexts or from broad areas of the site unassociated with features.

Other Tools

Other tools assigned to the Fort Ancient component based on their morphology consisted of T-shaped drills, unifacial endscrapers (Figure 7h-i), and a bifacially flaked teardrop-shaped endscraper. Nondiagnostic tools recovered from excavated features included a shaped biface, an unshaped biface, projectile point tips (undoubtedly from triangular projectile points, given their size and thickness), a drill fragment, and modified flakes.

In addition to projectile points, other kinds of tools representing earlier periods of the site's use were recovered. These included drills and drill fragments, scrapers (unifacial and hafted endscrapers; side scrapers),

Table 3. Metric Data for Triangular Projectile Points.

	Length			Basal Width			Middle Width		
	Range	Mean	n	Range	Mean	n	Range	Mean	n
Crude	22-33	33.36	13	12-20	16.61	13	13-21	16.60	13
Type 3	-	-	-	16.3	16.3	1	-	-	-
Type 4	10-23	17.42	8	12-19	15.61	8	7-15	11.50	8
Type 5	15-33	24.03	25	10-20	14.61	58	9-16	12.16	25
Type 6	20-34	26.21	8	9-19	13.99	18	1-12	10.17	8
Type 7	20-28	24.21	17	13-24	17.72	20	10-19	15.06	17
Type 8	26-40	33.80	3	17-24	21.52	5	14-16	15.73	3

	Upper Width			Convexity/Concavity			Maximum Thickness		
	Range	Mean	n	Range	Mean	n	Range	Mean	n
Crude	8-18	11.89	13	0	0	13	5-9	7.78	13
Type 3	-	-	-	0	0	1	4.35	4.35	1
Type 4	6-8	7.22	8	0	0	8	3-4	3.50	8
Type 5	5-11	7.63	25	0	0	58	3-10	4.63	58
Type 6	1-9	6.58	8	-.2--5.1	-1.44	18	3-6	4.52	18
Type 7	6-13	9.90	17	-1.2--2.8	-1.85	4	5-10	6.51	20
Type 8	8-10	9.36	3	-3.2--1.5	-2.32	5	3-5	4.32	5

All measurements are in mm.
NOTE: Measurements for Upper Width, Basel Shape, and Maximum Thickness in Table XI-6 are incorrect in Railey (1992). The correct table appears in Railey (1990:215).

93% reduction

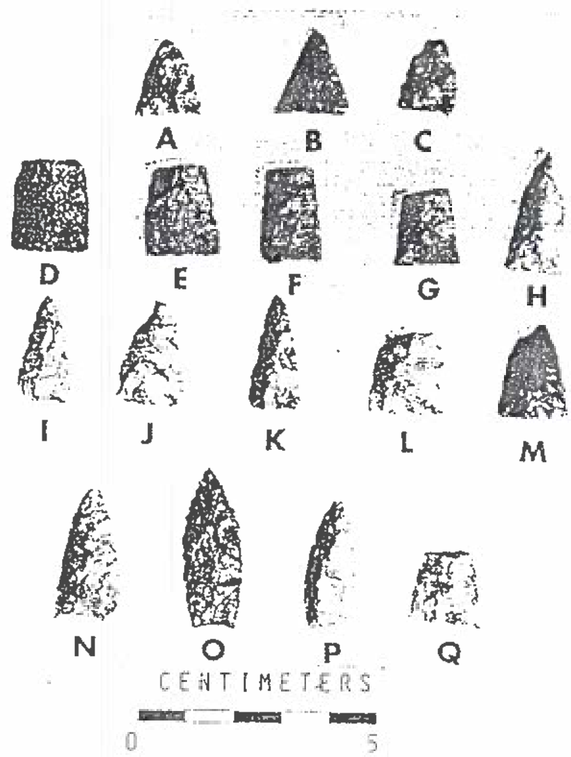

Figure 6. Fine Triangular Projectile Points: (a-c) Type 4; (d-m) Type 5; (n-q) Type 6.

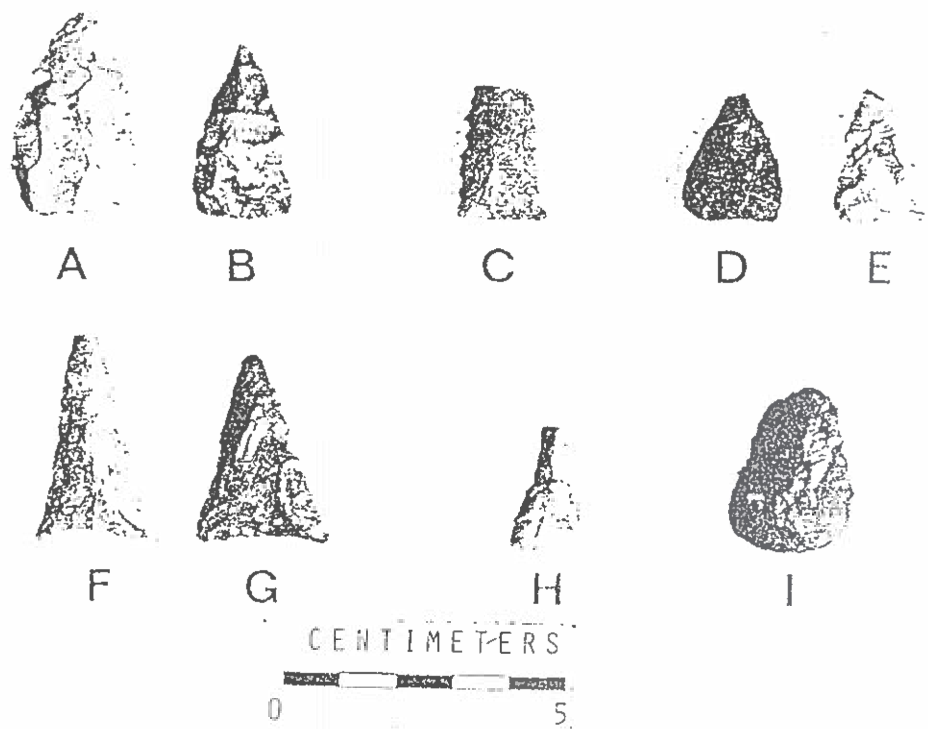

Figure 7. Miscellaneous Fort Ancient Chipped Stone Tools: (a-b) Crude Triangulars; (c) Type 3 Fine Triangular; (d-e) Type 7 Fine Triangular; (f-g) Type 8 Fine Triangular; (h) T-shaped drill; (i) unifacial scraper.

shaped and unshaped bifaces, biface fragments, a spokeshave, a unifacial tool, projectile point fragments, and modified flakes/chunks.

Discussion

Based on the presence of Paleoindian, Archaic, Woodland, and Fort Ancient points, the New Field locality appears to have been periodically utilized for the last 10,000 years. Most of the non-triangular projectile points were found in the northern part of site, while the triangular points were recovered from the southern two-thirds of the site, the area of focus for this study. That most of the recovered points are triangular indicates that the site's major component dates to the Late Prehistoric period.

Almost half of the New Field triangular points are Type 5 (Straight Sided) Fine Triangulars. Other well-represented triangular point types include types 4, 6, and 7 Fine Triangulars, and Crude Triangulars (Table 2). The Capitol View Site triangular point collection also is dominated by Type 5 Fine Triangulars, but at this site, Crude Triangulars account for one-third of the points, compared to about 10% of the New Field collection (Pool 1992). While both collections contain similar amounts of Type 4 Fine Triangulars, Type 6 Fine Triangulars are somewhat more common at New Field (14.4%) than they are at Capitol View (7.8%). Type 5 Fine Triangulars attain their greatest popularity between A.D. 1400-1550, while Type 6 increases in popularity throughout the Madisonville horizon (Railey 1992:161).

While Type 7 Fine Triangulars account for about 16% of the triangular points from New Field, only three (2.9%) were recovered from Capitol View and only two are represented in Railey's sample from northeastern Kentucky (Railey 1992:165). It is worth noting, however, that the latter two came from excavated early Madisonville horizon contexts at Snag Creek (Pollack and Jobe 1992). Taken together, the recovery of Type 7 Fine Triangulars from New Field, Capitol View, and Snag Creek suggests that this point style may be diagnostic of the early Madisonville horizon.

Based on characteristics of its triangular projectile point assemblage, it seems likely that New Field was occupied by Fort Ancient people sometime between A.D. 1400 and A.D. 1550. This statement is further supported by the absence of Type 1 (Small Tri-Incurvate) or Type 2 (Flared Base) Fine Triangular points, which represent earlier Fort Ancient types (pre-A.D. 1400 or A.D. 1000-1300, respectively) (Railey 1992:156, 158). Also, only one Type 3 (Coarsely Serrated) Fine Triangular point is present in the collection. This point type is well-represented on middle Fort Ancient (A.D. 1200-1400) sites (Railey 1992:168).

The recovery of a bifacial teardrop-shaped endscraper from the site also argues for a post-A.D. 1400 temporal assignment for the Fort Ancient component at New Field. This type of scraper is diagnostic of post-A.D. 1400 Fort Ancient tool assemblages in northeastern Kentucky, but occurs most frequently in protohistoric (post-A.D. 1550) assemblages (Railey 1992:143-144). The low frequency of this type of scraper within the New Field assemblage thus corroborates the site occupation date range suggested by the triangular projectile point collection.

GROUND, PECKED, AND BATTERED STONE TOOLS

The ground, pecked, and battered stone artifact assemblage recovered from New Field consists of pestles, abraders, celts/axes, hammerstones, and a few miscellaneous specimens. The specimens were assigned to mutually exclusive groups based on morphology and inferred function, which usually represented traditionally defined types of ground, pecked, and battered stone tools (Griffin 1943; Hanson 1966; Mills 1906).

All specimens were collected from surface contexts. Given this fact, the site's multiple occupations, and the functional, non-temporally diagnostic characteristics of these specimens, it is difficult to conclusively assign many of these materials to the site's Fort Ancient occupation. Artifacts like these, however, have been identified at Fort Ancient sites in Kentucky and elsewhere.

Three pestles were collected from the site. Two are cone-shaped, brown sandstone rocks that have been pecked and battered across their surfaces, while the third, made from granitic rock, has a wide flattened base and a narrow, cylindrical handle.

The smaller of the two fine-grained sandstone abraders may represent a shaft straightener, given the presence of two, deep narrow grooves that exhibit striations. The larger specimen is a tabular piece of rock with long, wide, shallow abraded depressions or grooves on both faces. This rock may have been used to form or sharpen axes or celts, given the shape and characteristics of the grooves.

Whole or fragmentary celts/axes are the most frequently occurring group of artifacts in the New Field ground, pecked, and battered stone assemblage. Six are manufactured from granitic rock and one is made from tillite. Represented in this assemblage are a complete three-quarter grooved ax; a complete, fully grooved, double grooved and double pointed ax; and the proximal end of a fully grooved ax. Battered stones, which probably functioned as hammerstones, consist of generally complete, rounded chert (n=4), quartzite (n=1), or granitic (n=1) rocks that exhibit heavy battering along all margins and on some faces.

Three miscellaneous ground, pecked, or battered stone tools were collected from the site. The celt/chisel is made from a heat-treated piece of chert. It is very well-polished on one face and pecked and chipped on the other face. A large quartz or quartzite river cobble, exhibiting scars where three "flakes" had been removed to form a point, exhibits evidence of battering on the point. This object may have been used as a chopper. An extremely weathered, flat, circular limestone rock was collected, which probably represents a shaped limestone disc. Two flakes had been removed from the margins, suggesting intentional shaping.

Discussion

The New Field ground, pecked, and battered stone tool assemblage consists of functional objects generally lacking any clear temporal association. A variety of purposes is reflected, including chopping or pounding, or use in the manufacture of other items. Most are manufactured from nonlocal stone (granite or sandstone).

Sandstone abraders are common at Larkin, which suggests that these objects can be assigned to New Field's Fort Ancient component. Similarly, shaped limestone discs occur frequently on middle Fort Ancient sites in the Bluegrass (Fassler 1987; Pollack and Hockensmith 1992; Sharp and Pollack 1992). The function of these objects is unknown.

It is worth noting that no pitted stones were collected. Similarly, no objects of personal use or adornment often associated with Fort Ancient sites, such as pipes, discs/discoidals, or cannel coal ornaments, were recovered from New Field. This may be due more to the nature of research activities conducted at the site than to a lack of use of these items by the site's Fort Ancient occupants.

WORKED SHELL ARTIFACTS

The worked shell artifact assemblage consists of a notched freshwater mussel shell and three ornaments. These items are considered to be related to the Fort Ancient occupation of the site based on morphology and context of recovery. Analysis consisted of describing each specimen in detail and taking appropriate measurements.

The notched freshwater mussel shell was collected from general surface contexts. It is well-preserved and measures 106.5 mm long and 66.1 mm wide. A 19.6 mm long notch has been cut into this shell, adjacent to its hinge, and is oriented diagonal to the hinge. The notch measures 12.5 mm at the widest point (along the exterior edge of the shell) and 2.0 mm wide at the narrowest part of the notch. The notch is considered to have been intentionally cut, due to its regularity and sharply delineated edges. The notch is too narrow to represent a plow cut: any direct contact with a plow blade would have damaged rather than carefully notched the shell. The function of this object is unknown.

Shell ornaments consist of a bead and two gorget fragments. The identity of the shell (i.e., whether freshwater or marine) could not be determined. Half of a disk shell bead was recovered from Feature 2-92. The bead measures 4.7 mm in diameter and is 2.4 mm thick at its thickest part.

One of the gorget fragments was collected from the surface of Feature 4, documented in 1991. It measures 106.1 mm long and 34.2 mm wide. Four scallops, measuring between 15.8 and 21.5 mm wide, have been cut into the edge of this specimen. An unscalloped area along the edge measures 43+ mm long. No other evidence of decoration is present. A scalloped shell gorget, described as a rattlesnake gorget (Griffin 1943:166), is depicted from Fox Farm in Mason County (Griffin 1943:Plate CXXI, figure 10).

The other specimen was collected from the surface of Stain 1-92. It consists of about three-quarters of a gorget that measures 52.2 mm in diameter and is 2.8 mm thick. Two suspension holes are located near the bottom of the gorget, though they show little evidence of wear. The gorget exhibits a figure engraved on the inside (concave) surface, framed by an single engraved border line (Figure 8). The figure design is executed using straight and curved engraved lines. A series of drilled circles, dots, or pits fill the zones that outline the figure (Figure 8a). The figure depicted on this gorget is that of a bird, with feet, tail, body, wings, and a portion of the neck. The bird may be a "thunderbird" or some sort of raptorial species, but this cannot be determined conclusively because the head of the bird is missing (Figure 8b).

Based on a review of Fort Ancient literature (i.e., Brashler and Moxley 1990; Foley and Lipscombe 1961; Glass n.d.; Griffin 1943; Hanson 1966, 1975; Smith 1910) and gorgets illustrated from eastern Tennessee by Kneberg (1959), a gorget from the early Madisonville horizon Man Site in West Virginia and a gorget from the late Madisonville horizon Hardin Village in Greenup County, Kentucky most closely resemble the New Field gorget. The Man Site specimen depicts an animal (horned reptile/spider) within a circle filled with a drilled dot background (Brashler and Moxley 1990:5, 9). The use of drilled dots to fill the space, the encircling engraved line, and the atypical animal depicted, even though it is not a bird, are general stylistic elements this gorget shares with the New Field specimen.

The Hardin Village gorget (not illustrated in Hanson 1966, but see Holmes 1994:161) is much larger than the New Field specimen, measuring about 110 mm in diameter. Drilled dots fill-in the background. The figure on this gorget most likely represents a wood duck, rather than a crane, as suggested by Hansen (1966:161), due to the depiction of head feathers and two webbed feet (Holmes 1994:161). Again, while the image depicted

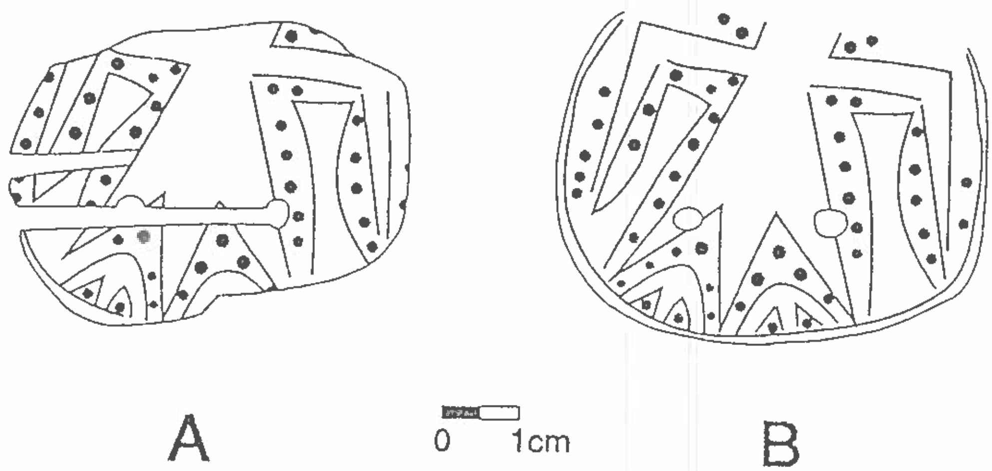

Figure 8. Scale Drawing of the Engraved Shell Gorget: (a) the gorget as collected; (b) reconstruction of the gorget assuming bilateral symmetry of the figure.

is not identical to that on the New Field specimen, the fact that both gorgets depict birds and the fact that drilled dots are used as background filler suggest a similar engraving tradition.

Despite the depiction of a stylistically and iconographically unique figure on the New Field gorget (Jeffery P. Brain, personal communication 1991; Jon Muller, personal communication 1991; Marvin T. Smith, personal communication 1991), the use of drilled dots to fill space on it suggests that this specimen is related to a general Fort Ancient engraving tradition. The depiction of an atypical zoomorphic figure on the New Field specimen, like those on the Man Site and Hardin Village gorgets, suggests that it may represent a local Fort Ancient iconographic or symbolic tradition.

Discussion

Worked shell ornaments were manufactured throughout the Late Prehistoric period (A.D. 1000-1750), but tend to appear in larger numbers in Fort Ancient artifact assemblages after about A.D. 1400 (Jobe and Turnbow 1992). The recovery of shell gorgets at New Field provides additional confirmation that the site was occupied during the early Madisonville horizon period. It also supports Pollack and Henderson's (1992b:288-290) suggestion that Fort Ancient communities began to participate more fully in extraregional exchange after A.D. 1400.

BOTANICAL REMAINS[4]

Botanical remains (n=36,615; weight=621.3 gm) analyzed from the New Field Site were recovered from the five excavated features. Most specimens were recovered from 14 flotation samples (125.75 l), but five of the corn cobs and six of the beans were collected from 6.35 mm dry screened contexts. The majority of the New Field botanical assemblage is represented by wood charcoal, which is distantly followed by cultigens, nutshell, seeds, and general unidentified charcoal (Table 4).

Table 4. Botanical Summary.

Major Categories	Freq.	Pct.*	Gm wt.	Pct.*
Wood Charcoal	32,850	89.7	566.8	91.2
Nutshell	1,022	2.8	24.8	4.0
Cultigens	2,389	6.5	28.5	4.6
Seeds (not cultigens)	226	0.6	--	--
Unidentified-General	128	0.3	1.2	0.2
Total	36,615	99.9*	621.3	100.0

*calculated to nearest 0.1%.

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4 The discussion of Botanical Remains was authored by Jack Rossen, University of Kentucky, Lexington, Kentucky

Soil samples were processed in a water flotation tank designed by John T. Carter. It consists of a portable utility basin with a drain and two control valves to regulate (1) water agitation and (2) a hand-held sprayer. A 1 mm mesh screen catches the heavy fraction. Once floated and dried, each sample was sieved through 2 mm mesh, prior to sorting charcoal from roots and other non-carbonized contaminants. Charcoal specimens larger than 2 mm are representative of smaller specimens, with the possible exceptions of acorn and squash rind (Asch and Asch 1975). Identification of specimens larger than 2 mm is also more reliable, and thus sieving saves considerable laboratory sorting time. All materials less than 2 mm in size were carefully scanned for carbonized seeds. In addition, selected charcoal samples collected from 6.35 mm dry screened contexts were examined for identifiable botanical remains.

All analyzed samples were examined under a microscope at magnifications of 10 to 30x. Identification of seeds and nuts was aided by a comparative collection of both archaeological and modern specimens, along with standard seed catalogues (Martin and Barkley 1973). Seeds and nutshell were sorted by species, counted, and weighed to the nearest tenth of a gram. Wood charcoal was identified when possible through direct comparison with wood blocks. Macroscopic wood characteristics were observed from specimen cross-sections. Changes in the visibility of macroscopic characteristics that occur during carbonization also were accounted for, to insure maximum accuracy of identification (Rossen and Olson 1985).

The New Field wood charcoal frequencies represent carefully constructed estimates, not exact figures, for lots containing more than 400 specimens. (Actual frequencies were recorded for lots containing fewer than 400 specimens). Frequency estimates were arrived at in the following manner. Two hundred specimens were counted, this subsample was weighed, and the weight of the total sample was divided by that of the subsample. This number was then multiplied by 200. Estimates of species composition of a sample were derived by identifying between 15 and 30 specimens. An estimate of the relative percentage each species represented of the whole was then used to derive the estimated frequency of each species. This is believed to be an efficient and reliable method for handling large lots of wood charcoal (Rossen 1991).

Preservation of botanical remains varies greatly between sites. For instance, some Kentucky Fort Ancient sites, such as Fox Farm in Mason County, and Thompson in Greenup County, have produced large quantities and a wide variety of well-preserved botanical remains from excavated contexts (Rossen 1992a). At other Kentucky sites, such as Augusta in Bracken County and Laughlin in Lewis County, botanical preservation was quite poor (see Rossen 1992a). Some factors that influence preservation are soil drainage or chemical composition of the midden deposits (such as ash content of the soil). The circumstances surrounding plant carbonization, including firing temperature and the amount of oxygen reduction present, also influence the preservation of botanical remains.

The surface features of the New Field specimens exhibit little erosion. This characteristic, together with the sheer quantity of specimens, indicate that botanical preservation at the site is quite good. In fact, the New Field specimens represent some of the very best preserved Fort Ancient botanical remains, almost comparable to those from Fox Farm (see Rossen 1992a:202). This good preservation allowed consideration of details for the New Field specimens, such as corn morphology, that are not always possible to examine within all Fort Ancient botanical collections.

The New Field collection reflects the typical Fort Ancient botanical pattern established in the archaeological literature both in Kentucky and elsewhere in the Fort Ancient culture area (Cowan et al. 1990; Erickson 1993; Rossen 1992a, 1994; Wagner 1983, 1987; Wheelersburg 1992): a corn-beans-squash dominated horticulture, a general lack of Woodland period native cultigens, and a wild plant collecting component. The wild or semi-wild plant profiles seem to vary among sites, while the cultigen profiles and densities are very consistent

(Rossen and Edging 1987; Wagner 1987). The New Field Site follows this pattern by having a relatively high frequency of smartweed (*Polygonum* spp. cf. *convulvus*) seeds relative to other Fort Ancient sites, but a cultigen profile and density that is comparable to other Kentucky Fort Ancient sites (Table 5).

Wood Charcoal

Wood charcoal from archaeological sites may be used to reconstruct the prehistoric forest composition of a place, as well as to document wood species that are favored for firewood or construction. Previous analyses of wood charcoal from Kentucky Fort Ancient sites clearly demonstrate the possibility of separating primary, secondary, and tertiary forest species (Rossen 1991, 1992a). However, this type of environmental reconstruction/wood use preferences analysis often requires a large botanical sample or the combination of wood charcoal from nearby sites (Rossen 1994). Forest profiles of this type often contain 15 to 20 species. The New Field collection, while containing a great quantity of specimens, consists of only ten wood species from only five features. It would thus be expected to contain only a subset of Bourbon County's prehistoric forest species.

According to botanists, much of prehistoric Kentucky is thought to have been covered by various forms of oak-hickory forests (Baskin et al. 1987; Campbell 1985). Wood charcoal profiles from central Kentucky upland settings, such as the Muir Site in Jessamine County (Rossen 1988), the Florence Site Complex in Harrison County (Rossen 1994), and the Guilfoil Site in Fayette County (Rossen 1987a), all have corroborated this hypothesis by producing wood charcoal profiles that are heavily dominated by hickory (*Carya* spp.) and white oak (*Quercus* spp.).

Wood charcoal comprises 89.7% of the recovered remains by frequency (n=32,850) (Table 4 and 6). Hickory dominates the identifiable collection, accounting for 53.1% by frequency and 52.2% by weight (Table 6). Honey locust, and to a lesser extent, black locust and white oak, were used, while American elm, white ash, and black walnut appear as secondary species. White oak, which usually appears in Kentucky sites as a co-dominant primary species with hickory (Rossen 1991), is only present at New Field in secondary amounts. Species appearing in minor amounts are slippery elm, sycamore, and American chestnut.

The underrepresentation of white oak in the New Field collection, in comparison to several other Fort Ancient sites (Rossen 1991), requires additional discussion. It is possible, as stated above, that the relatively low number of sampled contexts is skewing the data. The presence of only ten species in this collection reinforces this suggestion. The Fox Farm Site, with its excellent botanical preservation and recovery from only a few contexts, likewise produced relatively few wood species (Rossen 1991, 1992a). It is also possible that the New Field inhabitants strongly preferred to use hickory. In any case, some wood charcoal anomalies are present in this collection. Care should be taken when using this assemblage directly for environmental reconstruction.

Nutshell

Nutshell remains include hickory and black walnut, along with trace amounts of acorn, American chestnut, and butternut (Table 7). Hickory is by far the most common nutshell. This is in accord with most ethnohistoric references concerning Southeastern Indians, which suggest a preference for hickories because they were easier to collect and process than black walnuts and other nuts (Swanton 1946). While this pattern exists for most Fort Ancient sites, three central Kentucky sites have produced more black walnut than hickory: Guilfoil in Fayette County (Rossen 1987a), Capitol View in Franklin County (Henderson 1992; Rossen n.d.a), and the Florence Site Complex in Harrison County (Rossen n.d.b.; Sharp and Pollack 1992). These differences may represent either localized nut preferences, microenvironmental differences, or contextual and sampling differences in the archaeological assemblages.

Table 5. Archaeobotanical Densities at Kentucky Fort Ancient sites.

Sites	NUTSHELL Freq/Liter	NUTSHELL Grams/Liter	CORN Freq/Liter	CORN Grams/Liter
Capitol View (15Fr101)[1]	0.6	.011	0.4	.006
Carpenter Farm (15Fr36A)[2]	1.4	.024	0.8	.005
Florence (15Hr21)[3]	11.9	.216	1.8	.017
Florence (15Hr22)[3]	40.4	1.343	4.5	.067
Fox Farm (15Ms1)[4]	2.3	.057	8.4	.262
Guilfoil (15Fa167)[5]	3.5	.093	3.8	.027
Goolman (15Ck146)[10]	-	.183	-	.0005
Muir (15Js86)[6]	4.5	.072	4.0	.034
Larkin (15Bb13)[9]	0.8	.017	1.0	.010
New Field (15Bb45)[7]	8.1	.197	16.8	.189
Petersburg (15Be6)[8]	2.7	.038	3.2	.018
Snag Creek (15Bk2)[4]	2.4	.027	3.6	.031
Thompson (15Gp27)[4]	1.4	.026	4.3	.059

[1]Rossen n.d.a
[2]Rossen 1992b
[3]Rossen n.d.b
[4]Rossen 1992a
[5]Rossen 1987a
[6]Rossen 1988
[7]This paper
[8]Rossen 1994
[9]Rossen 1987b
[10]Turnbow et al. 1983:Table VI-7 and p. 265

Table 6. Wood Charcoal.

Species	Freq.	Pct.*	Gm wt.	Pct.*	Ubiquity
Hickory (*Carya* spp.)	13,654	53.1	237.5	52.2	92.9
Honey locust (*Gleditsia triacanthos*)	5,956	23.2	101.6	22.3	57.1
Black locust (*Robinia pseudoacacia*)	2,226	8.7	38.9	8.5	57.1
White oak (*Quercus* spp.)	2,120	8.2	41.7	9.2	57.1
American elm (*Ulmus americana*)	573	2.2	9.9	2.2	28.6
White ash (*Fraxinus americana*)	442	1.7	8.0	1.8	7.1
Black walnut (*Juglans nigra*)	430	1.7	12.5	2.7	14.3
Slippery elm (*Ulmus rubra*)	162	0.6	2.1	0.5	7.1
Sycamore (*Platanus occidentalis*)	115	0.4	2.5	0.5	7.1
American chestnut (*Castanea dentata*)	38	0.1	0.3	0.1	7.1
Total Identified Wood Charcoal	25,716	99.9*	455.0	100.0	
Unidentified Wood Charcoal	7,134		111.8		
Total Wood Charcoal	32,850		566.8		

*calculated to nearest 0.1%.

Table 7. Other Botanical Remains.

Species	Freq.	Pct.[1]	Gm wt.	Pct.[1]	Ubiquity
Nutshell					
Hickory (*Carya* spp.)	784	76.7	18.3	73.8	92.9
Black walnut (*Juglans nigra*)	221	21.6	5.9	23.8	71.4
Acorn (*Quercus* spp.)	9	0.9	0.2	0.8	21.4
American chestnut (*Castanea dentata*)	6	0.6	0.4	1.6	7.1
Butternut (*Juglans cinerea*)	2	0.2	0.0	0.0	14.3
Total	1022	100.0	24.8	100.0	
Cultigens					
Corn (*Zea mays*)					
kernel	864		9.0		
cupule	1228		10.6		
rachis segment	13		0.8		
cob[2]	13		6.0		
husk	1		0.4		
Bean (*Phaseolus* spp.)[2]					
complete	12		0.6		
fragments	3		0.0		
Squash (*Cucurbita* spp.)					
seeds	39		0.3		
rind	190		1.5		
Gourd (*Lagenaria* spp.)					
rind	26		0.0		
Total	2389		29.2		
Seeds of Wild Plants					
Smartweed/knotweed (*Polygonum* spp. cf. *convulvus*)	160				
Small-seeded nightshade (*Solanum americanum*)	7				
Grape (*Vitis* spp.)	6				
Sumac (*Rhus* spp.)	6				
Pokeweed (*Phytolacca americana*)	6				
Blackberry (*Rubus* spp.)	4				
Bedstraw (*Galium* spp.)	3				
Grass (Graminae)	3				
Purslane (*Portulacca* spp.)	1				
Unidentified Seeds	30				
Total	226				

[1] calculated to nearest 0.1%
[2] includes specimens from screened contexts

Cultigens

The three main Fort Ancient cultigens (corn, beans, and squash) were recovered from the New Field Site. For many years, corn and *Phaseolus* beans have been recognized as staples of the Fort Ancient diet (Rossen and Edging 1987; Wagner 1987).

Corn is present primarily in the form of kernels (n=864) and cupules (n=1,228), which form the outer structural layer of the cob that holds the kernels (Table 7). In addition, thirteen cob fragments (Figure 10) were recovered: eight from flotation samples and five from dry screened contexts.

Most Fort Ancient corn is 8-row, with wide, narrow, open cupules and low, wide, crescent-shaped kernels (Rossen 1992a; Wagner 1987). This type is commonly referred to as the "Eastern Eight" variety. It is thought to contrast with a 12-row "Midwestern Twelve" variety found in the central Mississippi Valley (Johannessen 1984). The New Field collection, as with the collection from Fox Farm (Rossen 1992a; Wagner 1987), contrasts with most other Fort Ancient sites in that it contains as many 10-row as 8-row specimens (Table 8). Other morphological characteristics, however, such as open cupules (i.e., a 2.5:1 cupule width to length ratio [Table 8]) and low, wide, crescent-shaped kernels, conform closely to general attributes of the "Eastern Eight" variety. This is admittedly a small sample of cobs, and the issue remains as to what factors produce uniform versus more varied corn morphology at Fort Ancient sites.

It is worth noting that several of the 10-row cobs are unusually small in size, with four of six specimens (66.7%) having cob diameters of only 4 to 7 mm. While three 8-row cobs are similarly minute, the three cobs with the largest diameters all are 8-row specimens.

A total of 15 domesticated beans (*Phaseolus* spp.) was recovered (Table 7). These specimens are reniform in shape and are virtually indistinguishable from modern pinto beans. All but one specimen are single, detached cotyledons (Table 9) with clearly recognizable interior faces, and the measurable specimens are similar in size and shape to beans found at other Fort Ancient sites (Rossen 1992a; Wagner 1987).

Beans are present in the eastern United States by ca. A.D. 1000 and large numbers have been recovered from some Fort Ancient sites such as Fox Farm in Kentucky and Campbell Island in Ohio (Rossen 1992a; Wagner 1987). They are almost absent, however, from western Kentucky and most central Mississippi Valley sites from A.D. 1000-1300 (Johannessen 1984; Riley et al. 1990:531; Rossen and Edging 1987).

Most of the squash (Table 7), which is represented by 229 specimens (190 rind fragments and 39 seeds) was recovered from one feature, Feature 2-92. Many of the rind fragments are unusually large, exhibiting surface reticulations and remnant fragments of interior flesh not often seen archaeologically (Figure 9b). The squash seeds (some of which may represent the related cucurbit, pumpkin) also are well-preserved (Figure 9a; Table 10). Gourd, which has a thinner rind, is represented by 26 rind specimens. Both squash and gourd appear relatively early in the archaeological record of the eastern United States, having been identified in several Archaic period contexts (Cowan et al. 1981; Kay et al. 1980; Marquardt and Watson 1977).

There is debate concerning whether or not these plants, which were cultivated by Fort Ancient times, had native North American origins (see Fritz 1988; Heiser 1989; Smith 1987; Watson 1989 for the squash debate). Squash and gourd remains have been recovered from several other Fort Ancient sites (Rossen 1992a; Wagner 1987), but not in the quantities found at New Field. Since both squash and gourd are very fragile remains that may be chronically under-represented in archaeobotanical collections (Asch and Asch 1975), the

Table 8. Corn Cob Measurements.[1]

Length	Max. dia.	Min. dia.	Row No.	CW[2]	CL[3]
40.0	15.0	13.0	8.0	8.5	2.0
21.0	12.0	10.0	8.0	8.0	3.0
13.0	6.0	6.0	8.0	4.0	2.0
9.0	5.0	5.0	8.0	5.0	1.0
2.0	4.5	4.5	6.0	5.0	1.5
18.0	9.5	9.0	10.0	5.5	1.5
13.5	7.0	6.0	10.0	3.5	1.5
12.0	8.0	7.0	10.0	3.0-4.0	1.0
24.0	12.5	12.5	8.0	7.0-8.0	3.0-3.5
27.0	6.5	6.5	8.0	4.0-5.0	1.5-2.5
13.0	9.5	9.5	10.0	4.0-5.0	2.0
14.5	6.0	6.0	10.0	2.5-3.5	3.0-3.5
11.0	4.0	4.0	10.0	1.5-3.0	1.0-1.5

Corn Cob Assemblage Descriptive Summary

Row Number	Freq.	Pct.
6 row	1	7.7
8 row	6	46.2
10 row	6	46.2
	13	100.0

Mean	
Diameter	7.9
CW	5.0
CL	2.0

[1] in mm
[2] CW = cupule width
[3] CL = cupule length

Table 9. Bean Measurements.*

Specimen Number		Length	Width	Thickness
1	double cotyledon	9.00	6.0	3.0
2	single cotyledon	9.50	5.0	1.5
3	"	10.00	5.5	2.0
4	"	9.50	5.0	2.0
5	"	8.00	4.5	2.0
6	"	8.50	5.0	2.0
7	"	10.00	5.0	2.0
8	"	9.50	5.5	1.5
9	"	9.50	5.0	2.0
10	"	7.00	4.5	1.0
Mean		9.05	5.1	1.9
Mode		9.50	5.0	2.0

* in mm

Table 10. Squash Seed Measurements.*

Specimen Number	Length	Width	Thickness
1	8	4.0	3.0
2	-	5.5	2.0
3	7	4.5	2.5
4	8	5.5	3.0
5	8	4.5	2.5
6	7	5.0	3.0
7	8	4.5	3.0
8	8	4.5	3.0

* in mm

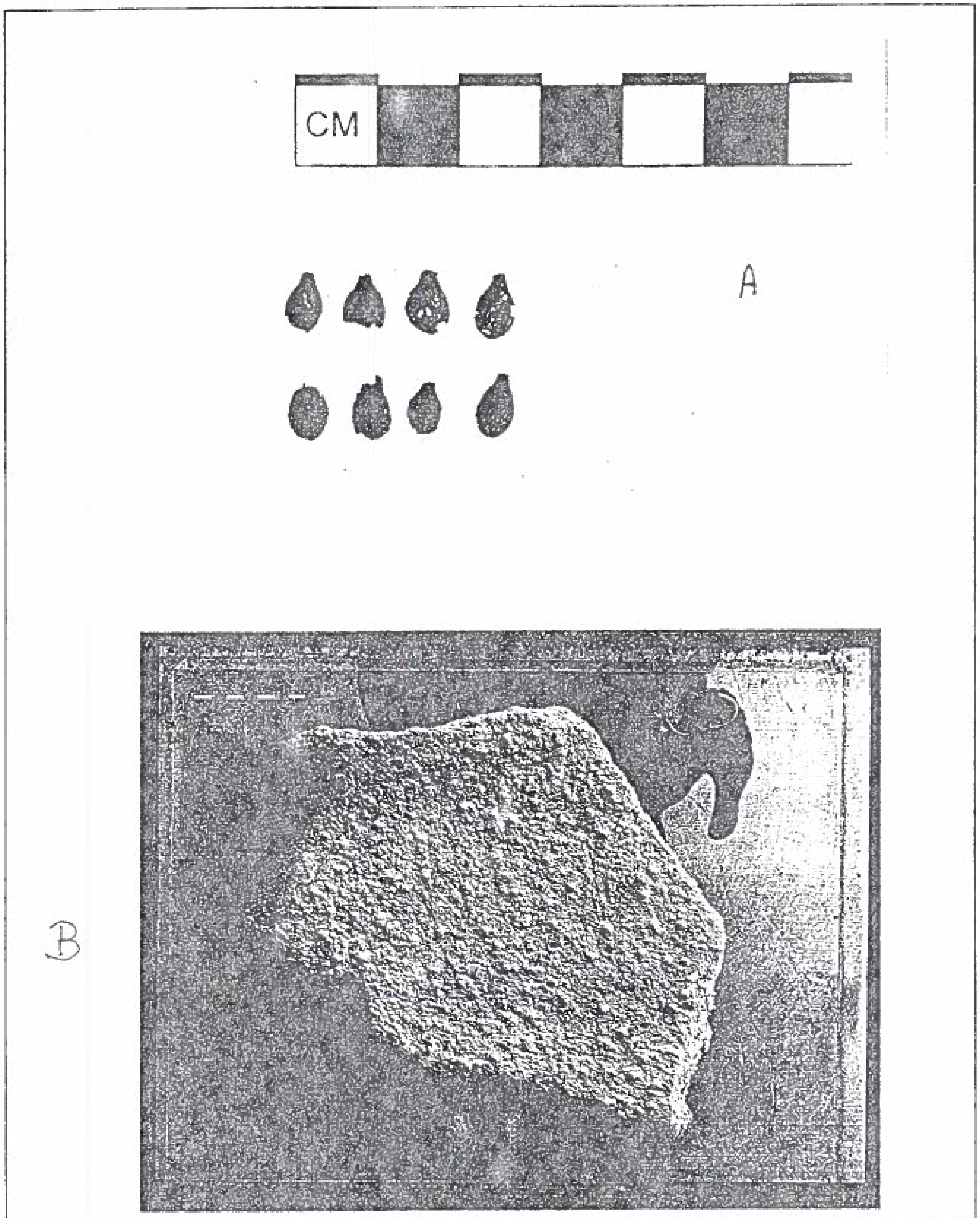

Figure 9. Squash Remains: (a) seeds; (b) Scanning electron micrograph (SEM) of rind at 25x.

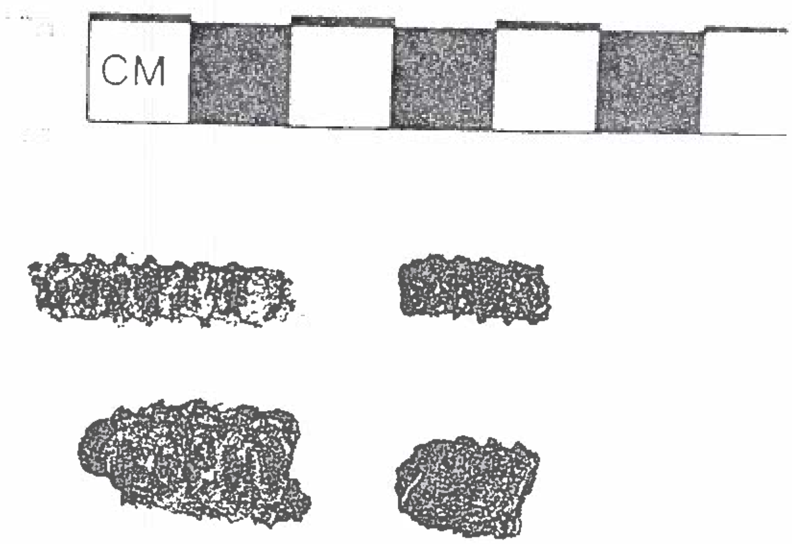

Figure 10. Corn Cobs.

large number of squash and gourd remains from New Field again may reflect more the preservation environment of the feature from which most of these remains were recovered than an increased use of these plants.

Seeds

A total of 226 carbonized seeds was recovered (Table 7). Smartweed (*Polygonum* spp. cf. *convulvus*) accounts for 160 specimens, which were recovered from Feature 2-92. These specimens are relatively large and broad, averaging 3 mm in length and 2.5 mm in both width and thickness. Their most distinctive attribute is their triangular cross-section, which closely resembles *P.* spp. cf. *convulvus* (Martin and Barkley 1973:150). *Polygonum* spp. cf. *convulvus* should not be confused with the native cultigen *Polygonum erectum*, which is common in Ohio Valley Woodland period sites (Wymer 1992). With the exception of Muir, an early Fort Ancient site with a botanical assemblage that reflects some Woodland characteristics (Rossen 1988), *Polygonum erectum* occurs rarely or is absent from Fort Ancient sites. Occasional specimens of *Polygonum* spp. cf. *Pennsylvanicum*, a broad, flat seed with a long, narrow cross-section, have been found in sites such as the Florence Site Complex (Rossen n.d.b; Sharp and Pollack 1992). It appears that Fort Ancient peoples may have used several species of *Polygonum* for their edible seeds.

Other seeds recovered in relatively low frequencies are commonly found in Fort Ancient contexts. These seeds are thought to represent a wild plant collecting dietary component, including the exploitation of fleshy fruits (Wagner 1983, 1987). Grape (n=6), sumac (n=6), and blackberry (n=4) are fleshy fruits that may be dried and stored. Sumac is a bush or tree that produces vitamin-C rich berries. Relatively large numbers of sumac seeds have been found at a few Fort Ancient sites, such as Fox Farm and the Florence Site Complex. It has been discussed as a possible semi-wild, manipulated, or even cultivated plant because of its ecology as a disturbed habitat, garden-edge invader that is relatively rare in undisturbed woods (Rossen 1992a; Smith 1970). Pokeweed produces poisonous berries, but its young greens are edible. Grass seeds may either represent utilized plants (Hunter 1990) or accidentally deposited and fortuitously carbonized seeds. Purslane (*Portulacca* spp.) may have been utilized for its edible greens, and small-seeded nightshade (*Solanum americanum*) produces edible fruits.

Bedstraw represents another case of a seed that is common in Fort Ancient contexts in low to moderate frequencies (Rossen 1992a). While it may have been used for its edible greens or as bedding material, the seeds also stick to hair and clothing (Wagner 1987). For this reason, the seeds often have been dismissed as accidental depositions (Asch et al. 1972:17-18). At the Capitol View Site, bedstraw was the predominant seed identified in the botanical collection (Henderson 1992; Rossen n.d.a). Examination of the spatial distribution of bedstraw seeds within house floor deposits at Capitol View may help resolve the issue of how bedstraw was utilized by Fort Ancient peoples (Rossen n.d.a).

It is important to note that chenopod (*Chenopodium* spp.) (e.g. Smith 1985) does not occur in the New Field collection. Many, but not all, Fort Ancient sites contain substantial amounts of chenopod, and in at least two cases, (i.e., SunWatch in Dayton, Ohio [Wagner 1987] and Fox Farm [Rossen 1992a]), detailed morphological study and scanning electron micrographs have demonstrated the presence of the cultivated variety, *C. berlandieri*. Chenopod is usually the only member of the native cultigens that is found in Fort Ancient sites, although occasionally maygrass (*Phalaris caroliniana*) occurs in very low frequencies (Cowan et al. 1990; Erickson 1993).

Discussion

At first glance, in comparison to other Fort Ancient sites, New Field nut and corn densities appear to be much higher. New Field has nut densities of 8.1 specimens and 0.197 grams per liter of floated soil, and corn densities of 16.8 specimens and 0.189 grams per liter of floated soil. However, as with the Florence Site Complex (Rossen n.d.b; Sharp and Pollack 1992), these elevated densities appear to reflect the very good botanical preservation of one pit feature, Feature 2-92. When this pit feature is removed from the sample, New Field has nut and corn densities of 2.1 specimens and 0.05 grams per liter of floated soil, and 4.8 specimens and 0.06 grams per liter of floated soil, respectively. These figures are consistent with densities recorded for other Fort Ancient sites (Table 5).

In the past, Fort Ancient nut densities have been considered to be quite low, reflecting the deemphasis of that resource as corn and beans became prominent in the diet (Rossen 1992a; Rossen and Edging 1987). While this pattern is supported by the New Field collection, this study does suggest that sample context and preservation may influence botanical densities. When larger excavation efforts result in a greater variety of contexts sampled, such as at the Capitol View (Henderson 1992) and Muir sites (Turnbow and Sharp 1988), or when test excavations are not dominated by a single, well-preserved feature, such as at the Carpenter Farm Site in Franklin County (Pollack and Hockensmith 1992), archaeobotanical densities are generally lower and more consistent. Therefore, it is recommended that when comparing and contrasting archaeobotanical indices, such as site densities, consideration should be given to the contexts from which the data were recovered and the circumstances that generated them. If the underlying contextual and preservation conditions can be controlled, fluctuations in density indices may be viewed as local variation in diet, plant utilization, or simply sampling biases. If not, such as in the present case, they may be incorrectly viewed as reflecting regional or site-specific cultural differences.

With the exception of chenopod, Fort Ancient people appear to have deemphasized their use of native cultigens. This pattern sharply contrasts with that of contemporary Mississippian groups, who continued to utilize them heavily (Rossen and Edging 1987). The New Field collection corroborates the Fort Ancient pattern in that it lacks native cultigens. Not even chenopod, the one native cultigen known to have been substantially used by Fort Ancient people, is present in this collection.

Aside from the remarkable state of preservation of the plant remains from one feature and the fact that it produced a seed type (*Polygonum* spp. cf. *convulvus*) not usually recovered from Fort Ancient sites, the New Field assemblage is, in most other respects, a very typical Fort Ancient collection that reconfirms a general plant-use pattern that is well-established in the archaeological literature. Wagner (1983) defined this pattern in 1983 from data she compiled from throughout the Fort Ancient culture area. She documented a repetitive pattern of heavy reliance on corn and beans and a distinctive wild plant collecting component focused on fleshy fruits (Wagner 1983, 1987). Subsequent research has shown that once established about A.D. 1000, Fort Ancient plant use (with only minor variation) was remarkably stable and consistent, while other aspects of Fort Ancient life, such as ceramic and triangular projectile point styles, village configuration, and burial patterns, underwent many changes (Pollack and Henderson 1992a, 1992b).

The Fort Ancient plant-use pattern, then, was apparently an adaptive change from that of the preceding Woodland Period, which emphasized a variety of starchy-oily seeded native cultigens (Lopinot 1988; Rossen 1995; Wymer 1987, 1990). Corn and beans were the primary Fort Ancient staples. Squash and gourd were widely grown, along with other plants such as sunflower and tobacco. The native cultigens were deemphasized, although chenopod continued to be grown in Fort Ancient gardens. Fleshy-fruited wild plants, such as grape, blackberry, pawpaw, and sumac, were an important secondary food source. The occurrence of sumac in some site assemblages suggests that this disturbed-habitat plant also may have been manipulated or cultivated (Rossen 1992a). Nuts remain in the diet, but they also appear to have played a much less important role than during the preceding Woodland Period (Rossen and Edging 1987).

It has been suggested elsewhere (Rossen 1992a) that Fort Ancient people made conscious decisions about their plant inventory and plant-use patterns, choosing to discard time-honored plant foods, adopting and emphasizing plants such as beans much more than neighboring groups, and maintaining a strong secondary wild plant food component. The botanical data from the New Field Site support this distinctive pattern and add to our understanding of Fort Ancient plant food subsistence practices.

FAUNAL REMAINS[5]

Analyzed faunal remains from New Field consisted of 5,159 specimens of bone, teeth, and shell, representing 35 vertebrate and invertebrate genera and species. These remains were recovered from the five partially excavated features, with the majority of specimens recovered from features 2-92 and 28-92 (Table 11). All of the faunal remains from these features were analyzed, except specimens recovered from flotation samples that measured less than 6.35 mm. No faunal remains from non-feature contexts were analyzed. Although the sample is rather small (797 identifiable specimens or 15.4%), analysis of these remains contributes to the growing body of data on Fort Ancient animal exploitation.

The methods employed to analyze the New Field faunal remains involved the assignment of each specimen as identifiable or indeterminate mammal, bird, reptile, amphibian, fish, or shell. When possible, each specimen was identified to species and anatomical element and position (i.e., left or right side), and was examined for butchering evidence and/or other types of modification. These data were entered in an inventory of faunal remains that was used to generate frequency tables of the skeletal portions for each skeletal category. The frequency tables were employed to determine the skeletal composition for each represented taxon and the minimum number of individuals (MNI) represented for each identified species.

Additional information noted during this phase of the analysis included the number of burned, cut and/or modified specimens associated with each category. Subsequently, MNI determinations, meat yield estimates, and dietary ratios (White 1953) for each edible species were calculated.

Skeletal and Taxonomic Composition

As shown in Table 11, the New Field faunal collection consists of 55 individuals representing 14 mammal, seven bird, three reptile, one amphibian, eight fish, one terrestrial snail, and one crayfish taxa. The skeletal collection consists of 2,703 mammal, 979 bird, 18 reptile, three amphibian, 215 fish, one mollusc, and one crayfish specimen, as well as 12,390 undifferentiated bone and shell pieces and fragments.

Nearly 24% of the recovered remains had been subjected to some degree of burning. Less than one percent (n=16) of the material shows cut marks indicative of dismemberment, skinning, or defleshing procedures for white-tailed deer, bear, pigeon, and turkey. Also accounting for less than one percent of the sample are 15 modified specimens representing complete and portions of tools used in the production and maintenance of hunting equipment, or tools used for daily domestic chores.

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[5] The discussion of Faunal Remains was authored by Emanuel Breitburg, Tennessee Division of Archaeology, Nashville, Tennessee

Table 11. Analyzed Faunal Remains.

Taxa	SITE TOTALS							FEATURE TOTALS				
	Count	MNI	Meat[1] Yield	Percent Meat	B[2]	Cut	Mod[3]	1-92	2-92	21-92	28-92	32-92
Mammals												
Cervus canadensis, Wapiti	5	1	159.0	30.6	-	-	-	-	1	-	4	-
Odocoileus virginianus, White-tailed deer	462	6	180.0	34.7	103	12	5	22	149	78	141	72
Lynx rufus, Bobcat	1	1	4.5	0.9	-	-	1	-	1	-	-	-
Procyon lotor, Raccoon	5	1	5.7	1.1	1	-	-	-	3	1	-	1
Ursus Americanus, Black bear	2	1	107.2	20.6	-	2	-	-	-	-	2	-
Urocyon cinereoargenteus, Gray fox	2	1	2.2	0.4	1	-	-	-	-	-	-	2
Microtus spp., Vole spp.	1	1	-	-	-	-	-	-	-	-	1	-
Oryzomys palustris, Rice rat	44	5	-	-	1	-	-	19	2	-	10	13
Permoyscus spp., Field Mouse	2	1	-	-	-	-	-	1	-	-	1	-
Castor canadensis, Beaver	1	1	11.9	2.3	-	-	-	-	1	-	-	-
Sciurus niger, Fox squirrel	2	1	0.5	0.1	-	-	-	-	1	-	1	-
Sciurus carolinesis, Gray squirrel	21	2	0.4	0.1	2	-	-	6	1	2	9	3
Marmota monax, Woodchuck	8	1	2.1	0.4	-	-	-	-	-	-	-	8
Scalopus aquaticus, Mole	4	2	-	-	2	-	-	-	-	1	2	1
Total Mammals	**560**	**25**	**473.5**	**91.2**	**109**	**14**	**6**	**48**	**159**	**82**	**171**	**100**
Birds												
Small passerine	2	1	-	-	-	-	-	-	-	-	-	2
Hawk spp.	2	1	-	-	-	-	-	-	-	-	2	-
Bubo virginianus, Great horned owl	1	1	-	-	1	-	-	-	1	-	-	-
Ectopistes migratorius, Passenger pigeon	1	1	0.2	0.0	-	1	-	-	1	-	-	-
Ardeidae, Heron family	1	1	-	-	-	-	-	-	-	-	-	1
Meleagris gallopavo, Wild turkey	159	6	34.8	6.7	32	1	5	1	72	10	43	33
Colinus virginianus, Bobwhite quail	1	1	0.1	0.0	-	-	-	-	1	-	-	-
Total Birds	**167**	**12**	**35.1**	**6.8**	**33**	**2**	**5**	**1**	**75**	**10**	**45**	**36**
Reptiles												
Trionyx spiniferus, Spiny-softshell turtle	1	1	0.5	0.1	-	-	-	-	-	-	1	-
Graptemys/Chrysemys spp., Map/painted spp.	3	1	0.3	0.1	-	-	-	-	-	-	-	3
Terrapene carolina, Eastern box turtle	3	1	0.1	0.0	2	-	-	-	-	2	1	-
Total Reptiles	**7**	**3**	**0.9**	**0.2**	**2**	-	-	-	-	**2**	**2**	**3**
Amphibians												
Rana/Bufo spp., Frog/toad spp.	3	1	-	-	-	-	-	-	1	2	-	-
Total Amphibians	**3**	**1**	-	-	-	-	-	-	**1**	**2**	-	-

Table 11. Continued.

Taxa	Count	MNI	Meat[1] Yield	Percent Meat	B[2]	Cut	Mod[3]	1-92	2-92	21-92	28-92	32-92
	SITE TOTALS							FEATURE TOTALS				
Fishes												
Aplodinotus grunniens, Drumfish	4	1	0.5	0.1	-	-	-	-	2	-	2	-
Centrarchidae, Bass family	1	1	0.5	0.1	-	-	-	-	1	-	-	-
Centrarchidae (*Lepomis* spp. ?)	1	1	0.3	0.1	-	-	-	-	1	-	-	-
Cyprinidae, Minnow family	7	2	trace	-	-	-	-	-	3	-	2	2
Moxostoma carinatum, River redhorse	13	5	8.1	1.6	-	-	-	-	13	-	-	-
Moxostoma spp., Redhorse spp.	26	1	-	-	3	-	-	-	21	-	4	1
Catostomidae, Sucker family	1	-	-	-	-	-	-	-	1	-	-	-
Lepisosteus spp., Garfish spp.	5	1	0.5	0.1	1	-	-	-	4	1	-	-
Total Fishes	**58**	**12**	**9.9**	**1.9**	**4**	**-**	**-**	**-**	**46**	**1**	**8**	**3**
Mollusc[4]												
Anguispira alternata	1	1	-	-	-	-	-	-	-	1	-	-
Total Mollusc	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Other												
Crayfish spp.	1	1	-	-	1	-	-	-	-	-	1	-
Total Other	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Indeterminate												
Large mammal	2079	-	-	-	731	-	3	34	623	373	777	272
Small mammal	33	-	-	-	5	-	-	1	13	2	5	12
Small rodent	31	-	-	-	-	-	-	-	2	1	27	1
Bird	812	-	-	-	354	-	1	15	280	39	294	184
Turtle	11	-	-	-	-	-	-	-	1	-	9	1
Fish	157	-	-	-	1	-	-	-	147	1	6	3
Fish scales present	X	-	-	-	-	-	-	-	X	-	X	X
Shell	9	-	-	-	-	-	-	-	-	9	-	-
Miscellaneous bone	1230	-	-	-	-	-	-	40	731	418	1	40
Total Indeterminate	**4362**	**-**	**-**	**-**	**1091**	**0**	**4**	**90**	**1797**	**843**	**1119**	**513**
TOTAL	**5159**	**55**	**519.4**	**100.0**	**1240**	**16**	**15**	**139**	**2078**	**941**	**1346**	**655**

[1] Kilograms
[2] Burned
[3] Modified
[4] Freshwater mollusc specimens and terrestrial land snails recovered from features were not submitted for analysis.

Mammals

Of the material assigned to the mammal class (n=560), 462 specimens (ca. 83%) represent mature white-tailed deer. A minimum of six individuals is represented by the recovery of a similar number of mostly complete or fragmented left proximal ulnae. The remaining 17% of the identifiable mammal bone represents 13 additional species. These species, in addition to deer, represent mammals (Burt and Grossenheider 1976, Shelford 1963) typical of a mixed mesophytic forest region (Braun 1950). Identified species include wapiti, bobcat, raccoon, black bear, gray fox, vole, rice rat, field mouse, beaver, fox and gray squirrel, woodchuck, and mole, or species more commonly associated with forested, semiforested, and riparian/aquatic habitats.

White-tailed deer (Table 11) dominate the mammal bone sample by specimen count, number of individuals, and percentage of contributed meat (34.7%). Axial (antler, craniofacial, mandibular, dental, vertebral, and costal) skeletal remains account for 45.2%, and forequarter (scapula, humerus, radius, ulna, carpals and metacarpals) and hindquarter (innominate, femur, tibia, tarsal, and metatarsal) account for 21.4% and 19.7% of the deer sample, respectively. Miscellaneous metapodial, phalanx, and sesamoid bones account for 13.6%. A little more than 22% of the deer bone sample had been subjected to some degree of burning, 2.6% of the specimens exhibit modification produced by human use, and 1.1% of the specimens bear cut marks.

Wapiti, although represented by five specimens and one individual, was the second most important species with respect to contributed meat (30.6%). The animal is represented by three antler fragments, one shed beam, and one thoracic spinous. Though the species is represented by a single individual, the quality and quantity of the meat (159 kg), hide, and bone obtained from a single animal would attest to the potential importance of the species to the subsistence economy.

Black bear is the third most important game mammal present in the assemblage, accounting for an estimated 20.6% of the meat consumed by the residents of the New Field Site. It is represented by a rib shaft bearing cut marks and a right humerus with cut marks along the distal aspect of the shaft.

Of the smaller mammals (e.g., bobcat, raccoon, beaver, gray squirrel, and fox squirrel), raccoon and beaver were the more important mammals that were sources of meat, fur, and bone. Small mammal-use accounts for a little more than 5% of the total meat estimate.

Birds

Of the 167 identifiable bird bones, 159 (95.2%) represent turkey. The remaining eight specimens represent small passerine species, hawk species, great horned owl, passenger pigeon, heron family, and bobwhite quail. Turkey was the most significant contributor to the diet, providing an estimated 6.7% of the total contributed meat. All other species contributed a trace amount of meat. Two cut bird bones were identified and four show modification as a result of human use.

Reptiles and Amphibians

Identifiable turtle bones (n=7) were assigned to one semi-aquatic species (spiny softshell turtle), one of two genera (map or painted turtle spp.), and one terrestrial species (eastern box turtle). None of the specimens show obvious signs of modification. Turtles account for approximately 0.2% of the estimated meat consumed by the residents of the New Field Site. These animals were most likely acquired during warm weather months (May to late October).

Amphibians are represented by three skeletal fragments of either frog or toad species. If eaten, toads or frogs contributed very little to the overall diet of the residents of the New Field Site.

Fishes and Molluscs

Of the 215 fish scales and bone fragments recovered from the site, 58 were identifiable to species: freshwater drumfish (n=4), bass family (n=2), sucker species (n=40), minnow family (n=7), and garfish species (n=5). Fishes seem to have been a minor food supplement, providing about 2% of the meat consumed at the site.

Mollusc remains are rare in the analyzed assemblage (these mollusc remains represent fortuitous occurrences in this assemblage; several hundred freshwater mussel shells and terrestrial snail shells were collected from excavated feature contexts but were not submitted for analysis). Nine specimens represent indeterminate bivalve and gastropod fragments. The only identifiable specimen recovered was Anguispira alternata, a common terrestrial snail often associated with moist woodlands.

Butchering Evidence and Modified Bone

The twelve deer specimens displaying cut marks show that the head, jaw, vertebral column, thoracic cage, and hind and forelimb elements were disarticulated and defleshed. The two cut elements of bear (rib and humerus) suggest removal of flesh and disarticulation of the forelimb at the elbow. Two cut bird bones, a carpometacarpus of passenger pigeon and a cuneiform of wild turkey, imply disarticulation of wing components.

A total of 15 bones had been modified. Nine specimens showing modification as a result of human use are identified as chert-working implements (four deer antler tines), awls (four turkey tarsometarsi), and manufacturing debris (a scored and broken bobcat femur). Six additional specimens represent awls, pieces of awls, bone pins, and fragments of other types of objects made from deer, large mammal, turkey, and bird bone.

Discussion

Although small, the faunal collection analyzed from New Field reflects some previously identified trends pertaining to the types of animal resources used, the habitats frequented by the site inhabitants to obtain animals, and the seasons when animal procurement activities were conducted (Breitburg 1992). The focus of hunting activity was centered on white-tailed deer, wapiti, black bear, turkey, and to a lesser extent, small mammals. Aquatic and semi-aquatic resources (i.e., turtles, fish, and mussels) seem to have been minor dietary supplements.

Based on the composition of identified deer remains, the carcass of the entire animal appears to have been taken to the village. The presence of deer antler and the state of epiphyseal union of long bones suggest that deer were taken throughout the year. Further evidence of a year-round pattern of animal procurement activity is suggested by the presence of turtles and fishes. Antler tine tools and awls suggest that chert tool manufacturing and maintenance, and hide-working tasks were common domestic activities of the Fort Ancient residents of the New Field Site.

With regard to these general trends, the faunal assemblage as a whole is typical for the region and time period. This can be seen when the resource composition of the New Field Site is compared to a generalized model of resource composition developed from an analysis of a broad sample of Fort Ancient sites (Breitburg 1992). The model hypothesizes that Fort Ancient sites will show a major, but fairly even, use of large game resources (deer, wapiti, and black bear). The New Field Site, although small in the number of recovered remains, is consistent with this animal exploitation pattern.

HUMAN REMAINS [6]

This section summarizes the human remains recovered from New Field (Wilson 1992). Skeletal elements collected in the late 1970s represented isolated human bones recovered fortuitously from the surface. Fortuitous individual human skeletal elements also were collected from the site surface in 1991 and 1992. Plow-disturbed, discrete clusters of human bone collected from the site surface in 1991 and 1992, with or without dark soil or limestone slabs in association, were considered to represent graves (see feature description) These were assigned feature numbers and all exposed bones were collected.

Burials were identified using two criteria. Primary consideration was given to location, regardless of elements present. For example, a small cluster of cranial fragments was considered to represent an individual based upon spatial data alone, even if no other elements were present. Feature numbers were assigned in these cases. Burials also were identified based on uniqueness of elements, regardless of provenience. For example, specimens recovered from general surface contexts were considered to be burials if identifying characteristics, such as unique age, clearly identified them as a separate individual from all other individuals. No feature numbers were assigned to these burials. Table 12 shows the frequency of skeletal remains and minimum number of individuals (MNI) for New Field. Table 13 shows the frequency of elements not assigned a burial number.

In analysis, each element was identified as to specific bone present, and when possible, area of bone and side represented. Also noted was any evidence of trauma, degenerative disease, pathological conditions, and any post-mortem taphonomic processes that may have affected the bone. The objectives of the analysis, given the incomplete sample from New Field, were to identify the minimum number of individuals; determine age and sex, where possible; and discuss any pathological conditions evident by macroscopic examination. Following a discussion of bone preservation, the characteristics of the New Field burial assemblage will be summarized.

PRESERVATION

Condition of the bone was good to excellent, although only Burial 5 was represented by more than a few fragments. In general, the collagen content appears normal and the cortices are present. Fragmented diaphyses of tubular bones, including femora, tibiae, humeri, ulnae, and radii, were the most frequent elements collected. Portions of the cranial vaults also were represented in several of the burials. As these elements are dense and comprised of compact (or cortical) bone, it is not surprising that they survived at the site. The epiphyses and metaphyses of long bones are made up of cancellous (or trabecular) bone (White 1991). Being more spongy and porous than cortical bone, they are less frequently preserved in archaeological contexts.

Teeth were recovered from three burials at New Field (Table 12). In addition, several unassociated teeth that could not be ascribed to a specific individual were recovered (Table 13). As with tubular bones, teeth preserve well and are sometimes the only skeletal elements recovered from archaeological contexts.

ESTIMATION OF MNI, AGE, AND SEX

Based on the data presented in Table 12, a minimum of nine individuals are represented. Due to the small number of skeletal elements represented by each burial, estimation of age was difficult to ascertain, and sex could only be estimated for two individuals: one is female and one is possibly female. Juvenile age

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[6] The discussion of Human Remains was authored by Jo Ann Wilson, University of Kentucky, Lexington, Kentucky

Table 12. Assigned Burials.

	Surface Burial 1 Juvenile 8-9		Surface Burial 2 Juvenile 11			Surface Burial 3 Adult?		Fea. 42-92 Burial 4 M Adult F?		Fea. 41-92 Burial 5 M Adult Female			Fea. 43-92 Burial 6 Adult?			Fea. 44-92 Burial 7 Adult?			Stain 1-92 Burial 8 Adult?			Fea. 45-92 Burial 9 Adult		
	L	R	L		R	L	R	L	R	L		R	L		R	L		R	L		R	L		R
Frontal				C							F													
Parietal			C		C		P		F	F														
Occipital				C							F													
Temporal			C		C					C														
Sphenoid											F													
Ethmoid																								
Maxilla	P									F														
Zygomatic										P														
Mandible		F								P														
Teeth																								
Maxilla	2		5		6					3														
Mandible			6		6					6														
Scapula										P		P												
Clavicle										C		C												
Ribs										P		P												
Sternum											F													
Vertebrae																				F				
cervical											4-C													
thoracic											5-C													
lumbar											4-P													
sacral											5-P													
Humerus								F		F		P										F		
Radius										C		C												F
Ulna										C		C										F		P
Hand											F													
Innomiate								F		F		P												
Femur									F	F		F				F							F	
Patella										-		-												
Tibia										-		P												P
Fibula										-		P												
Foot											F													
Other																								
Long bone frags											F									F				
Cranial frags														F			F						F	
Vertebral frags																								

Code: C = > 90% present; P = 25-90% present; F = <25% present; blank = absent

Table 13. Unassigned Elements.

	Surface Unassigned A L	Surface Unassigned A R	Surface Unassigned B L	Surface Unassigned B R	Surface Unassigned C L	Surface Unassigned C R	Surface Unassigned D L	Surface Unassigned D R
Frontal				F				
Parietal			P					
Occipital								
Temporal								
Sphenoid								
Ethnoid								
Maxilla			F					
Zygomatic								
Mandible								
Teeth								
Maxilla	1		3					
Mandible			6					
Scapula								
Clavicle								
Ribs			F					
Sternum								
Vertebrae								
cervical								
thoracic								
lumbar								
sacral								
Humerus								
Radius								
Ulna								
Hand								
Innomiate								
Femur								
Patella								
Tibia								
Fibula						F		
Foot							F	
Other								
Long bone frags								
Cranial frags								
Vertebral frags								

Key
C = >90% present; P = 25-90% present; F = <25% present; blank = absent

assignments were based on dental eruption and formation (Ubelaker 1989), and adults were aged by evidence of degenerative changes, degree of dental attrition, cranial suture closure, and general morphological characteristics (Bass 1987; Brothwell 1981; Krogman 1973; Meindl and Lovejoy 1985). Where possible, more than one aging method was employed. Based on these criteria, and an assumed MNI of nine individuals, two juveniles, two middle adults (25-45), and five adults of unknown age were identified. No infants were recovered from New Field.

Of the two juveniles, one (Burial 1) is estimated to have been between 8-9 years old at the time of death, based on Ubelaker's (1989) sequence of formation and eruption of teeth among American Indians. Dental eruption and formation associated with the other juvenile (Burial 2) indicates an age of approximately 11 years (Ubelaker 1989).

Of the two middle adults, one is female and one is possibly female. The gracility of the linea aspera on the right femur shaft fragment of Burial 4 suggests that it may be female. Burial 5 was determined to be a female with an estimated age of 35-39. It was determined to be female based on its wide sciatic notch, the presence of a preauricular sulcus, a low degree of sacral curvature (Bass 1987), and the presence of a large septal aperture on the right humerus that completely penetrates the bony plate separating the olecranon fossa from the coronoid fossa. The latter trait (Finnegan and Faust 1974:10) has been reported more frequently in females than males (Benfer and McKern 1966). Also, the left femur head of Burial 5 has a maximum vertical diameter of 43.5 mm; the right femur head had a diameter of 43.3 mm; and the glenoid cavity had a length of 30 mm. These measurements also suggest that this individual is a female (Pearson 1917-1919:Table 27 in Bass 1987:219; Dwight 1894 in Bass 1987:123 Table 20). The age of this individual was based on auricular surface morphology (Lovejoy et al. 1985) and the presence of a fused sacrum (fusion of the sacrum is complete by age 31 [McKern and Stewart 1957:97]).

ANOMALIES AND PATHOLOGIES

Each element was carefully examined macroscopically for evidence of anomalies or pathological conditions. Six of the individuals (Burials 1, 2, 3, 4, 5, and 9) and one isolated bone exhibit evidence of pathological conditions, two of which had active periosteal lesions at the time of death.

The right mandible fragment of Burial 1 exhibits an active periosteal lesion affiliated with the mental foramen and alveolar ridge. Similar periosteal activity was noted on the alveolar ridge of the maxilla between the deciduous second molar and permanent first molar. In both cases, these lesions may be associated with replacement of the deciduous dentition by the permanent teeth.

Burial 2 exhibits a slight degree of porosity (pitting) of both orbital roofs and the posterior aspect of the right parietal, parallel to the lambdoidal suture, which is interpreted as representing cribia orbitalia. In children, the bones may be thickened, while in adults only pits remain (Mann and Murphy 1990). Thickening of the outer table of the skull may or may not accompany this condition. No thickening of the cranial vault was noted for this individual. An accessory tubercle is bilaterally present on the central portion of the occlusal plane for this individual.

The irregular surface of the outer table of Burial 3's right parietal is a typical bony response to inflammation and proliferation of granulation tissue. The inner table reflects many small pores along the meningeal grooves, indicating hypervascularity in this region as well (Ortner and Putschar 1985:92-93). In addition, there is thickening of the skull, with almost complete fill-in of the diploe by compact bone. Conditions such as these may be caused by a variety of stresses. Trauma in the form of a scalp wound (Ortner and Putschar

1985) or burning, as well as a systemic disorder, such as treponemonal disease, are possibilities. However, caution should be used in making a differential diagnosis on the basis of one bone.

Slight marginal lipping was present on the lateral aspect of the capitulum for Burial 4. The only pathology noted for Burial 9 is a slight remodeling and thickening of the tibia shaft fragment.

The fairly complete left parietal of the isolated bone (Unassigned B, see Table 13) exhibits a slight thickening of the diploe. A small stellate lesion is present on the anterior portion near the medial border of the sagittal suture. This type of lesion is the result of some type of stress, ranging from localized site of trauma (scalp wound) to systemic disorders (endemic syphilis). Observation of a stellate lesion on the cranial vault often infers a diagnosis of syphilis. However, as previously stated, a differential diagnosis based on a single bone, especially one exhibiting nonspecific periostitis or osteo-periostitis, is very difficult and subject to error (Steinbock 1976:94).

Burial 5 represents a nearly complete individual, and thus a more complete description of pathologies is possible. The lateral aspect of the mandibular condyle exhibits slight remodeling. While the posterior aspect reflects some lipping, this condition is not reflected in the left temporal. This may represent temporomandibular joint stress related to arthritis. Because the temporal fossa does not exhibit pitting and/or osteophytes on the articular surface and margin, the lesions on the condyle may represent trauma or infection (Mann and Murphy 1990:43).

Several lines of evidence suggest that Burial 5 experienced a great deal of trauma or stress during her lifetime. When viewed as a whole, the periosteal activity associated with the pectoral girdle (scapula and clavicle) is located in areas of muscle attachments. This localization suggests activity-related stress rather than systemic disorder. For instance, both the left and right scapula reflect periosteal lesions on the body of the acromion process. This area provides attachment for the *deltoideus muscle* and the upper fibers of the *trapezius muscle* (White 1991). Well-healed lesions are present on the inferior border of the left acromion process as well as the ventral aspect. The right scapula displays periosteal lesions on the inferior aspect of the acromion process and the supraspinous fossa, as well as slight lipping in the glenoid cavity. There is a small focal lytic lesion located on the acromioclavicular joint surface. The left acromioclavicular joint is affected in that it has a somewhat pinched appearance on the lateral aspect of the clavicle and shows remodeling on the joint area of the clavicle. This is probably trauma or stress related. The clavicles exhibit bilateral well-healed periosteal lesions along the diaphyses more in the mid-shaft or lateral than sternal regions. The locations of these lesions also suggest stress or trauma.

Similarly, activity-related stress is expressed on the right humerus in the form of a bony build-up on the medial and lateral aspects of the distal portion of the bone. The right humerus displays well-healed periosteal lesions on the distal aspect, predominantly on the posterior section, but some on the ventral as well.

The right ulna exhibits an active periosteal lesion on the proximal medial aspect. The left ulna displays a focal lytic lesion on the proximal lateral aspect near the site of the connective tissue with the radial tuberosity. This lesion may also be activity related. The roughened appearance at the site of the brachial tuberosity for the insertion of the *brachialis muscle*, a flexor of the elbow, is bilateral, but bigger on the right.

The diaphysis of the distal aspect of the right radius exhibits extensive well-healed remodeling. This is possibly the site of trauma, such as a fracture, but without a radiograph, it is impossible to discern. This may also be activity related. Well-healed remodeling is also expressed, but to a lesser degree, on the left radius. This would further suggest activity-related stress.

No lipping was noted on either the left or right femur head. The anterior distal portion of the right femur fragment exhibits remodeling and a well-healed periosteal lesion. An elevated area of bony response is also noted.

The nearly complete right innominate exhibits a fairly large area where the three bones of the os coxae, the ilium, ischium, and pubis, come together and fuse. The acetabulum is not shallow, as would be expected in a congenital condition, suggesting that this condition is developmentally related (Mann and Murphy 1990). This is further confirmed by the shallow fovea capitus on the femoral heads. There may have been some sublaxation, but no indication of chronic dislocation such as a second joint or lipping on the acetabulum is evident (Mann and Murphy 1990; Ortner and Putschar 1985).

The lateral aspect of the posterior region of the sacrum, adjacent to the auricular surface, exhibits a bony response. This may be trauma related.

Cervical vertebrae 4-7, thoracic vertebrae 1-3, and lumbar vertebrae 2-5 were recovered for this individual. In addition, the eighth and ninth thoracic vertebrae collected as part of a general surface collection in 1977 have been assigned to this burial based on similarity in appearance and age. Also, T8 and 9 were not recovered along with the other vertebrae, adding plausibility to this assignment. The epiphyseal rings are completely fused to the centra on all vertebrae. Slight lipping is noted on L3 and T8 and 9, but no osteophyte development was present. On T1, the articular facets for the ribs are irregular. This supports the possibility of a trauma, as suggested by exostosis seen on the superior ridges of some ribs.

The eighth thoracic vertebra displays a linear depression on the inferior end plate. The ninth thoracic vertebra has a circular depressed lesion on the superior end plate. Erosive lesions of this type suggest the presence of Schmorl's nodes (Ortner and Putschar 1985). This condition is common in the elderly and is a result of degenerative disc disease. Schmorl's nodes in subadults result from trauma, such as heavy lifting, a fall from height, trauma during physical exercise, and similar activities (Mann and Murphy 1990).

In general, the abnormalities observed on the skeletal elements associated with Burial 5 indicate that most were probably activity-related as opposed to resulting from disease. It is possible that an activity such as grinding corn may result in the type of lesions seen in the pectoral girdle. This certainly is not the only explanation for these conditions. It is suggested as a possibility, as it is assumed that the occupants of New Field were horticulturalists and that the grinding of corn would have been a normal activity for a female member of the village.

TEETH

Dentitions were examined for carious lesions, abscessing, and degree of attrition (wear). Dental caries, resulting from the demineralization of enamel as a component of a disease process, were identified according to location on each tooth, tooth type, and number of lesions per tooth. The presence of dental plaque and fermentable carbohydrates in the diet are necessary for formation of carious lesions. However, the lack of the disease does not necessarily reflect a diet poor in fermentable carbohydrates (Hillson 1986:287). No abscesses are present in any dentitions recovered from New Field. Degree of attrition was scored according to Smith (1984). This method was employed because attrition could be scored for incisors, canines, and premolars as well as molars.

Attrition on the first molar of Burial 1 was scored 2, moderate cusp removal (blunting). Burial 2's dentition had the following scores: the incisors were scored as 2, canines 1, premolars 1, first molar 2, and second molar 1. Mild enamel hypoplasia was noted on the canines of Burial 2, a juvenile.

Several teeth were recovered from Burial 5. A left maxillary fragment contained an intact first and second molar. The third molar was lost postmortem. The first molar exhibits a carious lesion on the interproximal aspect. Wear for the first and second molars was scored at 3 (full cusp removal and/or some dentin exposure, pinpoint to moderate) and 2 (moderate cusp removal [blunting]), respectively (Smith 1984).

The left mandibular portion from Burial 5 retained all dentition with the exception of the central incisor, which was lost portmortem, and the first molar, lost antemortem and completely resorbed. The first molar exhibits a small carious lesion on the buccal aspect. "Faux caries" (Haskins et al. 1995) are present on the interproximal aspect of the second premolar, as well as the buccal aspect of the second and third molars. A ridge of reactive bone build-up is present around the buccal aspect of the third molar. Within the range of the lingual aspect of the second molar, some slight pitting was observed along the alveolar ridge. This is probably associated with the loss of the first molar. No alveolar resorption or abscesses were present.

The remaining dentition data were collected from two unassigned elements (Table 13). A left mandibular second molar was scored as 2 (moderate cusp removal [blunting]) (Scott 1979). Three occlusal surface caries were noted in the crevices of this molar, one each on the buccal, mesial, and lingual aspects. This type of caries is often associated with the molars.

A maxillary fragment retained the left central and lateral incisor, as well as the left canine and first premolar. Attrition was scored as 5, large dentin area with enamel rim complete (Smith 1984), indicating moderate to heavy wear. Slight alveolar resorption suggests possible periodontal disease (Ortner and Putschar 1985). This diagnosis would be strengthened if calculus were present in association with the alveolar resorption.

DISCUSSION

A minimum of nine individuals (two juveniles, two middle adults aged 25-45, and five adults of unknown age) were recovered from the New Field Site. Although two juveniles were recovered, no infants were represented and no males were positively identified. The size of the New Field skeletal collection, as well as its bias toward females, precludes any attempt to reconstruct the demography of this Fort Ancient village.

Some statements can be made concerning the paleopathologies identified at New Field, however. Like Capitol View (Haskins et al. 1995) and Buckner (Robbins 1971), a large percentage of the New Field skeletal material exhibited periosteal lesions. Robbins (1971) noted that all of the Buckner remains, except fetuses and some infants, exhibited a high incidence of infection, disease, and trauma. Although infection, disease, and to a lesser degree, trauma (or the possibility thereof) are present at Larkin (Aaron Zibert, personal communication 1996), Capitol View (Haskins et al. 1995), and New Field, the percentages are not as high as those reported for Buckner.

Examination of the dentition of burials recovered from Capitol View, Larkin, and New Field revealed the presence of dental caries at these sites. Abscesses, however, were only present on the Capitol View and Larkin dentition (Haskins et al. 1995; Aaron Zibert, personal communication 1996), and mild hypoplasia was only noted in one New Field burial. These data differ from those recorded by Cassidy (1972) for the burial population from Hardin Village, a late Madisonville horizon Fort Ancient site located in northeastern Kentucky. Unlike central Kentucky Fort Ancient groups, the residents of this community had poor dental health: caries and abscesses (indicative of a diet high in carbohydrates, especially corn) and enamel hypoplasia were present in a large percentage of the Hardin Village population (Cassidy 1972). Human stable carbon-isotope ratios (C12/C13) from northeastern and central Kentucky Fort Ancient sites indicates that Fort Ancient groups living in both areas consumed large quantities of corn, with central Kentucky groups consuming somewhat more corn than Fort Ancient groups living along the Ohio River (Broida 1983, 1984; Shurr 1994; Shurr and Schoeninger 1995). Since corn was an important part of the central Kentucky Fort Ancient diet, it was expected that the central Kentucky burial data also would show a high incidence of dental caries. The low incidence of tooth decay in central Kentucky Fort Ancient populations may be due to sampling biases, or it could reflect differences in food preparation and consumption. Analysis of a larger skeletal sample is needed before this issue can be addressed.

RADIOCARBON DATES

Charred wood samples from two of the five features (Feature 2-92 and Feature 21-92) excavated during the 1992 New Field investigations yielded radiocarbon dates of A.D. 1310(1418)1455 and A.D. 1400(1440)1611, respectively (Table 14). At two standard deviations, these dates overlap between A.D. 1400 and A.D. 1455, which suggests that the New Field Fort Ancient component dates to the early part of the Madisonville horizon. Such an occupation date range appears to be somewhat early, however, when considered relative to the characteristics of the ceramic and lithic artifact collections from the early Madisonville horizon Capitol View Site (Henderson 1992) and late Madisonville horizon Larkin Site (Pollack n.d.; Pollack et al. 1987).

Comparison of the New Field materials and chronometric dates with those from Capitol View and Larkin suggests that New Field was occupied sometime after Capitol View and sometime before Larkin. As with New Field, Capitol View's radiocarbon dates (Henderson 1992:232) place it near the beginning of the Madisonville horizon. Thus, based solely on radiocarbon dates, these two sites could be considered contemporary. However, certain aspects of the New Field ceramic assemblage (e.g., notched lips; more plain surfaced ceramics; a larger percentage of decorated specimens) and lithic assemblage (e.g., predominance of Type 5, 6, and 7 fine triangulars) suggest that this site was occupied somewhat later than Capitol View, using characteristics identified by Henderson et al. (1992:268-269). The later Larkin Site ceramic assemblage (Pollack n.d.) lacks the amount of incised decoration present within either the New Field or Capitol View assemblages and contains an even greater percentage of plain surfaced ceramics. These trends suggest that the date range for the New Field Fort Ancient village occupation should be moved forward in time ca. 50-100 years, relative to the radiocarbon dates, to between A.D. 1450 and 1550.

RESULTS OF THE 1992 INVESTIGATIONS

The 1992 investigations of the New Field Site documented 37 features, one burned area, one structure, one stain (possible structure), and five graves (Figure 11). Methodologies employed during these investigations documented features that were visible as surface stains and concentrations of artifacts, ash, or charcoal. Most of the pit features consisted of dark soil stains that contained cultural materials, burned soil, ash, and/or charcoal. They varied in size and thickness, ranging from 1.0-3.6 m in diameter (with most having a diameter of less than 2.0 m), and ranging from 5-25 cm in thickness below the plowzone. All were considered to date to the Fort Ancient occupation of the site due to the identity of the materials recovered on the surface or in soil cores.

Five of the 37 pit features (features 1-92, 2-92, 21-92, 28-92, and 32-92) were sampled through the excavation of 1 x 1 m units. Features 2-92 and 28-92 were large, deep, stratified trash pits (Figure 12 and 13). Both contained large quantities of subsistence remains, as well as shell tempered ceramics and lithics. The upper

Table 14. Radiocarbon Dates.

Laboratory Number	Radiocarbon Age	Calibrated Radiocarbon Dates at Two Sigma (Stuiver and Pearson 1986)	Material Dated
BETA-60196	510 ± 50 B.P.	1310 (1418) 1455	mixed woods
BETA-60197	450 ± 50 B.P.	1400 (1440) 1611	honey locust wood

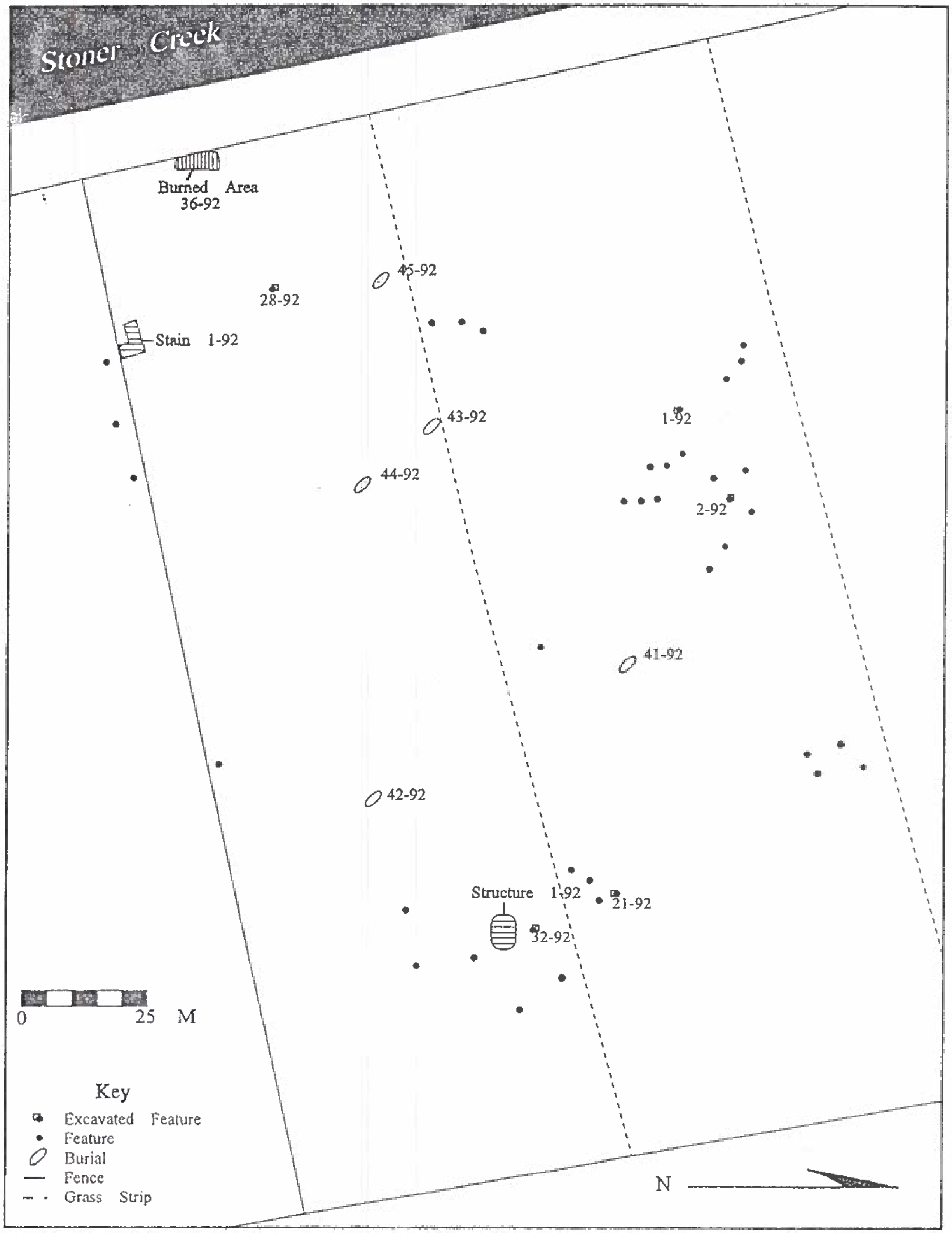

Figure 11. Distribution of Features Evaluated During the 1991/1992 Investigations Located in the Central and Southern Sections of the Terrace at New Field.

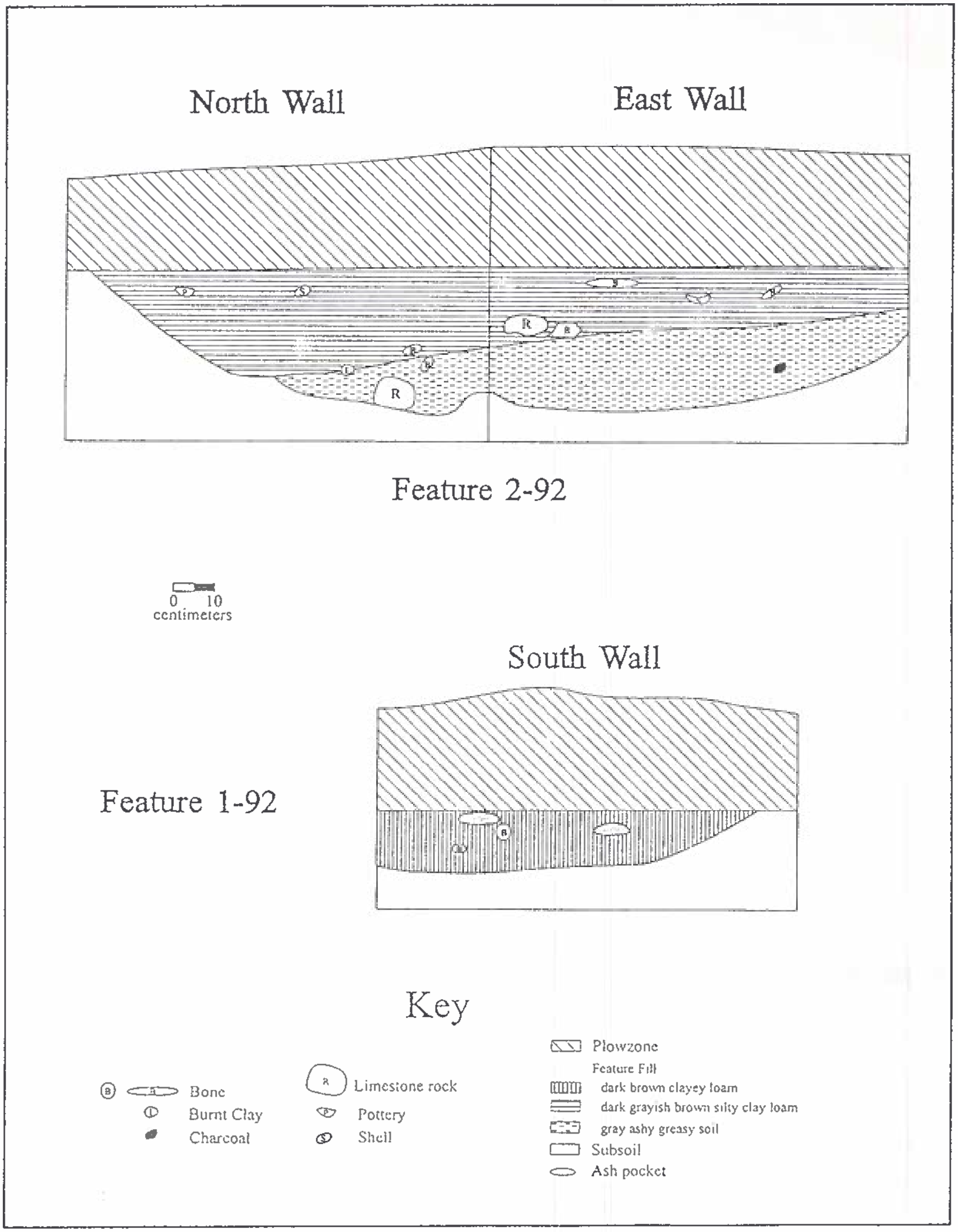

Figure 12. Profiles of Feature 1-92 and Feature 2-92.

zone in each pit was a dark grayish brown silty clay loam mottled with charcoal. It overlaid a zone of gray ashy greasy soil (Feature 2-92) or a zone consisting of a light gray silty clay loam containing ashy pockets of soil (Feature 28-92). In neither case was any in situ burning observed.

A zone of light to medium brown silty clay loam containing light to yellowish brown mottling was documented for Feature 28-92 below the two zones containing Fort Ancient materials (Figure 13). The excavation of a shovel probe and further soil coring failed to encounter the subsoil at 190 cm below surface within this feature. Small, thick limestone tempered cordmarked sherds were recovered from this zone, interpreted as representing deposits from an earlier, Woodland occupation of the site.

Features 1-92, 21-92, and 32-92 were somewhat smaller and in general did not produce the quantities of artifacts and subsistence remains recovered from the stratified features (Figure 12). Feature matrices ranged from a dark brown clayey loam containing charcoal mottles and ash pockets (Feature 1-92) to an ashy gray brown silty clay loam (Feature 32-92) to a medium brown silty clay loam mottled with charcoal (Feature 21-92). Again, no in situ burning was observed in these features.

Feature 6/36-92, the burned area, was an oblong area located near Stoner Creek, consisting of a concentration of chunks of burned soil (Figure 11). A zone of burned orange soil extended 20-30 cm below the plowzone in this locality. None of the burned clay fragments examined in the field or laboratory appeared to represent daub. Also, no artifacts, charcoal, or ash deposits were noted in association with this feature. Thus, without excavating this feature, it is difficult, if not impossible, to characterize.

Structure 1-92 consisted of a rectangular stain of dark soil mottled with charcoal that measured 4.9 m (north-south) by 7.7 m (east-west) (Figure 11). Cultural materials recovered from or observed on the surface of this feature included ceramics, lithics, bone, shell, and wood charcoal. This feature measured approximately 5 cm thick in most places, but in four areas, slightly thicker deposits were documented that may represent the locations of internal features, posts, or areas where house deposits were less affected by plowing. It could not be determined if this structure contained a hearth.

Very dark soil and a fairly dense concentration of artifacts (including the engraved shell gorget) were documented as Feature 5/Stain 1-92 (Figure 11). Due to its less regular shape and less consistent thickness, this stain was not assigned a structure number, although it may, in fact, represent a structure. Ashy soil deposits were located within the stain, as was a small charcoal concentration. In some places, pockets of dark soil deposits measuring 5 cm thick were present below the plowzone, but in other areas, deposits below the plowzone were much thinner. As with Structure 1-92, no areas of red burning that might indicate the location of a hearth were observed in association with this stain.

Fort Ancient burials are generally primary inhumations placed in shallow pits (Henderson 1992; Henderson et al. 1992; Sharp and Pollack 1992). The New Field sample appears to reflect this pattern. In 1992, human remains were recovered from seven locations, five of which are considered to represent graves (Figure 11). It is unclear whether the human remains from the other locations (Stain 1-92 and surface contexts [Unassigned D, Table 13]) reflect the presence of intact graves or simply isolated skeletal elements in poor context.

At some Fort Ancient sites, one or two layers of limestone slabs are known to have been used to cover burials (Wayne Estes, personal communication 1992; Pollack et al. 1987). Two of the five graves at New Field, Feature 41-92 and Feature 42-92, were associated with limestone slabs located either on the surface (Feature 41-92) or located below the surface, recorded as a result of soil coring around the bones (features 41-92 and 42-92). No dark soil stains were associated with these features, however.

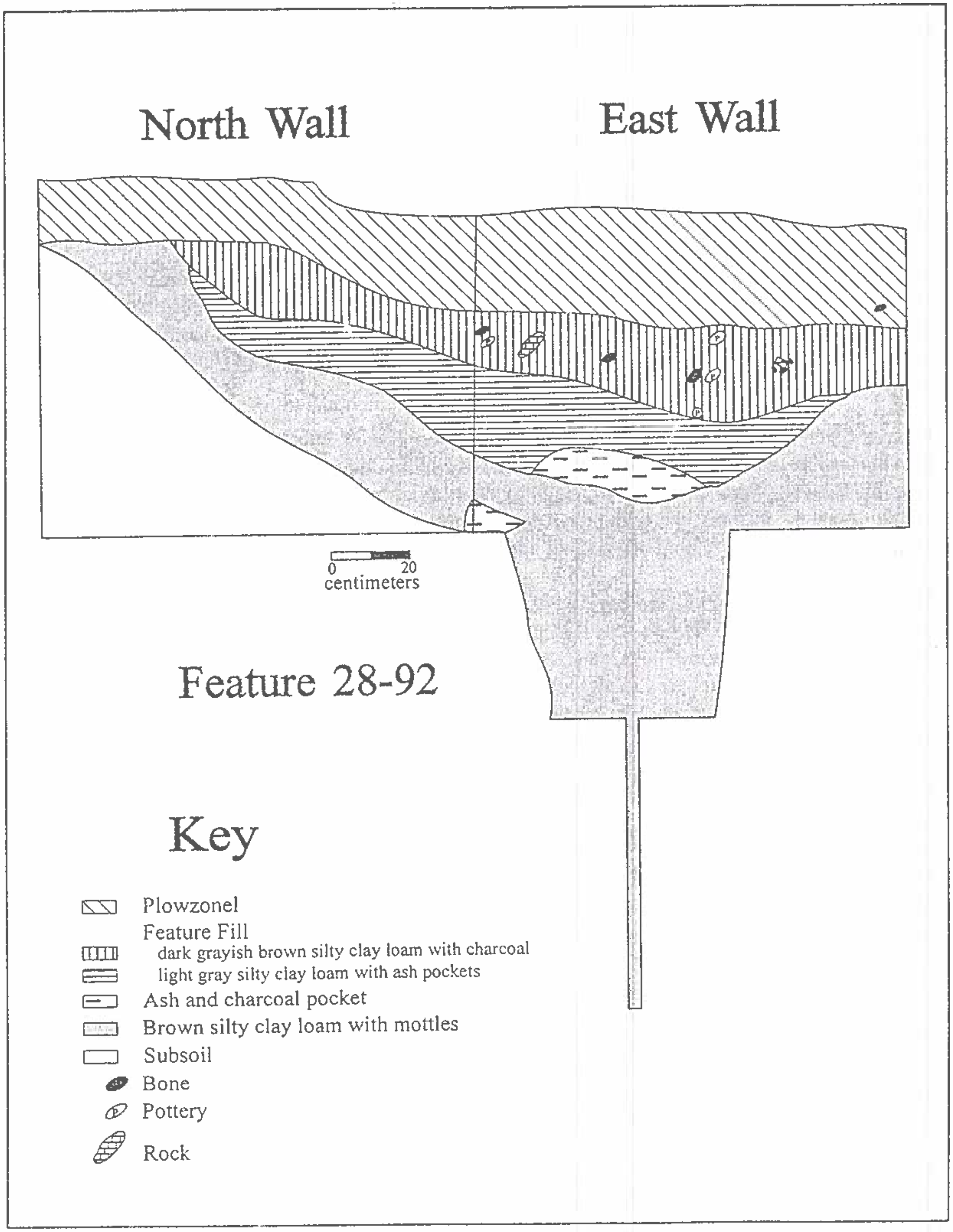

Figure 13. Profile of Feature 28-92.

Features 43-92, 44-92, and 45-92 were expressed as isolated concentrations of human bone identified on the surface. No discernable soil discoloration and no limestone rock slabs were present on the surface or in soil cores.

Fourteen possible grave locations, each consisting of limestone slab concentrations, were documented in 1992. However, limestone slabs also appear as residual rocks in the subsoil at New Field. Since the presence of limestone slabs on the surface may or may not indicate the presence of graves, and because no human bone was associated with the rocks, none of the 14 limestone slab concentrations were recorded as graves.

Individual human elements also were collected from general surface contexts at New Field during all four seasons of research. Since these specimens could not be associated with any particular locality, they were not considered graves. However, aspects of human bone elements permitted identification of some as discrete burials (see human remains discussion).

VILLAGE PLAN

An examination of the spatial distribution of the New Field features can provide general insights into the organization of this and other early Madisonville horizon Fort Ancient communities. Although found in all areas of the site, features interpreted as pits and structures tend to occur in clusters that vary in size (Figure 14). The smallest clusters contain four pit features; four pit features and a grave; or three pit features and a stain that may represent a domestic structure. The largest clusters contain ten pit features and a structure, or 16 pit features. Features that could not be associated with any cluster consist of two pit features and four of the five graves (Figure 14). The burned area, due to its enigmatic identity and location almost equidistant from two of the clusters, was not considered to be associated with a cluster.

The structure, as well as the stain, are interpreted as domestic structures, while most of the pit features are interpreted as trash disposal areas. Trash disposal areas are located in the vicinity of the identified structures (Figure 14), although not all trash disposal areas are associated with documented structures. The association of trash disposal areas with structures is a pattern expressed at other Fort Ancient villages, such as Capitol View (Henderson 1992) and the Florence Site Complex (Sharp and Pollack 1992). Therefore it seems reasonable to assume that the feature clusters documented at New Field represent residential areas within the community.

As a result of these investigations, a total of five residential areas were documented at the site (Figure 14), with the largest ones probably representing areas within the community that were occupied by more households or for longer periods of time. These residential areas define an oval village measuring 180 m (northeast-southwest) by 150 m (northwest-southeast) (Figure 14). The center of this village is generally devoid of features and artifacts, which suggests that it may have functioned as a plaza.

Only one of the graves could be confidently associated with a residential area; the others tended to be located toward the center of the site, away from the residential areas. A similar pattern has been documented for grave location at the contemporary Capitol View Site (Henderson 1992). At middle Fort Ancient sites, however, graves were located in a mortuary zone between the plaza and the residential zone (Sharp and Pollack 1992). During the late Madisonville horizon, the dead were buried in discrete cemeteries, such as those identified at the nearby Larkin Site. A general lack of association between graves and domestic living spaces in central Kentucky during the late Madisonville horizon also is consistent with mortuary trends documented at sites in northeastern Kentucky, such as Hardin Village (Henderson et al. 1992). At New Field, the practice of interring the dead away from residences and close to the center of the community represents at once a continuation of the middle Fort

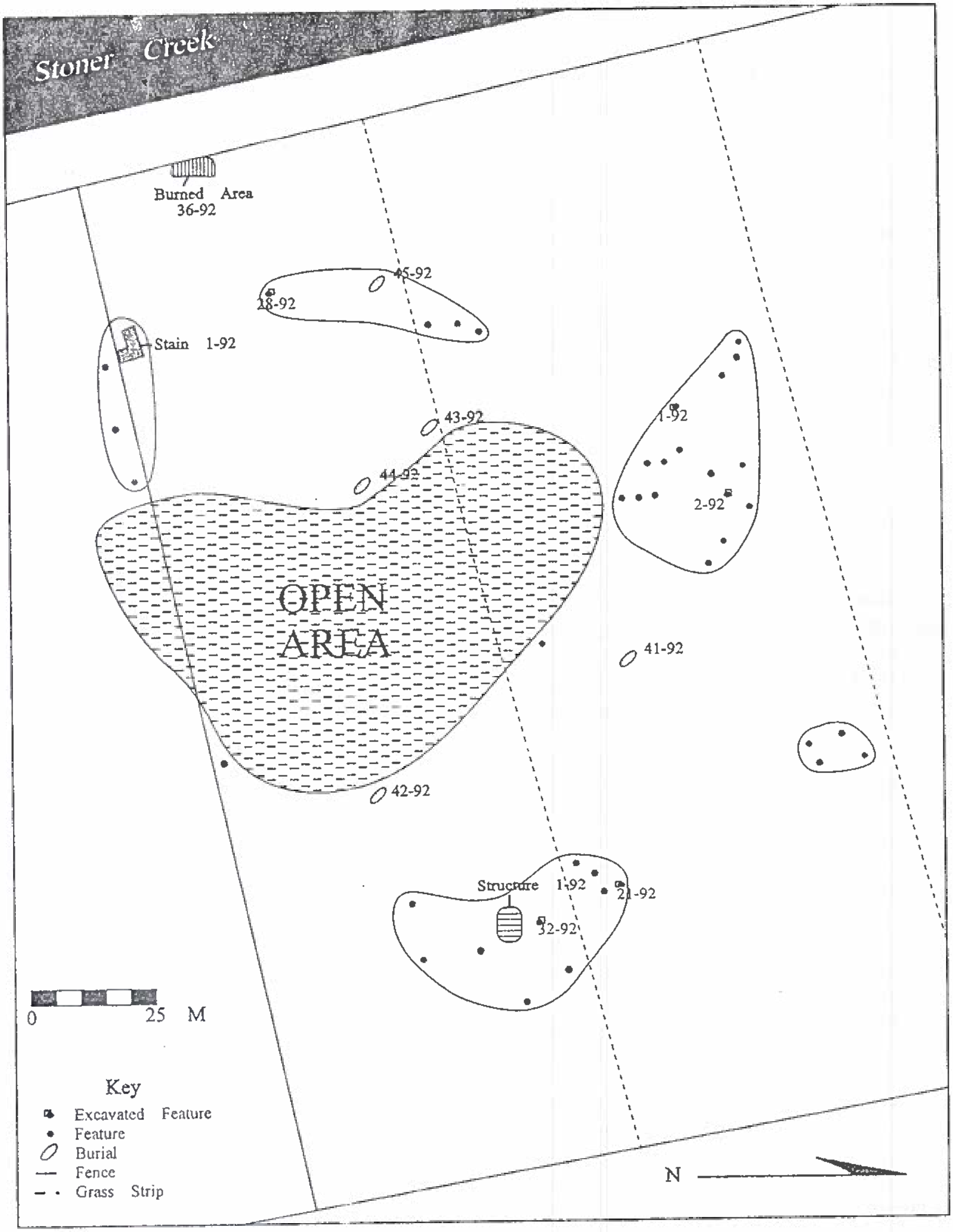

Figure 14. Distribution of Features, Showing Clusters and Open Area or Plaza.

Ancient pattern (the dead buried close to the village center) and a change in that pattern (the dead were no longer interred in a ring surrounding the plaza).

Based on these observations, it appears that the plan of the village at New Field most closely resembles that of the contemporary Capitol View Site: groups of structures and associated trash disposal areas comprising residential areas that surround an open area or plaza, with the dead interred toward the center of the site apart from the residential areas. This type of community organization differs from the well-defined concentric mortuary, residential, and trash disposal zones documented for earlier middle Fort Ancient villages (Sharp and Pollack 1992; Heilman et al. 1990). Despite these differences in village plan between middle Fort Ancient and early Madisonville horizon communities, they share the presence of a central area or plaza, with the dead buried close to the village center. Perhaps changes in sociopolitical organization contributed to the shift from a village plan consisting of concentric activity zones to discrete residential areas. It is worth noting that villages organized in this manner could have more easily accommodated new households than circular villages.

SUMMARY

Based on the analysis of materials collected from three seasons of general research at New Field, and the more intensive investigations carried out in 1992, the New Field Site can be considered a good example of an early Madisonville horizon Fort Ancient village in the central Bluegrass. Based on characteristics of the site's diagnostic artifacts and a comparison of the ceramics and lithics from this site with those from Capitol View and Larkin, it seems likely that this Fort Ancient community was occupied sometime during ca. A.D. 1450-1550.

The ceramic collection is characterized by Madisonville Plain and Madisonville Cordmarked vessels that exhibit a high percentage of decoration in the form of incising on plain necks of globular jars. Jar handles are parallel-sided or triangular (convergent-sided) straps. Bowls, some with notched rim strips, and pinch pots complete the New Field vessel assemblage. The chipped stone tool assemblage is dominated by type 5, 6, and 7 Fine Triangular projectile points, and Crude Triangular projectile points. Few bifacial, tear-drop shaped endscrapers are present in the collection. New Field subsistence patterns are consistent with those documented for other Kentucky Fort Ancient sites: a heavy reliance on corn and beans supplemented by wild plants and a preference for white-tailed deer, wapiti, black bear, turkey, and to a lesser extent, small mammals. Though few in number, worked shell ornaments, especially a gorget incised with the figure of a bird, imply that the New Field site inhabitants participated in some form of extraregional exchange.

The distribution of pits, structures, and graves at New Field suggests that this Fort Ancient community was organized around a central area or plaza generally devoid of features and artifacts. The village consisted of several residential areas that contained structures, trash disposal areas, and work areas. The dead appear to have been interred towards the center of the site away from the residential areas.

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CONTROLLED SURFACE COLLECTION AND SALVAGE DATA RECOVERY FROM THE TWIN MOUNDS SITE (15BA2)

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ABSTRACT

This paper presents an overview of the recovered material culture and surface patterning of a small gridded area of the Twin Mounds Site (15Ba2), Ballard County, Kentucky. It also documents continued site destruction and a prehistoric structure revealed in the walls of a pot hunter's hole. Material culture characteristics are consistent with those presented by Kreisa (1988), taking into account the different recovery methods used in both studies. Although spatial analysis results are inconclusive, distributional patterning at Twin Mounds is not dissimilar to that revealed at the Adams Site (15Fu4) by Stout (1989).

INTRODUCTION

First described by Collins (1882), who mistakenly identified a levee remnant as a third mound, the Twin Mounds Site has been the subject of sporadic professional interest (Loughridge 1888; Moore 1916; Thomas 1894; Webb and Funkhouser 1932). Kreisa (1988), who conducted the site's first major investigation in the late 1980s, produced a detailed topographic map of the site, clarified the boundaries of the Mississippian and Late Woodland occupations there, and demonstrated the existence of a pre-A.D. 900 occupation of the general site area. He exposed the remnants of a house basin, a single-set post structure, and a wall trench structure, each of which was constructed in the early part of the Mississippi period. He also identified a later Mississippian occupation, probably dating to A.D. 1250-1350, represented by midden deposits and another house basin.

The studies reported in this paper are part of a project directed at making a controlled examination of the horizontal distribution of the Twin Mounds surface assemblage in order to extrapolate from the site's well-documented vertical sequence across a portion of the site surface. Another goal is to compare identified activities and distributional patterns at a small community with those at a large town in reasonably close proximity; i.e., the Adams Site in Fulton County, where Stout (1989, 1995a) delimited patterns of probable household clustering in the village areas, using a directional variance method. Before the current study, Stout's method had been used only at the Adams Site. Twin Mounds provided the opportunity to test the directional variance method at a smaller site in close proximity, and to compare observed distributional patterning at Adams with distributions found at Twin Mounds.

If the method could be adapted satisfactorily, testing Twin Mounds for certain community patterns would be a straightforward task. Stout's (1989) spatial analysis of the Adams Site revealed that the community was divided along both functional and social lines during the Mississippi period. Stout found redundant domestic activity area composition throughout the village areas, each cluster containing debris representing essentially the same activities from one household to another, which led him to conclude that Adams Site households were substantially self-sufficient production units. He also identified a pattern of consistent spacing between domestic clusters (25-30 m from the center of one cluster to the center of the next), suggesting social regulation and community planning. These are among patterns to be examined at other Mississippian sites; however, the artifact assemblage was also valuable. Descriptions of the large surface collected assemblage (Stout 1987, 1989, 1995b) have helped delimit culture historical relationships with other nearby Mississippian sites (e.g., Garland 1992; Wesler 1989).

Questions concerning the spatial analysis of the Twin Mounds Site are presented elsewhere (Burks 1993, 1995a, 1995b; Stout 1995a); however, a synopsis is provided to orient the reader. The focus of the present discussion is instead on by-products of the Twin Mounds spatial analysis project: (1) the large material culture assemblage, which provides additional information on the site's final indigenous occupation phases, and (2) the data salvaged from a pot hunter's hole at the top of Mound B.

SITE AND SETTING

Twin Mounds (15Ba2) is a small multicomponent site on a natural levee in Barlow Bottoms of western Kentucky, less than 1 km east of the present channel of the Ohio River and 7 km north of this river's confluence with the Mississippi River (Figure 1) (Kreisa 1988: 45; Webb and Funkhouser 1932). The site consists of two mounds built atop the highest site elevations, a plaza, and village areas, all dating to the Mississippi period, as well as sizable concentrations of Late Woodland deposits, together covering an area of over 14-15 ha (Kreisa 1988: 45) (Figure 1). The Late Woodland material is primarily located on a ridge to the southwest of the Mississippian mound and plaza complex (Kreisa 1988: 45) (Figure 1). The prehistoric plaza, south of Mound A and east of Mound B, is surrounded by village deposits to the north, south, and east. A shallow swale, perhaps a slough filled by siltation, appears to surround a large portion of the village.

For over a century, most of the site has been planted in row crops. Historic farmsteads were once scattered along a dirt road crossing the Barlow Bottoms. In the nineteenth century, a house was constructed on the top of Mound A, the smaller of the two mounds (Kreisa 1988: 45). That house and most of the structures on the Barlow Bottoms disappeared from the landscape in the mid-1930s, when the Ohio River rose to an unusually high flood level and inundated most of the area. The north and south sides of Mound B have been modified by the construction of a barn and by land leveling (Kreisa 1988: 45). Both mounds are now thinly wooded, with large areas covered by sparse grass or without any vegetation. Further notes on the condition of the mounds are presented in a later section of this paper.

The seasonally inundated Barlow Bottoms are 8 km wide at their widest (Kreisa 1988). According to Davis (1923), the natural vegetation in the Barlow Bottoms vicinity includes stands of willow and cottonwood lining the Ohio River channel, and cottonwood, elm, sweetgum, and sycamore forests with cane understory located on current and relict natural levees. Davis also reports that sweetgum, elm, and cypress were native vegetation in seasonally inundated swamps and low portions of old back slope remnants, and that water tupelo and bald cypress grew in the sloughs and swamps. Most of Barlow Bottoms has been plowed and planted in row crops since Davis' survey.

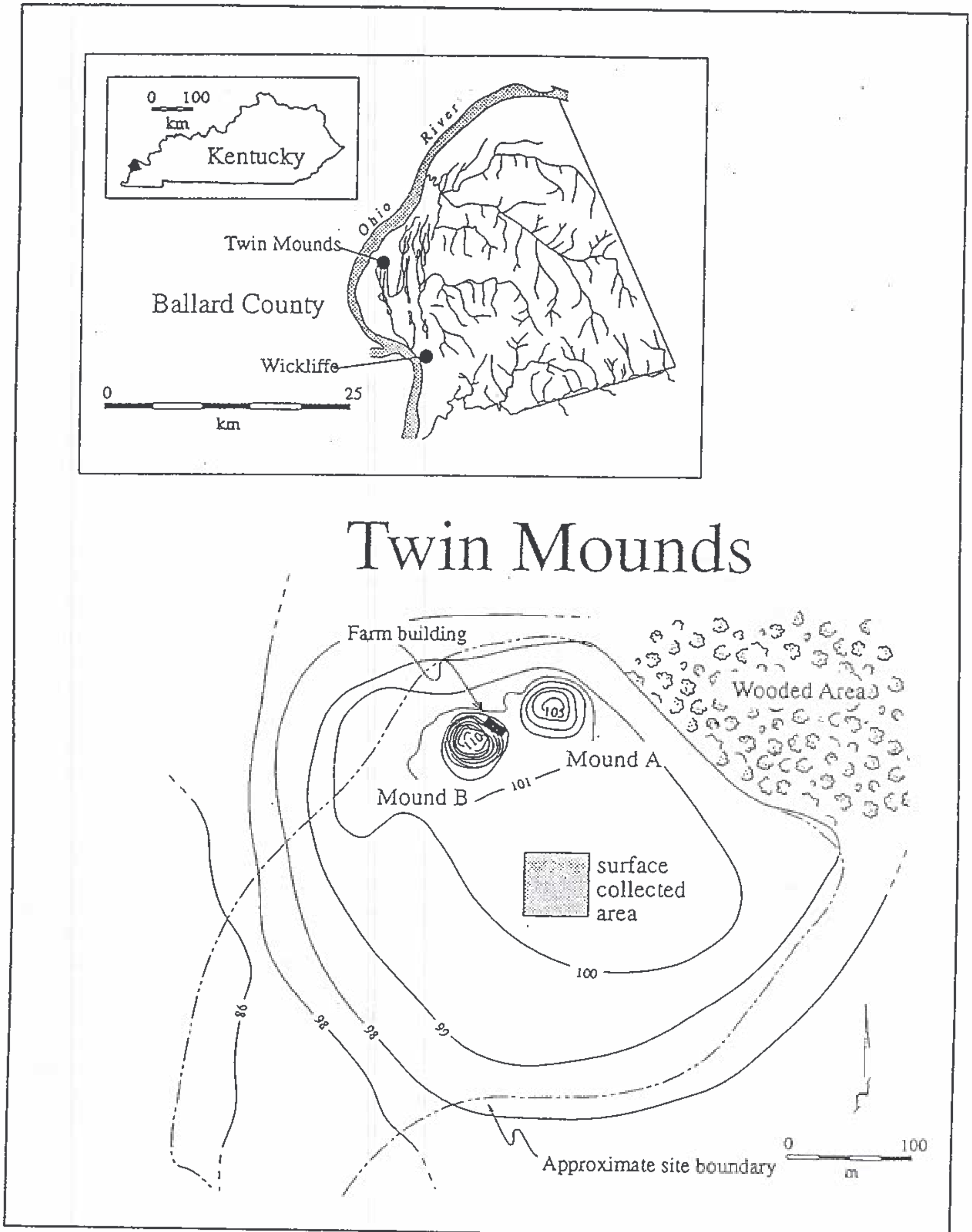

Figure 1. Topographic Map of the Twin Mounds Site (15Ba2) in Ballard County, Kentucky (after Kreisa 1988: Figure 13; Webb and Funkhouser 1932).

METHODS

The surface investigations conducted at the Twin Mounds Site were adapted from methods used by Stout (1989; 1995a) on the Adams Site, a 7.3 ha Mississippian town with seven mounds, two plazas, and midden as thick as 1.5 m, about 100 km south of Twin Mounds. Artifacts were collected from a 50 m by 50 m grid in 5 m by 5 m collection units at the southeast corner of the Twin Mounds plaza, as delimited by Kreisa (1988). Site preparation included plowing (without disking) and a light rainfall. For consistency from unit to unit, collecting was time-controlled with crew members recollecting each other's units.

MATERIAL CULTURE

CERAMICS

Ceramics are the most abundant material class, consisting of 9,318 potsherds, of which 8,524 are attributable to Mississippian manufacture, 642 to Late Woodland, and 152 to uncertain origin. A total of 437 rims, mostly too small for vessel form and size determination are present in the assemblage. Profiles of some larger rim sherds are shown in Figure 2. The ceramic typology used below follows Kreisa (1988); Phillips (1970); Phillips et al. (1951); and Stout (1989).

The Mississippian ceramic assemblage is dominated by Mississippi Plain and Bell Plain (Table 1). Mississippi Plain, the coarse shell tempered plainware commonly found throughout the Middle and Lower Mississippi valley (Phillips 1970; Phillips et al. 1953), comprised 74% of the ceramic assemblage. Bell Plain, the burnished, fine grog and shell tempered type also common throughout the Middle and Lower Mississippi valley (Phillips 1970; Phillips et al. 1953), comprised 15% of the ceramic assemblage. The balance of Mississippian pottery comprises less than 2% of the entire ceramic assemblage, and includes the following types: Matthews Incised, Kimmswick Fabric Impressed, Crosno Cordmarked, Old Town Red, Wickliffe Thick, O'Byam Incised, untempered plain, Mound Place Incised, and Nashville Negative Painted, in declining order of frequency. Late Woodland types include grog tempered Baytown Plain (5%), Mulberry Creek Cordmarked (<2%), and Larto Red (<1%) (also called Larto Red-Filmed).

Although the ceramic types with the greatest representation are the same in both this study and in Kreisa's (1988) investigation, the proportions in this assemblage are strikingly different. The large Mississippian counts relative to Woodland in the present assemblage are easily explained by the recovery method; i.e., the more recent material is in deposits closer to the surface, which are more likely to become part of the plow zone, and therefore more likely to be brought to the surface by plowing. Once these objects are brought to the surface, their numbers are likely to increase as they are broken into more but smaller pieces by each new pass of the plow (Dunnel and Simek 1996). Excavation, by its very application, therefore recovers comparatively undisturbed materials from the entire depth of deposits, which in Kreisa' case would mean greater representation of Woodland artifacts. Furthermore, analysis of surface collected ceramics can lead to unrealistically high counts of plainwares; few decorated types have decoration over more than a small portion of the vessel, so that the majority of sherds from broken decorated vessels in the present study are counted as plainwares. Mississippi Plain and Bell Plain, therefore, may be overrepresented among coarse and fine paste ceramics at Twin Mounds.

LITHICS

The lithic analysis terminology follows Binford (1963), Burks (1995b), Ives (1984), Spielbauer (1976), Stelle (in Lewis 1986), and Stout (1989). A detailed description of the lithics is presented in Burks (1995b).

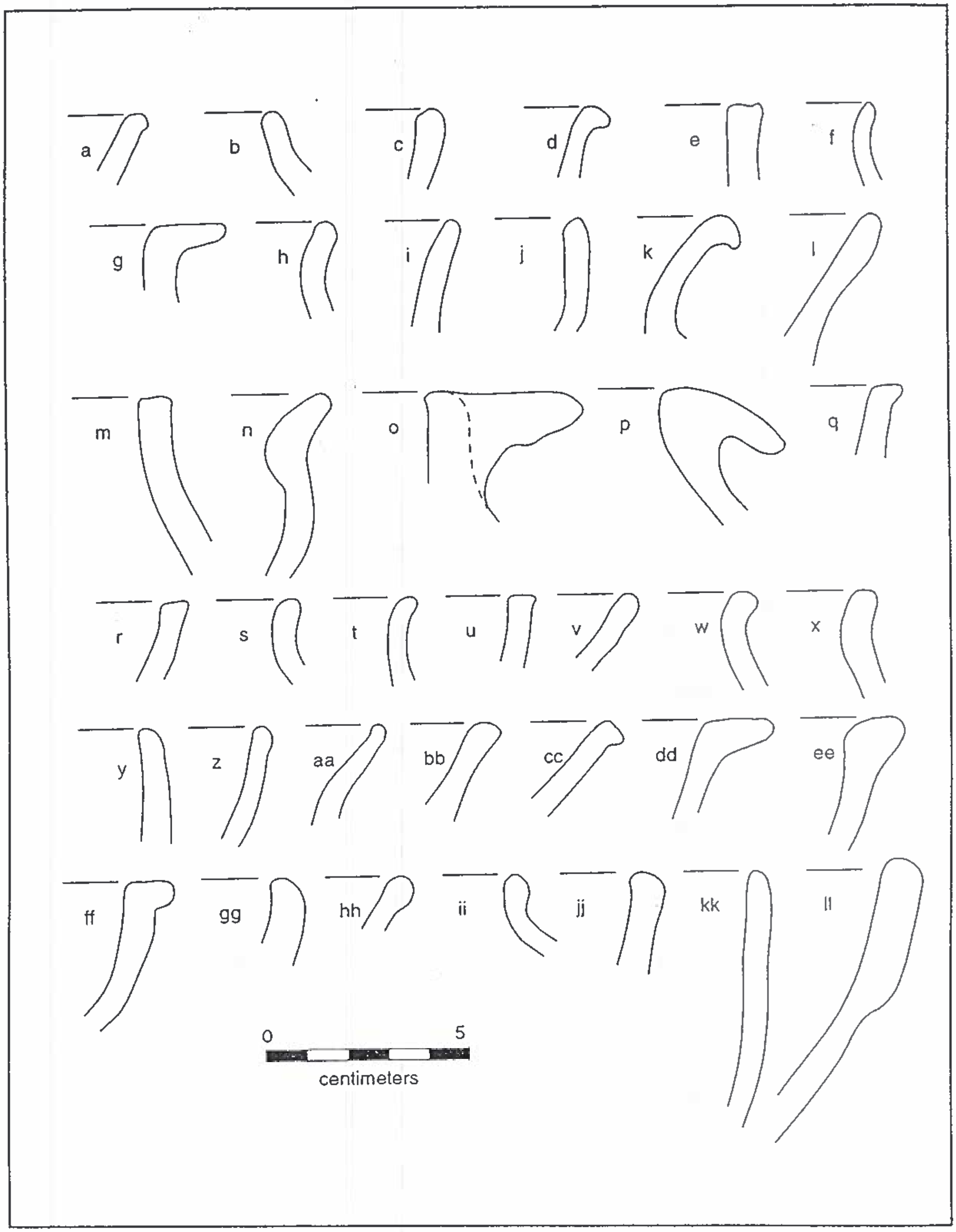

Figure 2. Selected Rim Profiles: a-p) Mississippi Plain; q-gg) Bell Plain; hh) Kimmswick Fabric Impressed; ii-ll) Baytown Plain (after Burks 1995a: Figure 5).

Table 1. Summary of Material Culture Classes and Counts for the Twin Mounds Surface Collection.

Artifact Class	*Type*		*Count*	*Total*
Daub			**945**	**945**
Ceramics (rims n=437)				
	Mississippian Types			
		Mississippi Plain	6,848	
		Bell Plain	1,398	
		Matthews Incised	67	
		Kimmswick Fabrick Impressed	55	
		Crosno Cordmarked	46	
		Old Town Red	40	
		Wickliffe Thick	28	
		O'Byam Incised	25	
		untempered plain	8	
		Mound Place Incised	6	
		Nashville Negative Painted	3	
		Subtotal	**8,524**	**8,524**
	Late Woodland Types			
		Baytown Plain	495	
		Mulberry Creek Cordmarked	145	
		Larto Red	2	
		Subtotal	**642**	**642**
	Other Ceramics			
		Unidentified	135	
		Unidentified Incised	17	
		Subtotal	**152**	**152**
		Total Ceramics		**9,318**
Flaked Stone				
	Tool/Tool Fragment			
		Biface/Biface Fragment	43	
		Projectile Point	9	
		Drill	5	
		Graver	3	
		Bipolar Tool	12	
		Subtotal	**72**	**72**

Table 1. *Continued.*

		Count	Total
Retouched Flakes			
	Unifacial	27	
	Bifacial	23	
	Subtotal	**50**	**50**
Artifact Class	*Type*	*Count*	*Total*
Utilized Flakes		**139**	**139**
Amorphous Cobble		**113**	**113**
Reduction By-Products			
	Primary Flakes	302	
	Secondary Flakes	630	
	Tertiary Flakes	49	
	Shatter	410	
	Biface Thinning Flake	25	
	Hoe Flake/Fragment	171	
	Core	49	
	Subtotal	**1,636**	**1,636**
Ground Stone		**34**	**34**
Rough Rock		**1,568**	**1,568**
	Total Lithics		**3,612**
Fauna		**683**	**683**
	Total Collection		**14,558**

Reduction by-products (debitage) comprise most of the chipped stone assemblage. Flaked stone tools, which comprise 12% of the lithic assemblage, are represented mostly by fragments, the most numerous being hoe flakes and biface fragments, followed by bipolar tools (wedges), projectile points, drills, and gravers (Table 1). Retouched flakes, the only other category of intentionally modified lithics found in this assemblage, comprise another 3% of the lithic assemblage. Sixty-six percent of retouched flakes are secondary reduction flakes and 34% are primary. Unifacial and bifacial modification of retouched flakes is nearly equally divided. Utilized flakes comprise 7% of the lithic assemblage; however, most of these are secondary flakes, and the rest primary.

Debitage comprises 70% of the chipped stone assemblage: primary reduction flakes account for 15%, secondary flakes for 31%, tertiary flakes for 2%, shatter for 20%, and cores for 2%. Five classes are defined for the debitage analysis. The first class is primary reduction flakes, also called decortication flakes, are the large flakes discarded in the removal of cortex (chert or flint cobble exterior), which is frequently composed of limestone. Secondary reduction flakes are also large, but flat with a ridged back, and exhibit cortex on 25% or less of their surface. Secondary flakes often exhibit flake scars, indicating in some cases that they were modified into tools or, in other cases, that flakes were broken off as the tool was used without modification. Tertiary flakes have the same general morphology as secondary flakes, but are smaller, because these flakes were primarily made by shaping a finished tool. In this study, bifacial thinning flakes are counted as a subclass of tertiary flakes. Shatter consists of chert fragments broken into a number of shapes and sizes. Cores, as the term is used in this study, are the final disposed lithic by-product from which no more flakes can be or have been removed (tools may also be cores, but when that is the case, they are not described with the debitage).

The only whole biface (Figure 3a) is a small triangular point of Burlington chert measuring 11 mm wide, 18 mm long and 3 mm thick. This point is plano-convex in transverse section and concavo-convex in longitudinal section, and exhibits a sigmoid bend. Expanding primary flake scars mark the blade edges on the dorsal surface in contrast to the ventral side, which has no primary flake scars at all. Shallow expanding tertiary scars are irregularly spaced along both sides of the blades, along with retouch and step fractures. This point is grossly similar in appearance to the Madison (Scully 1951) or Late Prehistoric Triangular (Kneburg 1956) type, which has definite Mississippian through Historic period associations throughout the central and eastern United States, and possible Late Woodland associations in select regions (e.g., Jenkins 1975: cited in Cambron and Hulse 1964).

One of the six projectile point fragments (Figure 3b) has an intact base measuring 12 mm. This specimen is made of Mill Creek chert. It is biconvex in transverse section and asymmetrically concavo-convex in longitudinal section, and exhibits broad, unevenly spaced shallow to moderately deep expanding primary and secondary scars and step fractures. What remains of this specimen is similar to the basal portion of Cambron and Hulse's (1964) Guntersville type, an excurvate lanceolate point found in association with Madison points. Guntersville was originally included in Kneberg's (1956) description of the Late Prehistoric Triangular type mentioned above.

The dominant chert on a piece basis was Purchase Gravel (44%), followed by Mill Creek (37%), Dover (9%), Burlington (3%), St. Louis (3%), and Ft. Payne (<1%). Purchase Gravel, also called Mounds (May 1980), is locally available along stream channels throughout western Kentucky and surrounding areas. This chert has a fine to medium texture, is generally colored light to dark caramel with a darker brown to maroon weathered cortex. Mill Creek chert outcrops in and around Union County, Illinois (May 1980), and was brought into Kentucky as hoes or hoe blanks (Kreisa 1988; Sussenbach and Lewis 1987). Mill Creek has a medium-fine to coarse granular texture and eggshell to dark buff color (Fowke 1928; Spielbauer 1976). Dover was quarried in Stewart County, Tennessee, and the surrounding vicinity (Tankersley 1989), although look-alikes from different geological formations are found in southern Illinois (Elco), southern Indiana (Dupes) and east central Ohio (Upper Mercer). Dover is fine to medium grained, has a resinous luster, and has brown to black lenticular

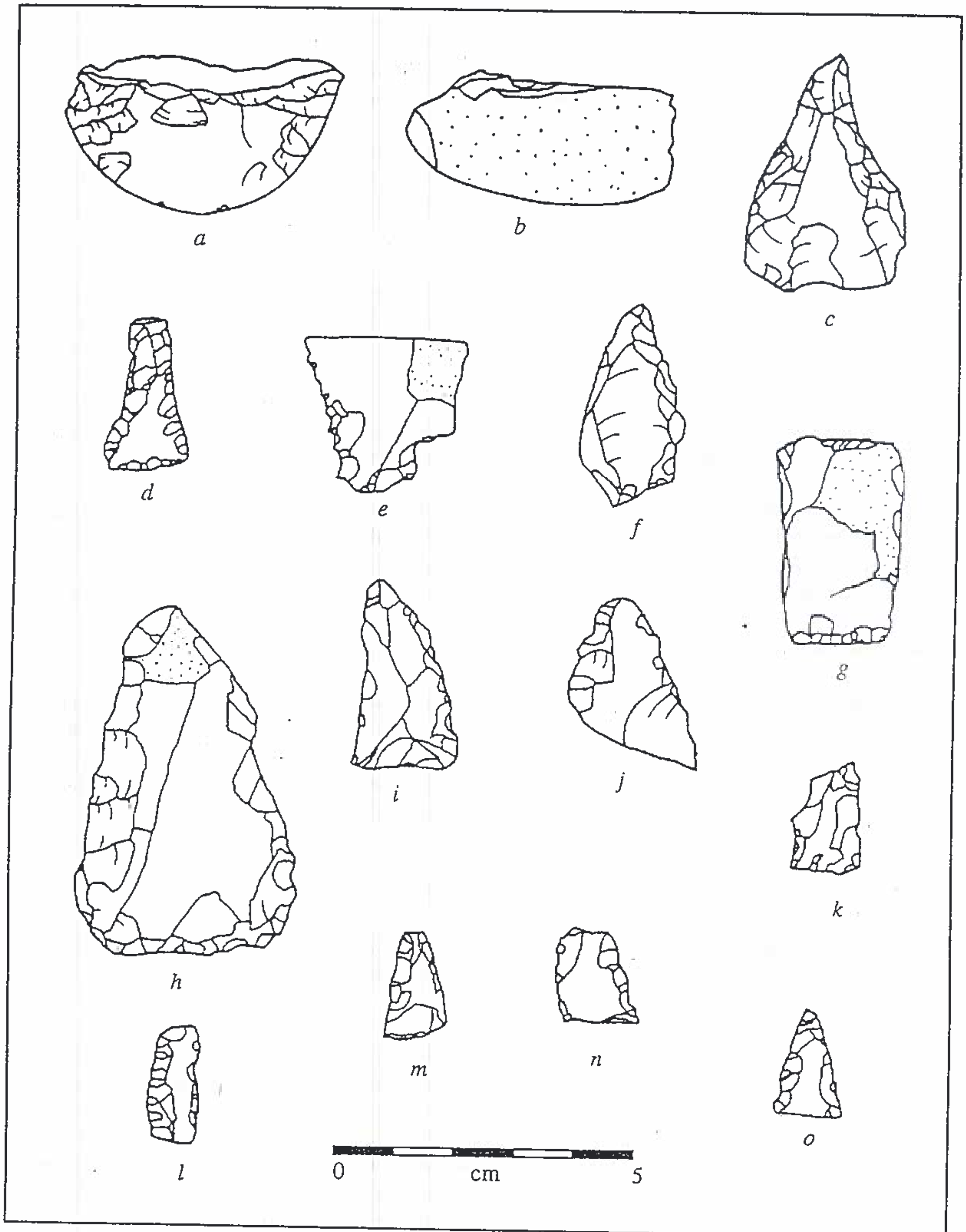

Figure 3. Lithic Tools from the Twin Mounds Surface Collection: a, hoe fragment; b, celt fragment; c-d, drills; e-f, unifacially retouched flakes; g, bipolar tool; h, retouched secondary flake; i-j, bifaces; k-o, projectile points (from Burks 1994b).

mottling in brown to gray matrix. Burlington, also called Crescent, Crescent Quarry, and Crescent Hills, outcrops extensively in southern Illinois (Luedke and Meyers 1984), west central Illinois, east central and southwestern Missouri, and southeastern Iowa (Tankersley 1989). Burlington's coloration ranges from white to pale gray and less commonly to yellow or even black, its texture from fine-grained and lustrous to coarse and chalky (Luedke and Meyers 1984). Burlington frequently contains fossils, especially crinoids. St. Louis chert is generally lustrous brown to gray, sometimes banded or streaked, outcropping in nodular and bedded forms in southern Illinois, southern Indiana (May 1980) , and portions of western Kentucky (Gatus 1979). Ft. Payne chert, also called Muldraugh, is generally fine-grained, with few inclusions and occasional banding, appearing in a range of colors from gray to tan, tan and light pink, and charcoal (Gatus 1979). This chert outcrops in portions of northwestern Tennessee and western Kentucky (Gatus 1979).

The raw material of an additional 4% of the flaked stone assemblage could not be identified with certainty, but may on further examination prove to include Kornthal Breccia, Cobden/Dongola, and Kaolin. Although the locally available Purchase Gravel was the dominant lithic raw material, 81% of lithic tools were made of cherts whose sources lie outside of the Purchase region. Burks (1995b) infers from this a preference for better quality nonlocal raw material and the presence of a regional interaction network that was in some way involved in procurement and distribution of lithic raw materials. Certainly, the presence of tools other than hoes made of Mill Creek and Dover suggests reworking of broken hoes into new tools.

Thirty-four ground stone tool fragments were recovered, identifiable by a smoothed, flattened or striated surface. Twelve bipolar fragments were also collected (these are further discussed by Burks [1995b]). An additional 109 amorphous stone pieces, including unmodified pebbles and chert cobbles are also part of the surface collection assemblage, and although they apparently were not used as tools, they were manuports.

OTHER MATERIAL CULTURE

Decomposed structures are represented by 945 pieces of daub, sunbaked or burned clay plaster applied to wattle (lathing) in the construction of thick-walled houses and outbuildings. A total of 683 pieces of animal bone were collected. Preliminary sorting of the Twin Mounds fauna yielded no unusual findings for Mississippian midden contents; however, a detailed faunal analysis has not been completed by Paul Kreisa. General categories of fauna present are deer, fish, turtles, and waterfowl.

SPATIAL ANALYSIS

Artifact distributions are mapped logarithmically (based on maximum count within each artifact class) to provide greatest visual clarity following Stout (1989). Statistical spatial analysis follows Stout's (1989, 1995) directional analysis of variance.

Midden and mounds delimit the perimeter of the Twin Mounds plaza. The scant amounts of material at the collection grid's intersection with the area Kreisa (1988) identified as the plaza is apparent in every artifact class. Artifact clusters are interpreted by Burks (1993, 1995a) on the basis of visual inspection and statistical results, as the debris from domestic architecture and cultural activities: Cluster 1 in the northwest portion of the sampled area, Cluster 2 east of center, and Cluster 3 toward the southeast. Distribution maps of, first, all material culture, followed by daub, Mississippi Plain, Bell Plain, Baytown Plain, Mulberry Creek Cordmarked, and fauna are presented in Figures 4-10. The distance between the cluster centers of all material culture and daub is 25-30 m center to center, which is consistent with Stout's (1989) findings at the Adams Site; however, the collection grid size prohibits suggestions that these data support a Mississippian pattern of household spacing.

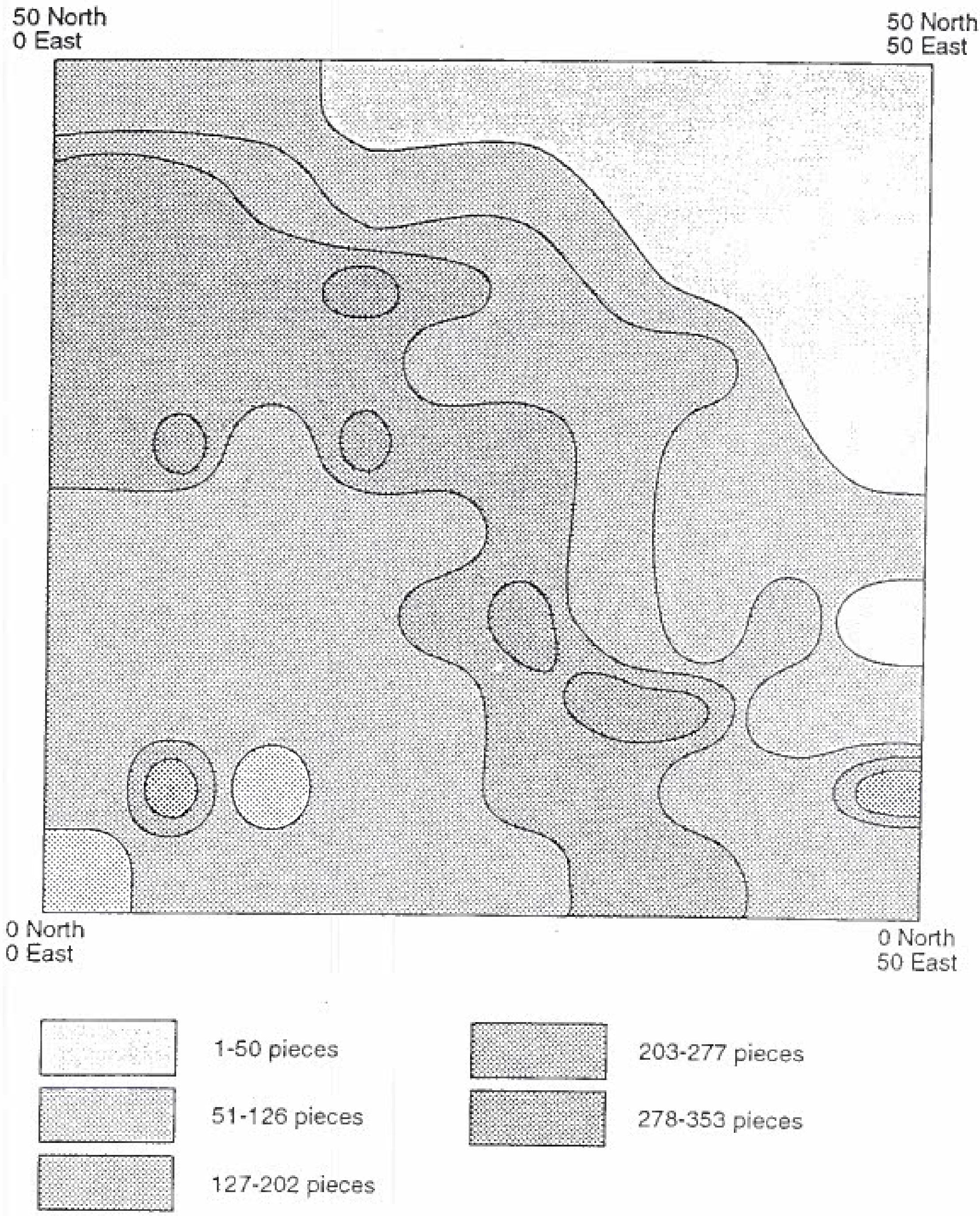

Figure 4. Distribution of All Artifacts.

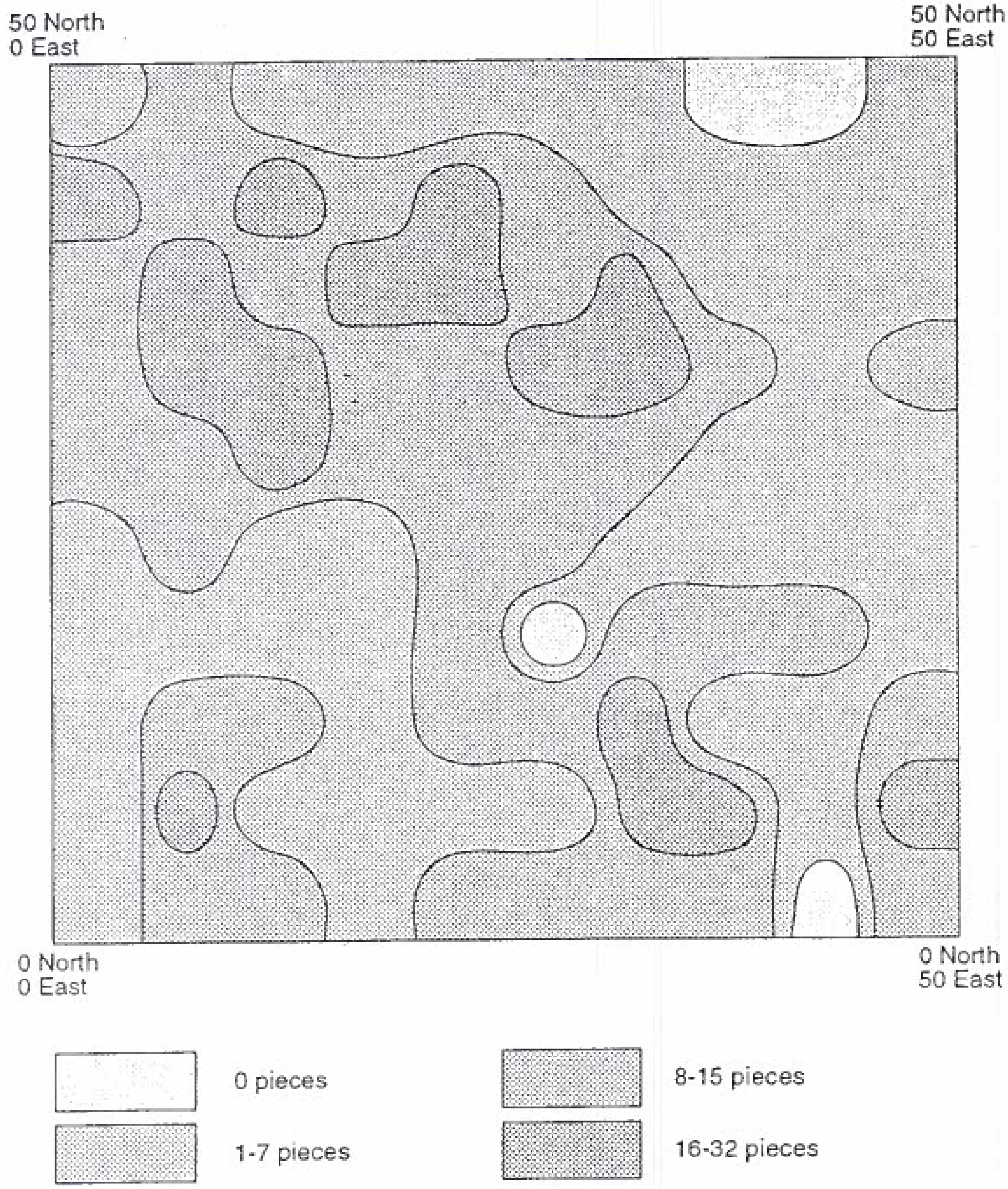

Figure 5. Daub Distribution.

The spatial patterning of individual artifact classes differs slightly from class to class. For example, Mississippi Plain (Figure 6) is more highly correlated with daub than Bell Plain (Figure 7), which is scantily present in Cluster 3 and more evenly distributed across the entire sample area. Baytown Plain and Mulberry Creek Cordmarked distributions (Figures 8-9) also correlate strongly with the composite clusters. This pattern is interpreted as being reflective of Mississippian disturbance of earlier deposits in the excavation of post holes, wall trenches, disposal and storage pits, and burials. The faunal distribution is consistent with the patterning of other artifact classes, with a predominance at the central and northwestern clusters (Figure 10). Lithic tool and utilized flake distributions (Figure 11) show similar patterning, but not so clearly because of the small number of artifacts in these classes. Secondary flakes (Figure 12), which comprise a larger proportion of the assemblage, however, show much clearer associations. Tertiary and hoe flakes are more evenly distributed across the site than the above assemblages (Figures 13-14), which would be consistent with finishing or repairing tools at home before setting out to use them. Evidence of tool repair while hunting, gathering or farming away from home would be dispersed throughout the surrounding region. On-site tool manufacture at Twin Mounds appears to have been carried out primarily in or near households. The distribution of debitage tends to concentrate around the domestic clusters, especially between the northernmost and easternmost clusters.

Surface patterning was also analyzed using Stout's (1989; 1995a) directional variance method (Figure 15). This method makes variance estimates between collection units (or quadrats) at all distances from each other along transects in three distinct directions. This study examined variance estimate patterning along north-south, east-west, and northeast-southeast (45° east of north) transects. The results found clusters at 25-30 m from each other, center-center as found at the Adams Site. The calculations made with Twin Mounds data, however, involved very few collection counts along some transects, because of the small number of total collection units to edge units. Therefore, results overemphasize patterns found in short transects, while patterns from long transects are represented by few transects.

RECENT SITE DEGRADATION

There have been few changes at the Twin Mounds Site since Kreisa's work; however, two are worth noting because they have yielded additional information concerning a Mississippian occupation, and because they remind us of the tenuous life span of even the most impressive structures when faced with natural and human forces. The first change is the recent digging of an expansive pot hole on the top of Mound B. University of Illinois students trimmed back the walls of this hole and plotted the wall profile, which contained a small portion of the Mississippian structure that at one time surmounted the mound.

The second change is continued erosion of a large portion of the surface of the northwest side of Mound B, exposing strata containing pottery fragments and daub. Mound erosion was noted more than a decade ago by Weinland and Gatus (1979).

Human activities are the most significant destructive forces affecting the Twin Mounds Site, although natural forces have also shaped the site. Decades of plowing have cut into the uppermost archaeological strata, damaging and distributing material culture, as well as human and animal remains. Plowing, combined with flood water action, is probably responsible for obscuring the slough that likely encircled part of the site.

Historic and modern construction projects, which have involved large-scale excavation, have had a more pronounced affect than the persistent plowing. The top of Mound A was removed in the nineteenth century (Kreisa 1988: 45), and, according to the current tenant farmer, the mound was further altered sometime since the middle of this century to make it a more accessible and flood-safe place on which to drive and store heavy farm

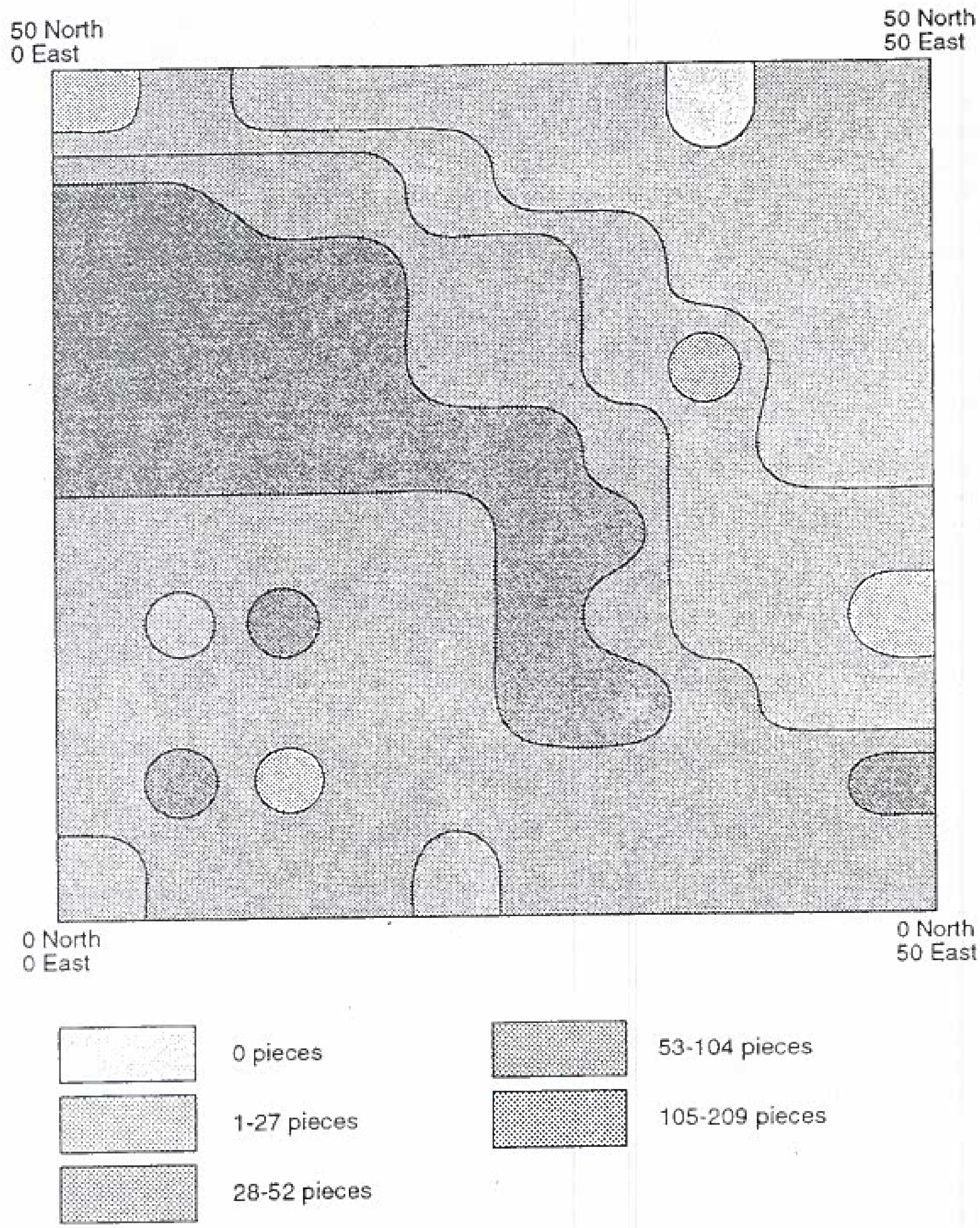

Figure 6. Mississippi Plain Distribution.

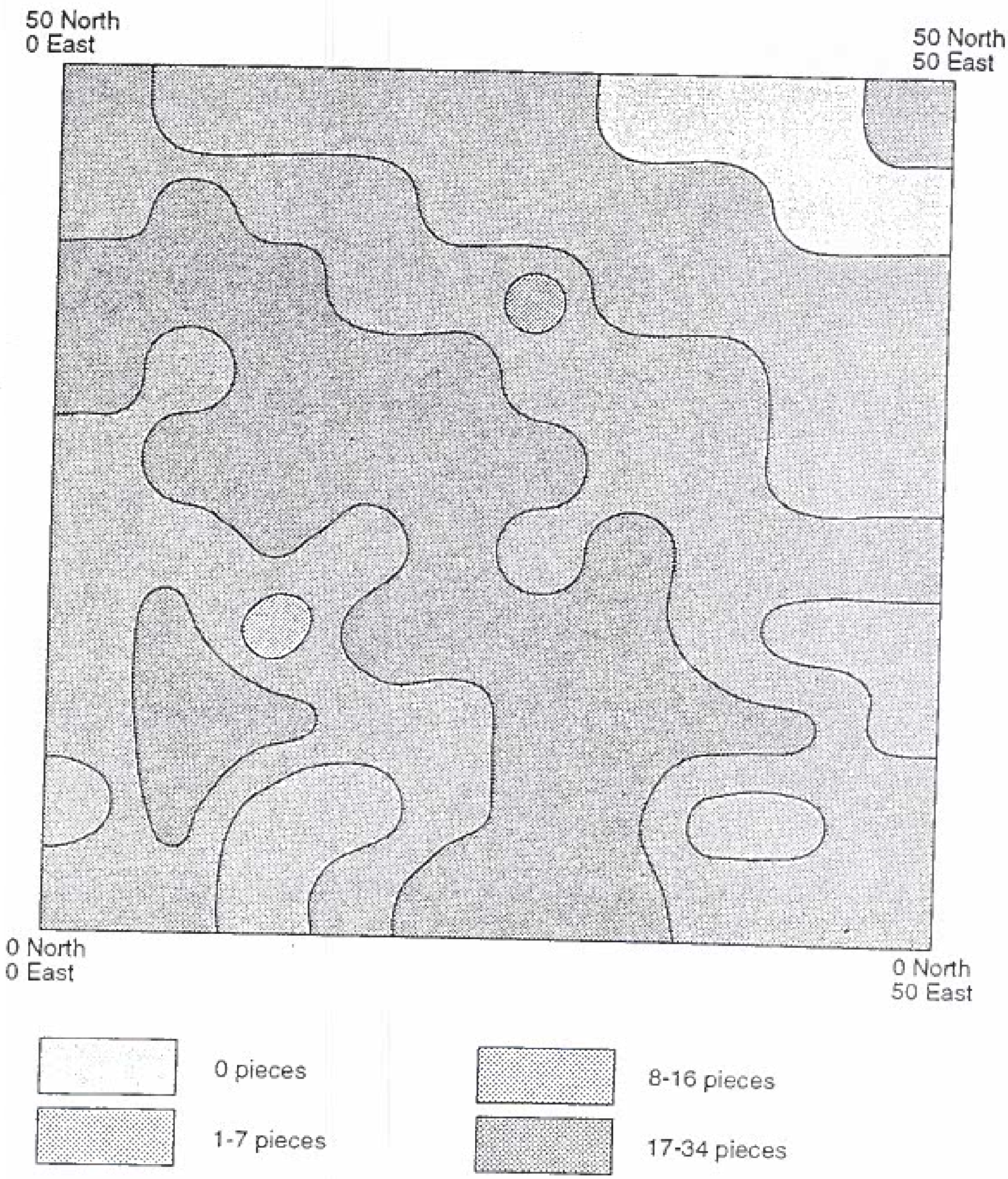

Figure 7. Bell Plain Distribution.

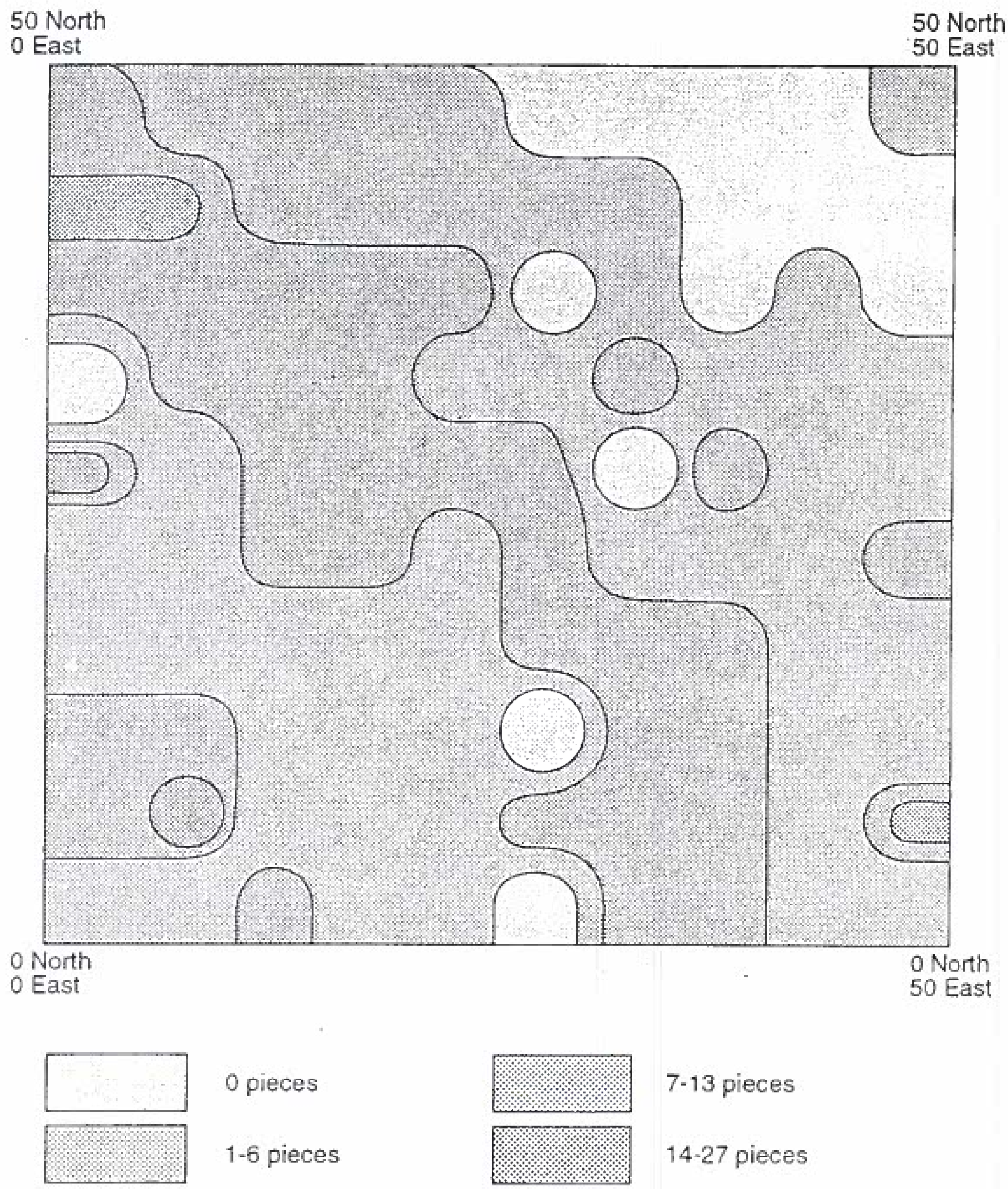

Figure 8. Baytown Plain Distribution.

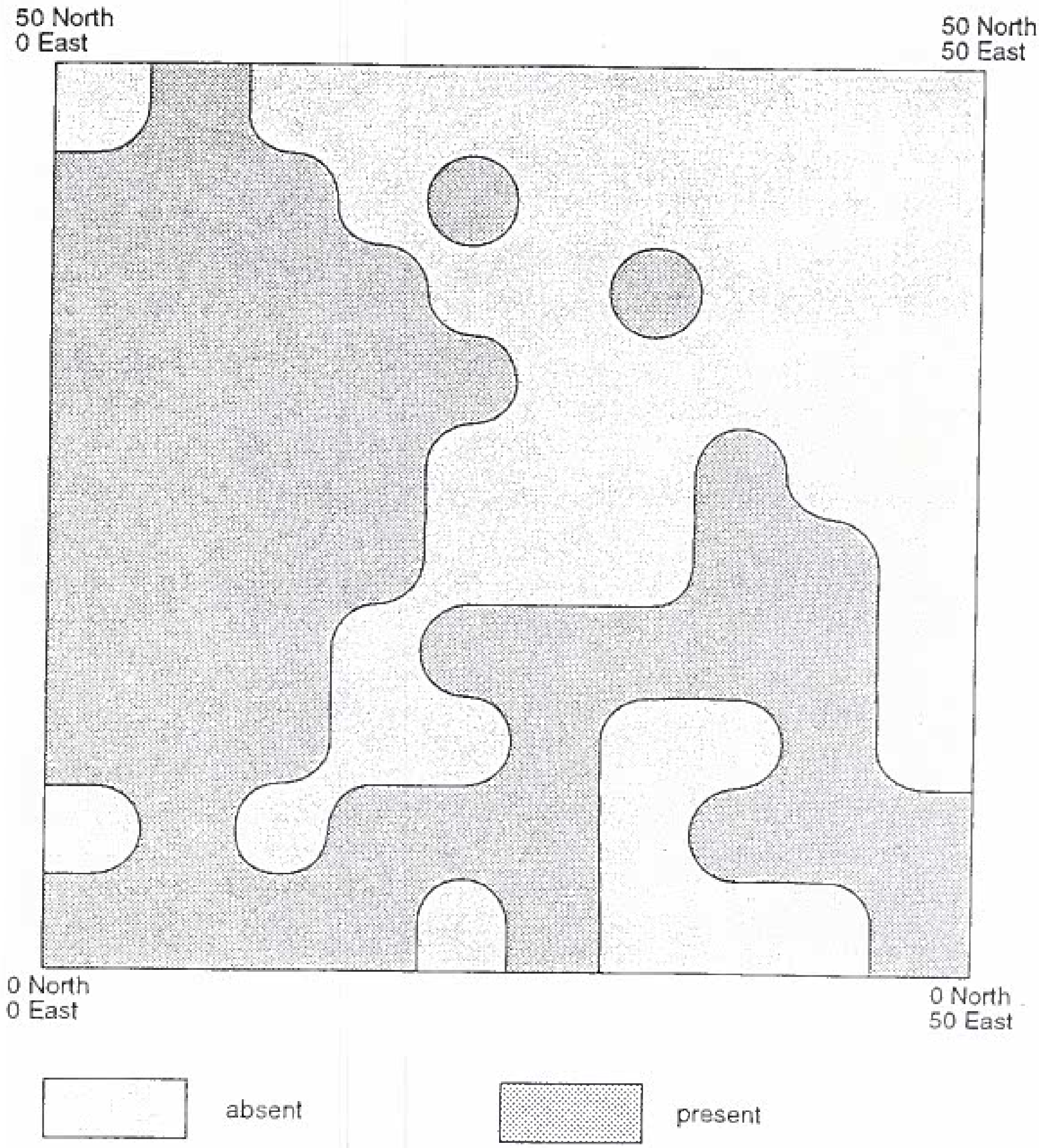

Figure 9. Mulberry Creek Cordmarked Distribution.

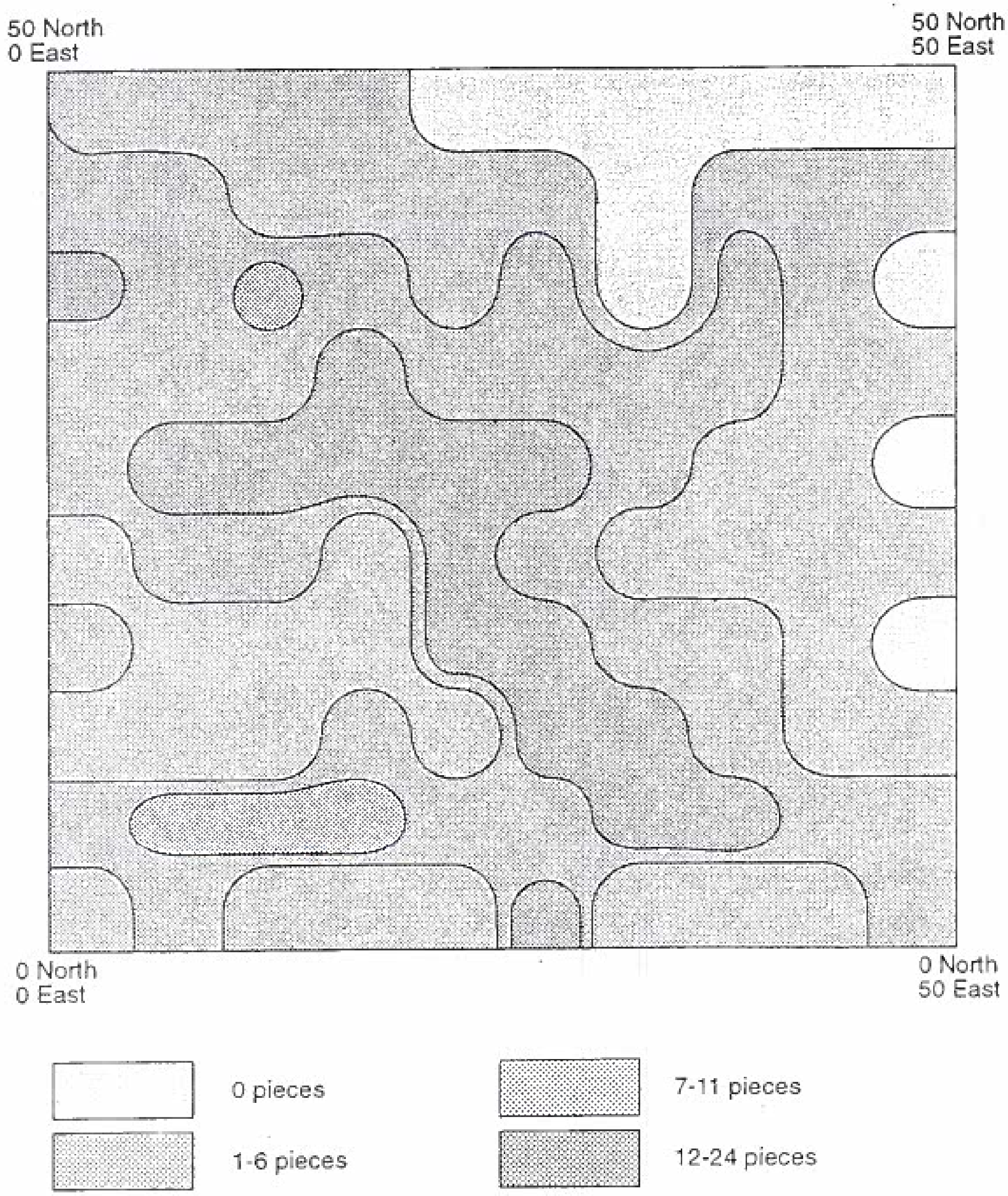

Figure 10. Faunal Distribution.

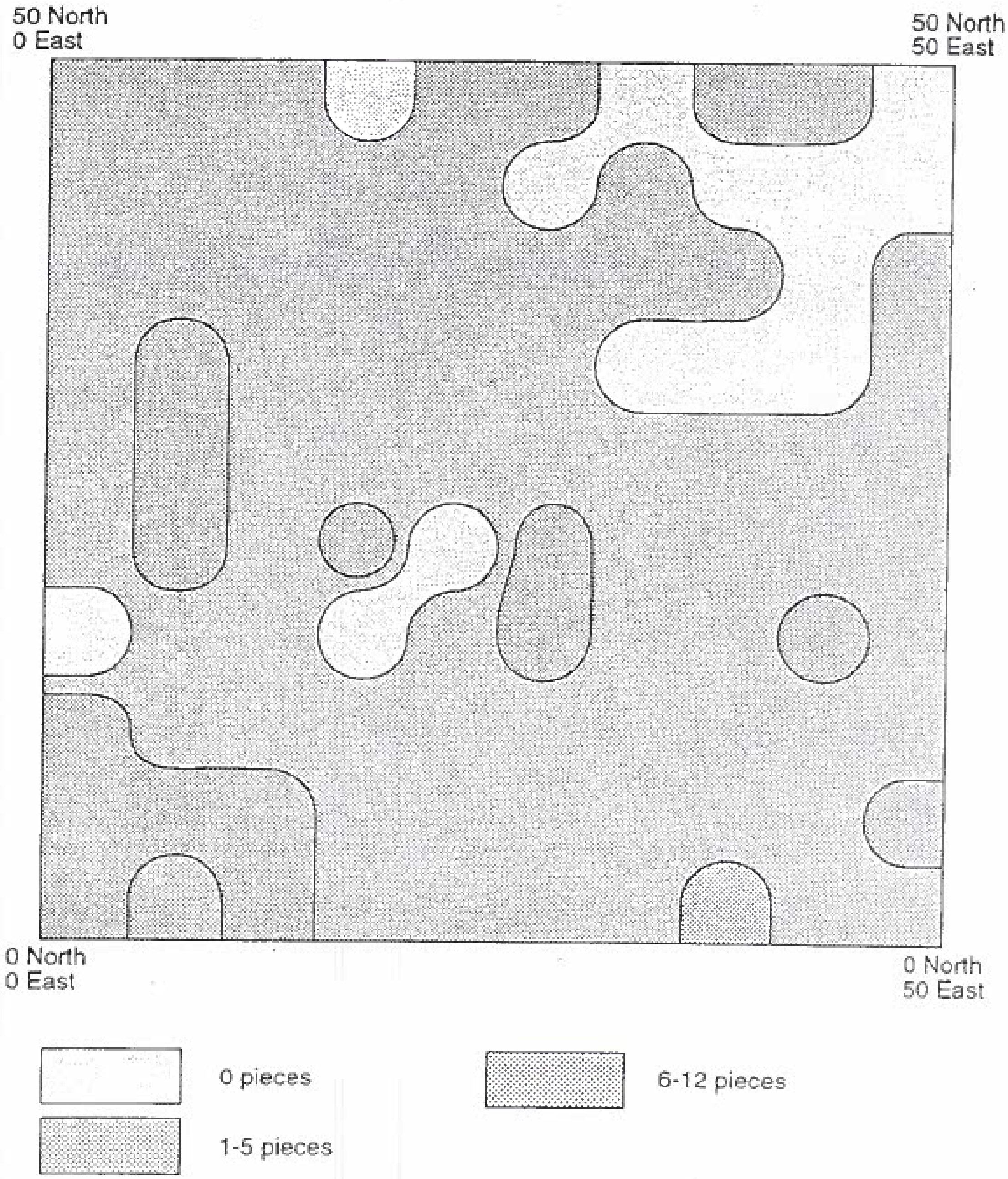

Figure 11. Lithic Tool and Utilized Flake Distribution.

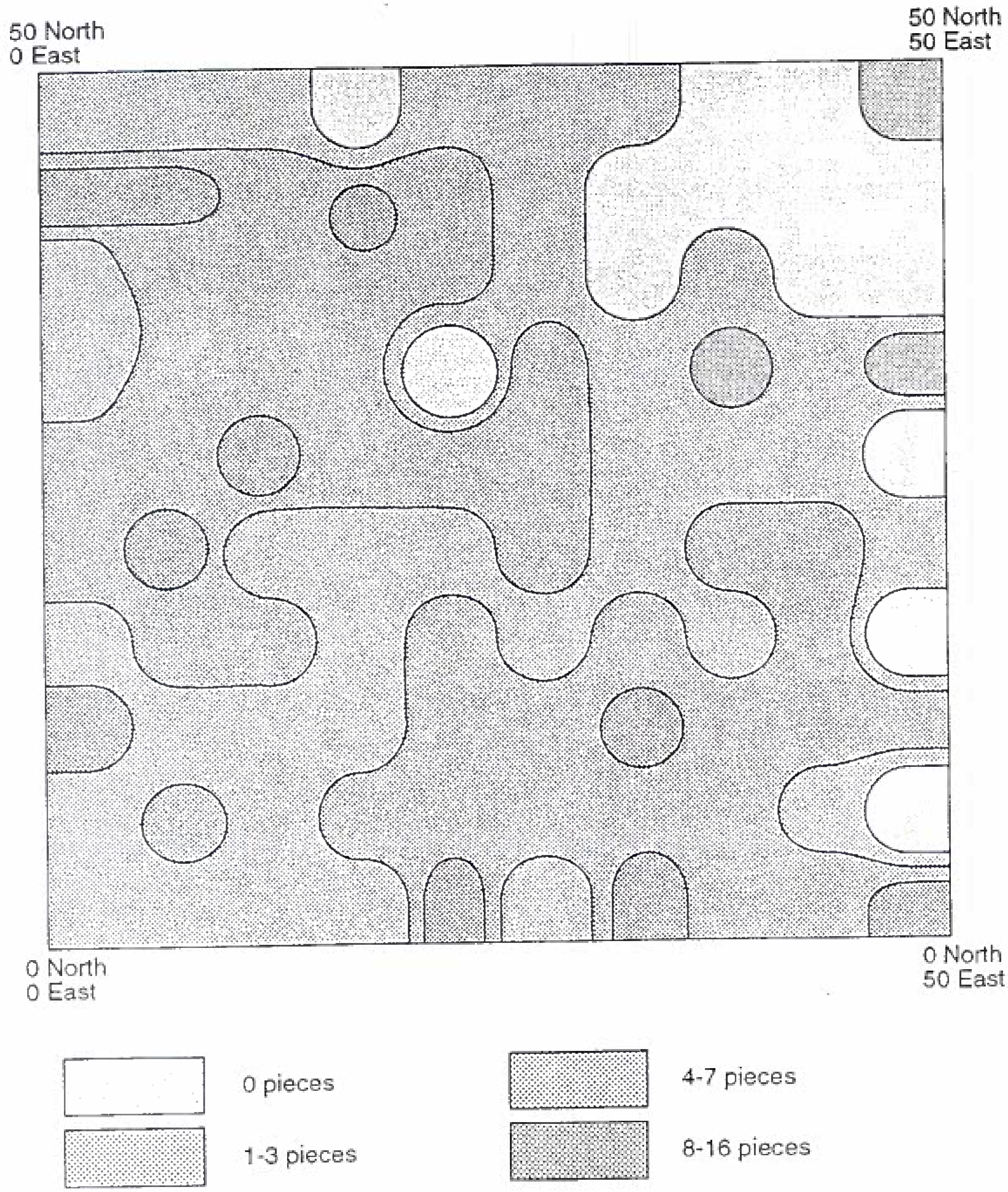

Figure 12. Secondary Flake Distribution.

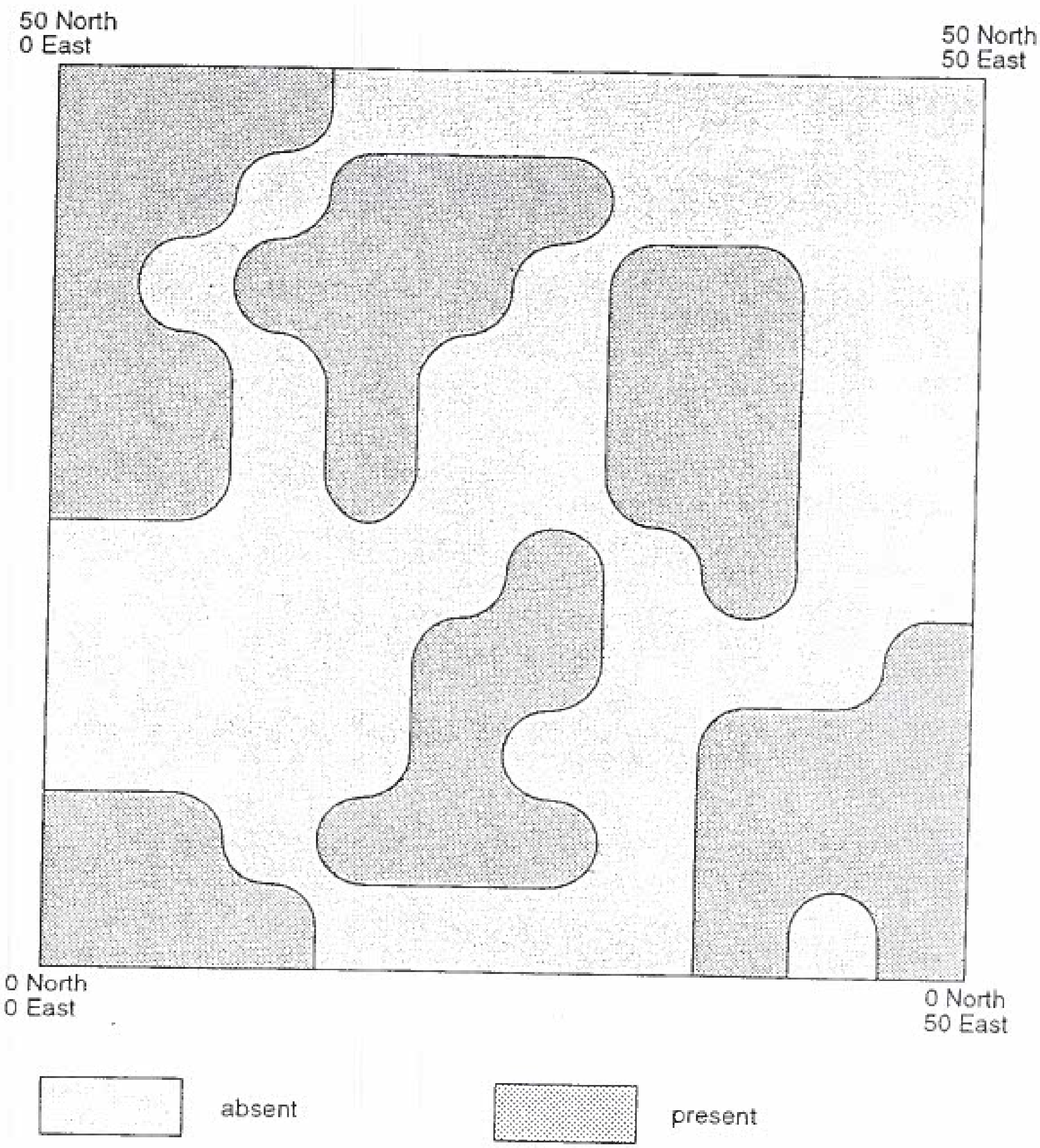

Figure 13. Tertiary Flake Distribution.

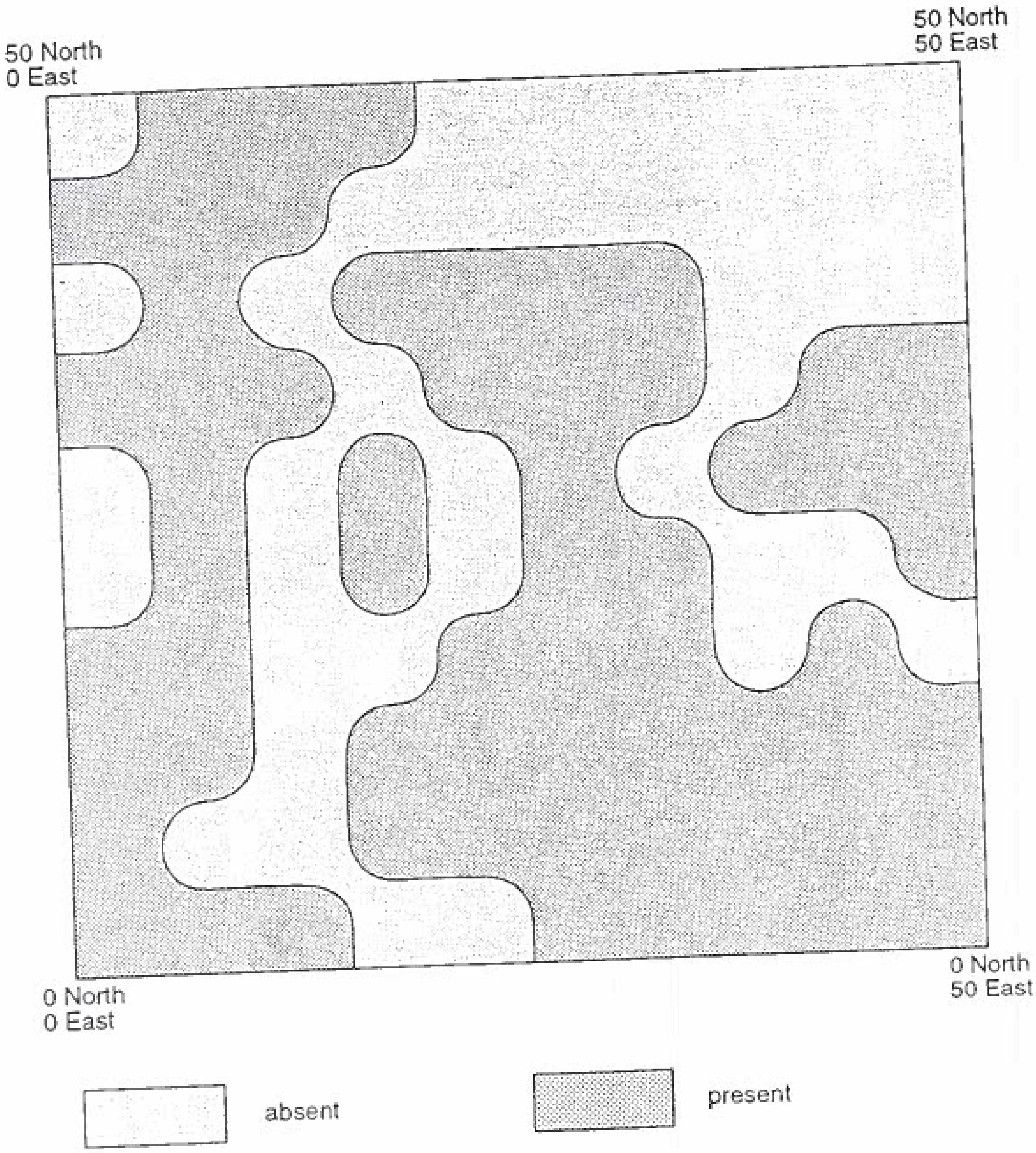

Figure 14. Hoe Flake Distribution.

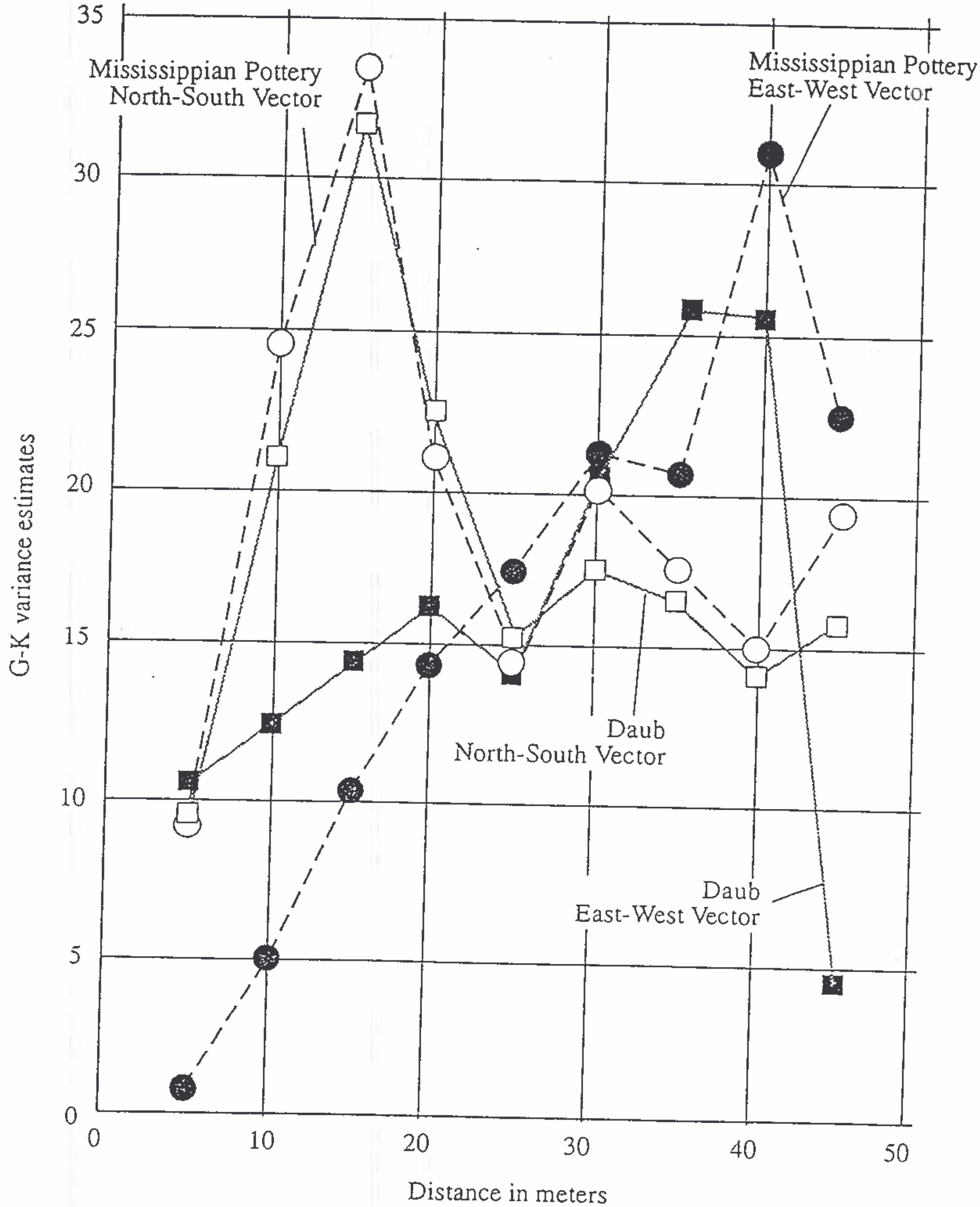

Figure 15. Surface Collection Directional Variance Estimates at Inter Unit Distances for all Mississippian Pottery Types and Daub (following Stout 1989).

equipment. Kreisa has noted the damage to the north side of Mound B from the construction of a large farm outbuilding. The foundation of this building cuts into the mound's north side and part of the causeway or saddle between the two mounds. In addition, a field entrance has been cut in and compacted between the two mounds.

A persistent source of site damage is pot hunting. The top of Mound B has the scars of numerous irregular holes, and more extensive trenching is rumored to have occurred. A large hole, surrounded by loose back dirt, was found on the west edge of Mound B's summit in early March 1992. The hole was approximately 1.5 m wide and nearly 1 m deep. Field crew members had seen a pot hunter's hole in the same location on an earlier visit, but it had been roughly 0.5 m deep and 1 m wide.

The field crew vertically trimmed the sides of the hole and mapped the wall profiles. The resulting drawing (Figure 16) clearly illustrates the hole's penetration through the edge or corner of a large mound superstructure of daub and cane. Scattered charcoal stains and ash lenses indicate potential hearths, or possibly a burned structure. The location of the daub mass within 2 m of the summit edge suggests a large structure, if the building was this close to the edge of the rest of the mound.

Another persistent force is the Ohio River, which annually alters the Barlow Bottoms and Twin Mounds to a greater or lesser extent (each flood season erodes vulnerable parts of the bottom land and site, a process that is greatly accelerated by plowing and other human activities that denude the soil). Recently, flooding cut into the base of Mound B, exposing layers of mound fill (Figure 16).

The sides of Mound B are sparsely wooded. The north side, adjacent to a large farm building, has only scattered brush covering the ground. The northwest mound slope appears to be covered mostly with dead or dying small deciduous trees and driftwood from a flood sometime in recent years (a large buoy was deposited by the Ohio River at the base of Mound B). The scant coverage has allowed erosion of the slope, probably caused initially by high flood waters, and since by rain. Kreisa (1988: 47) observed that the mounds measured larger at their bases when he worked at the site in the late 1980s than they are reported to have measured in the nineteenth and early twentieth centuries.

The eroding mound fill appears to be composed largely of pottery fragments. No excavation was undertaken out of concern that this action would accelerate the deterioration of the mound. Documentation of the pot hunting and erosion problems, however, are presented here as important references in the history of this site.

CONCLUSIONS

The intercluster distance found in the small grid at Twin Mounds is consistent with Stout's (1989) findings for the spacing between domestic clusters at the Adams Site; however, because of the small grid size, the spacing beyond 35-40 m cannot be addressed.

Three generalized artifacts clusters apparent in the Twin Mounds surface collection area lend support to an interpretation of self-sufficient households in a habitation and production pattern like that asserted by Stout (1989) for the Adams Site, where he concluded that the goods *used* by individual households were also *produced* by those same households, rather than by specialists. The clusters at Twin Mounds, as at Adams Site, are essentially redundant; however, the number of clusters is too small for valid statistical testing or for ascertaining the variability in cluster composition across the site. Furthermore, these findings are only *consistent* with the Adams Site findings, and are based on too small a collection area to formulate independent conclusions. Another

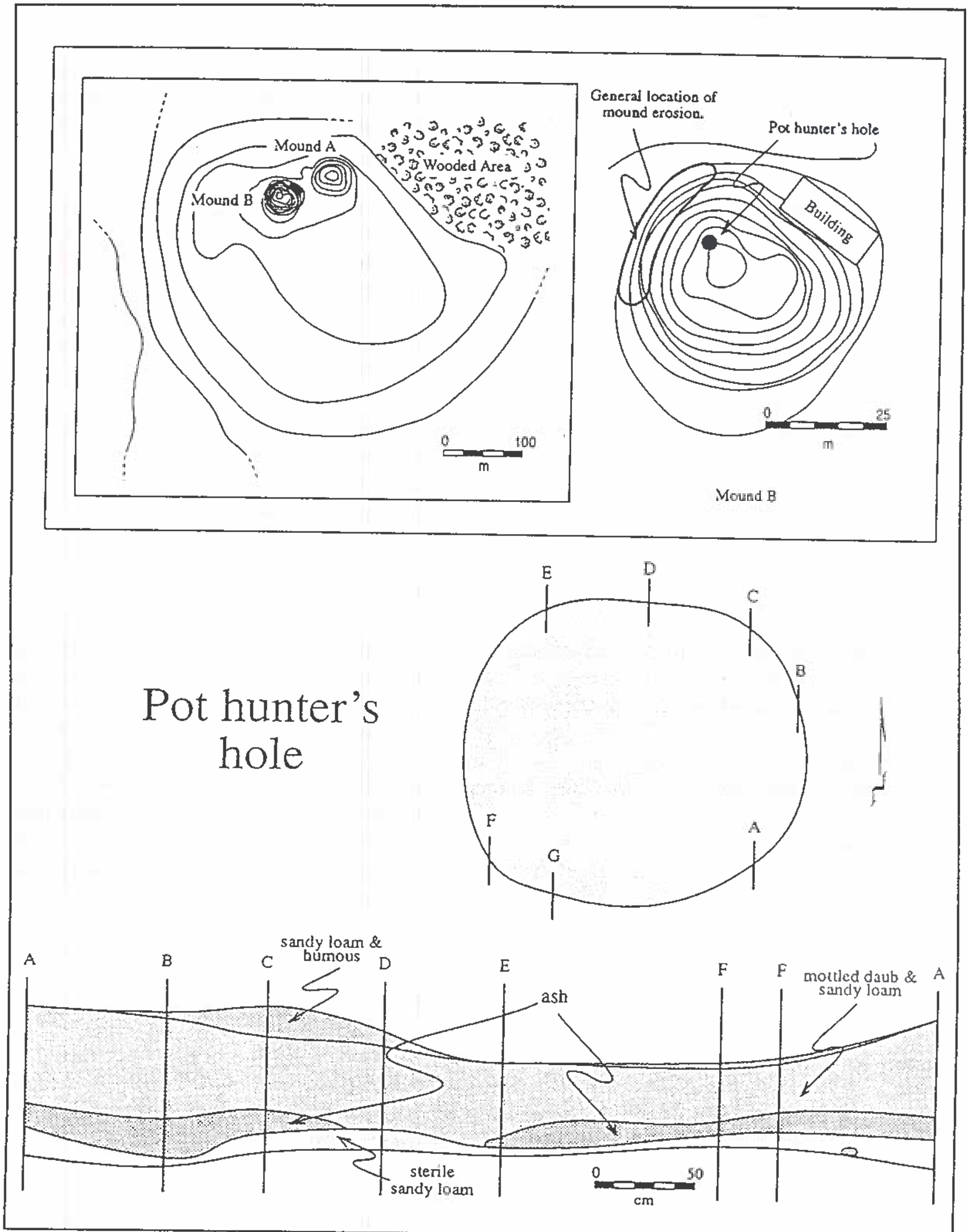

Figure 16. Plan View and Wall Profile of Pot Hunter's Hole in the Mound B Summit. Insets: Location of Erosion and Pot Hunter's Hole (insets after Kreisa 1988: Figure 13).

2500 m grid might contain a potter's or flint knapper's work station. Kreisa's (1988) excavation provided some evidence of intrasite task specific areas.

Although the Twin Mounds distributions were largely consistent with those at Adams, the domestic clusters were not an exact match. This may reflect actual differences in living patterns, or some undetermined bias. One serious collection problem that likely exists is a bias against small objects, such as tertiary flakes and bone fragments, which might have shed more light on the observed patterning.

In addition to planned research activities at Twin Mounds, the field crew attempted to record as much data as possible from locations where the site was being destroyed. Erosion, farming, and pot hunting may eventually lead to the virtual destruction of Twin Mounds, and for that matter, Adams and any number of Mississippian towns that have survived into the twentieth century. However, much information can be obtained from these sites and preserved before adverse effects take their toll. Erosion and pot hunting, despite their damage to the Twin Mounds Site, have brought to light small amounts of information for the development of archaeological problems that could lead to future field research at the site.

Among these potential problems are the size, shape, and purpose of the prehistoric structure that was located atop Mound B, given the thickness and proximity of the daub lens exposed by the pot hunter's hole reported in this paper. Mound construction methods, tantalizingly hinted at by clusters of material culture on the surface, may be determined easily with only limited excavation of the northwest slope of Mound B.

ACKNOWLEDGMENTS

Several individuals contributed to the project reported herein. The property owner has always been generous with information and access to the site. Our field guide, Mr. Andrew Sneathern, provided detailed information on surface clusters and site damage on our planning trip for the project. Dr. Kit Wesler put us up at the Wickliffe Mounds Research Center "bunkhouse" during our stay in Ballard County. Field crew members besides the authors were Hugh Drake, Joseph Dumas, Robin French, and Debra Hettinger. University of Illinois students who helped in the laboratory are John Horn, Mikki Johnson, Predrag Jones, Andrew Kaufmann, Story Kukla, Michael Russel, and Tyrone Washington. Robin French assisted with the project planning and preliminary lithic analysis, and commented on an early draft of this report. Paul P. Kreisa, Carol Knauss, Gregory W. Walz, Lynne M. Wolforth, and Thomas Wolforth were helpful reviewers. We authors have made numerous changes since reading their comments, and therefore bear all responsibility for any inaccuracies and omissions.

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ARCHAEOLOGICAL INVESTIGATIONS AT THE CANTON SITE (15TR1), TRIGG COUNTY, KENTUCKY

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ABSTRACT

Researchers from the University of Illinois sought to fill a gap in the knowledge of Kentucky's prehistoric heritage through archaeological investigations at the Canton Site (15Tr1), a little known Mississippian center on the Cumberland River in Trigg County, Kentucky. Investigations included preparing the site's first topographic map; making a general surface collection for regional culture historical comparisons and to locate gross activity areas; and retrieving stratigraphic data on this site's depositional history to assess its place in the Mississippian culture as it was manifest in the lower Cumberland and Tennessee River valleys.

INTRODUCTION

Although the Canton Site was documented in the early nineteenth century (Marshall 1824; Rafinesque 1824, 1833; Stout and Lewis 1995), this Mississippian center has not been investigated by archaeologists for over 150 years, being only briefly mentioned by Webb and Funkhouser (1932: 376) in their *Archaeological Survey of Kentucky*. Rafinesque (1833) prepared the only previously existing "map" of the site, a panoramic view of the mounds and their surroundings that was included in a comparatively detailed French journal article describing the locations of nine mounds, a palisade, and a possible borrow pit (Stout and Lewis 1995). Prior to the project reported in this article, no topographic mapping had ever been attempted and no professional archaeological investigation had ever been done at this site.

By contrast, several nearby Mississippian sites of both greater and lesser magnitude are well documented; e.g., Jonathan Creek (15Ml4) (Webb 1952; Wolforth 1987), Papineau (15Cn11) (Railey 1984), Stone (40Sw23) (Coe and Fischer 1959), Tinsley Hill (15Ly18) (Clay 1963; Schwartz 1961), Tolu (15Cn1) (Webb and Funkhouser 1931). These sites have been interpreted as parts of a system focusing on Kincaid, the nearest regional center, located on the north side of the Ohio River between the mouths of the Cumberland and Tennessee Rivers (Butler 1977; Clay 1963, 1976, 1979; Rolingson and Schwartz 1966; Schwartz 1961). Although recognized as an important site in this region, Canton had not been examined by professional archaeologists before the investigations reported here. Mapping and testing of Canton were an opportunity to obtain new data that might solidify or reshape interpretation of the cultural and regional context and contribute to the existing Tennessee-Cumberland and Ohio-Mississippi Confluence region data sets and interpretation.

REGIONAL CULTURAL AND TEMPORAL CONTEXT

The major occupation and earth architecture of the Canton Site date to the Mississippi period. Kincaid, situated on the Black Bottom of the Ohio River, has been interpreted as the regional center for a number of smaller Mississippian towns and hamlets that lie to the south in the Cumberland and Tennessee valleys, including the town of Canton (Clay 1963, 1976, 1979). Located about midway between the mouths of the Cumberland and Tennessee rivers, Kincaid is the closest contemporaneous site of its magnitude in the region. Material culture assemblages from Kincaid and the Tennessee-Cumberland Mississippian sites are also generally similar to each other (Clay 1963, 1979; Railey 1984).

Although the region shared many ideas and goods, this hierarchical settlement model possesses weak chronological control, and some question exists as to the contemporaneity of Kincaid with presumed secondary and tertiary sites in the system (Butler 1977; Lewis 1990b; Muller 1978). Additional archaeological study of this region continues to be needed to further refine the chronology.

The current cultural chronology used in the lower Tennessee-Cumberland vicinity was devised by Clay (1979) and consists of two phases. The earlier phase, Jonathan Creek, began around A.D. 1045, based on radiocarbon dates from the Dedmon Site (15Ml68) (Allen 1976) and similarities between this site's ceramics, those from Jonathan Creek, and those from the lower strata at Tinsley Hill. This phase is characterized by Baytown Plain, Bell Plain, Kimmswick Fabric Impressed, McKee Island Cordmarked, Mississippi Plain, Mulberry Creek Cordmarked, and Old Town Red (also called Old Town Red-Filmed) ceramic types (Clay 1979). The most common vessel forms associated with this phase are globular jars with loop handles or bifurcated lugs, salt pans, and hooded bottles.

The boundary between the Jonathan Creek phase and the later Tinsley Hill phase was never delimited by Clay (1979); however, he suggests that Riordan's (1975) Angelly phase (A.D. 1100-1300) for the Black Bottom of southern Illinois parallels the Jonathan Creek phase development. Based on radiocarbon dates from upper levels at the Tinsley Hill Site, the Tinsley Hill phase may persist until as late as A.D. 1600. The Tinsley Hill phase ceramic assemblage contains the same types listed for the Jonathan Creek phase, but also has small amounts of Kimmswick Plain, Matthews Incised vars. Beckwith, Manly, and Matthews, Nashville Negative Painted vars. Nashville and Angel, O'Byam Incised var. Stewart, and Tolu Interior Fabric Impressed (Clay 1979). The loop handles and lugs typifying the Jonathan Creek phase jar appendages were replaced by wide strap handles.

PHYSICAL SETTING

The physiography of the Canton Site and its immediate surroundings play a major part in shaping the natural environment. The topography is characterized by long, steep to moderate hillsides, narrow ridge tops, and narrow bottoms. Situated on the bluff above Lake Barkley, the now-flooded Cumberland River, Canton surmounts Mississippian System deposits of limestone belonging to the Meramec Series, which contains some chert inclusions. Typically, these deposits are karstic, and contain numerous small sinkholes, basins, and less commonly small caves, which are the three primary means of water transport and drainage. Surface streams are responsible for the rest of the drainage (Humphrey 1981).

Many of the upland ridge tops and high stream terraces are covered with Quaternary deposits of loess, which are generally thicker on the east sides of major stream valleys than on the west. The loess, which in some locations is over 1 m thick, covers weathered bedrock surface, and is often intermixed with cherty gravels. The Tennessee and Cumberland River valleys, which drain nearly all of the surrounding region, are covered by thick layers of alluvium. Thinner alluvial deposits cover the valleys of the tributaries (Humphrey 1981).

The moderately well-drained loess deposits that characterize much of the upland in the Canton Site vicinity, combined with the warm, humid summers and moderately cold winters, supported an extensive mixed deciduous forest cover prior to Euroamerican settlement. Canton lies within Braun's (1950) Central Hardwood Forest Region, which is characterized by a diversity of tree species in which oaks dominate, followed in abundance by hickories, ashes, elms, maples, gums, and sycamores in favorable locations. Preston (1989: ix-xi) lists walnut, cottonwood, dogwood, numerous species of herbaceous annuals and perennials, and some grass species as common in this locality. Plant communities were undoubtedly correlated with variation in topography, soil type, and moisture availability, producing a mosaic of forest types, including extensive bottomland forest tracts along the major river valleys, mesic forests on well-drained slopes and valley bottoms, and xeric forests on the narrow ridge tops.

Western Kentucky's mixed deciduous forest and riverine system supported a variety of animal communities and species (Keller 1970; Kreisa 1988; Lewis 1986). Terrestrial mammals included deer, raccoon, skunk, opossum, bobcat, beaver, muskrat, and others; bird species included turkey, hawk, migratory water fowl, and migratory and resident passerines; and fish species included drum, bowfin, catfish, gar, and bass, as well as mussels and fresh water clams.

Although the Canton Site seemed largely intact and not threatened with imminent destruction when this investigation started, it was poorly known and faced a variety of potentially threatening forces. Like so many sites throughout Kentucky and the rest of the United States, the site has been plowed extensively. In the early 1800s, Rafinesque commented that "all of the fertile soil that covers the town has been plowed; however, the large monuments have been maintained. [T]he contours were still visible everywhere, but the plow will make them vanish here one day, as elsewhere" (Stout and Lewis 1995). Houses and churches have been in place at the site for more than a century, and part of the site had been graded and paved for a parking lot. The crew learned shortly after arriving at Canton that in the last 50 years the site has also undergone substantial excavation for construction, landscaping, and amateur investigations of the archaeological deposits and earthworks.

METHODS

Topographic data were obtained by transit, yielding the map shown in Figure 1. A photographic record of the site was made during transit survey, and was used as an aid in preparing the final map. Because of the distance to the nearest highway benchmark (over 3 km by road access) on the west bank of Lake Barkley, site

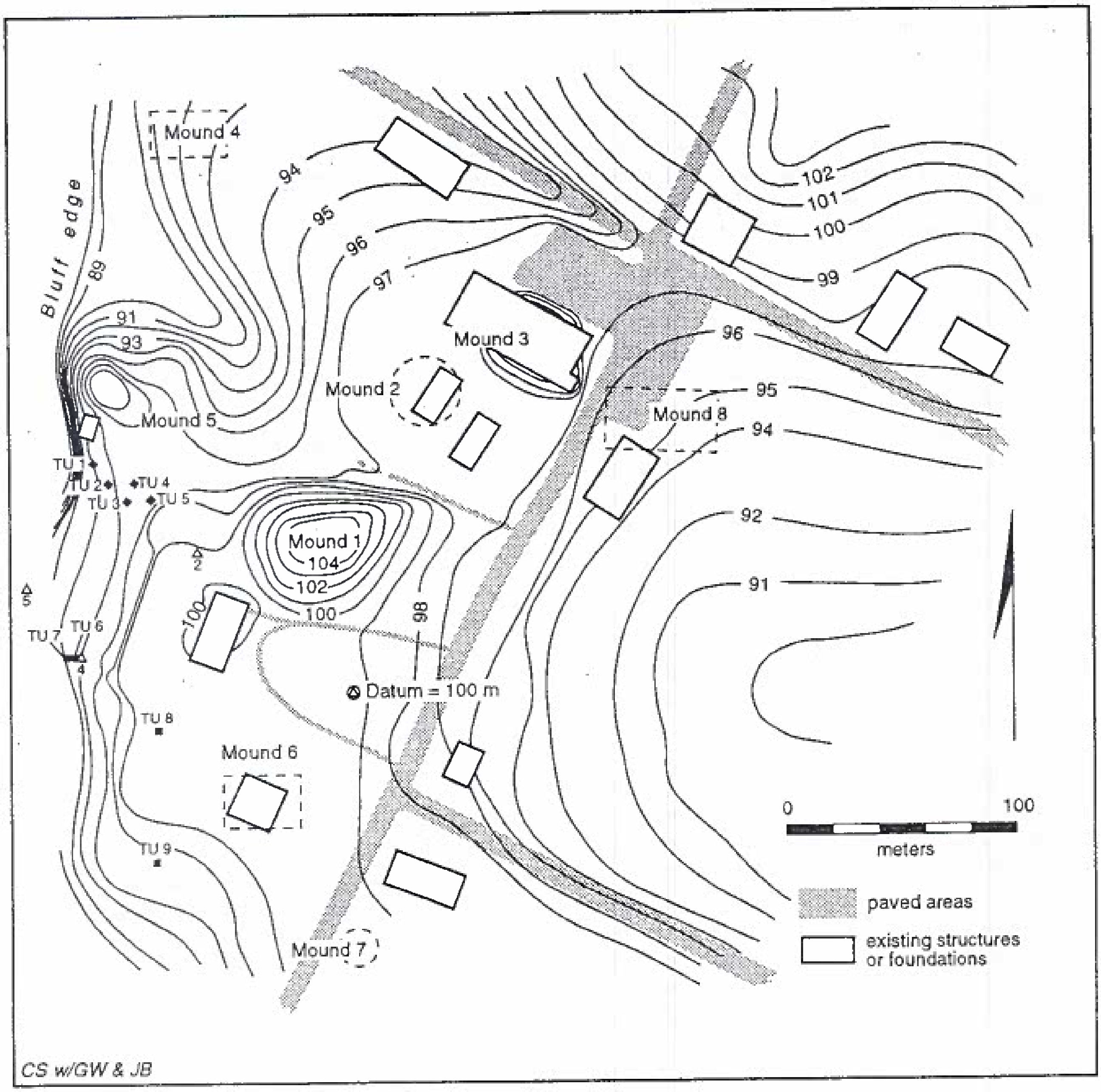

Figure 1. A Topographic Map of the Canton Site, Identifying Locations of Existing Structures, Transit Stations, and Test Excavations.

contours were measured from an arbitrary 100 m rather than mean sea level. A total of nine temporary datum stations were set up during the mapping, all of which were tied into the permanent datum established at the southwest corner of a house.

A general surface collection of the site was made; however, because of known areas of inaccessibility and differential surface visibility, no quantification of artifacts for statistical spatial analysis was attempted. This level of surface collection was appropriate, given the project's goals of site placement within the current regional ceramic chronology and identification of broad behavioral patterns of the Mississippian occupants (e.g., habitation areas versus plaza).

Because of the site's variable integrity, limited stratigraphic data were obtained from excavations of 50 cm x 50 cm and 1 m x 1 m "telephone booths." Less obtrusive measures, such as coring and post holes, were originally planned, but two property owners allowed the larger areas to be exposed. Although two radiocarbon tests were budgeted for the project, no prehistoric charcoal appeared in good archaeological context.

RESULTS

TOPOGRAPHIC MAP

The map in Figure 1 delineates the Canton Site contours, and locates the main earthworks, drives, parking lots, buildings, and gardens as they existed in 1992. The topographic map clearly identifies several of the earthworks shown in the nineteenth century site map made by Rafinesque (1833); this suggests that the early map is reliable even though the present study was unable to confirm some earthworks because of more than 150 additional years of post-depositional activity.

Since the 1830s, as Rafinesque predicted, the Mississippian town at Canton has become less visible. None of the fortification contours he describes are presently visible, and some of the mounds have been destroyed; according to current residents, many of the mounds have been altered or removed by bulldozing. Much of the site has been plowed at one time or another, and 1-2 ha is cultivated annually in small garden plots. The following paragraphs describe the site features identified by Rafinesque (1833; Stout and Lewis 1995), and identify points of discrepancy and potential historic site destruction.

Rafinesque's Mound 1 is still recognizable, but it is no longer the rectangular platform it once was, nor is it as tall as Rafinesque describes. There is no reason to conclude that Rafinesque's description was inaccurate, however, since both discrepancies can be attributed to alterations. A recent property owner used a bulldozer to remove sharp contours and pot hunter's holes so that the grass covering the mound might be mowed more easily. The southern half of the mound is regularly mowed during warm months, and the northern half is wooded with intermixed lower story vegetation. This now rounded mound is the largest of any remaining at the site, standing just over 4 m tall, 20 m long east-west, and 15 m wide north-south. The current property owner (a long-time resident of the community) recalls that a crew of excavators, probably pot hunters or amateur archaeologists, sunk several pits in the top of this mound, and in the course of those activities they removed human skeletal remains.

A broad, shallow dome marks the place of the deflated or removed circular platform identified by Rafinesque as Mound 2, which once stood just north of Mound 1. Two mobile homes have been anchored on the subtle rise that marks the mound's location. The east wing of a church sits atop Rafinesque's Mound 3, the center of which was excavated for the church's stone foundation. A somewhat elevated area, relative to the surrounding bluff slope, may mark the location of Mound 4, but no rectangular mound contours are apparent;

the point where this mound should be is at the end of a graded blacktop lane used as a boat launch. What is left of Mound 5 is clear despite one or more pot hunters' excavation of the entire mid-section of the circular platform. The elliptical apron described by Rafinesque is now a rounded ridge extending eastward from the gutted platform mound.

The location of Rafinesque's Mound 6 corresponds to the location of a Victorian house. This house does not appear, however, to have been constructed on a mound, as it was reported to have been at the time of Rafinesque's visit to the site in 1823. The small conical mound, Mound 7, and the fortification line south of Mound 6, both identified by Rafinesque, are no longer discernible on the surface.

Mound 8, the platform mound east of Mound 2, which even at the time of Rafinesque's visit had been partly destroyed, is only slightly elevated, and hardly recognizable as a mound. A flat area extending eastward from the narrow road that passes Mounds 1-3 may contain the remnants of this deflated mound. If so, much of the mound fill is now beneath either a church's asphalt parking lot or the foundation of the more eastern of the two church buildings.

The location identified by Rafinesque as a "large circular basin close to half full, once an amphitheater" was flooded and overgrown in May 1992, preventing the survey crew from gathering information for use in assessing Rafinesque's description and interpretation of the feature.

Rafinesque's description of the mounds on the north side of the site is more difficult to interpret. He refers to a "tall, square mound to the north (Mound 10) with small mounds," but the part of his map labeled "10" is between two small conical mounds situated on a large natural ridge and lying along a fortification line. On Rafinesque's map, a rectangular feature is drawn on the western third of the ridge and within the fortification line; thus, he interpreted either the rectangular feature or the ridge on which it was situated as a mound and large aboriginal tomb. If he intended the rectangular feature to represent a mound, then it most likely lies beneath a ranch style house built in the second half of this century. If, on the other hand, Rafinesque intended to identify the entire ridge as a mound, then much of this portion of the site has been lost. The interpretation of Rafinesque's narrative is further confused by informants who indicate that in the 1950s burials were bulldozed out of the western end of the ridge (the current house site) and from much of the ridge top. Apparently, none of the small circular mounds have survived.

SURFACE COLLECTION AND EXCAVATION

The material culture from the surface collection and excavations is tabulated in Table 1. The ceramic typology used below follows Clay (1979), Kreisa (1988), Phillips (1970), Phillips et al. (1951), and Stout (1989). Grog tempered Baytown Plain and Mulberry Creek Cordmarked ceramic types in the surface collection and excavated assemblages represent Late Woodland or early Mississippian vessels. Shell tempered Mississippi Plain, Old Town Red, and Kimmswick Fabric Impressed represent vessels deposited throughout the Mississippi period.

Lithic categories for this analysis are based on those used by Stout (1989). The only stone tools in the assemblages are termed flake tools, which are chert flakes that have been modified into tools through purposeful removal of flakes to make and refine the tool. When describing a flake tool, the function, assessed from the tool's gross form rather than from use wear analysis, is given as an adjective; e.g., flake cutting tool. Debitage includes primary through tertiary reduction flakes and amorphous shatter. Primary, or decortication, flakes are the large pieces discarded in the removal of cortex (chert or flint cobble exterior), which is frequently composed of

Table 1. Material Culture from the Surface Collection and Excavations at the Canton site.

Provenience	prehist. pottery	1st lithic flakes	2nd lithic flakes	3rd lithic flakes	lithic shatter	rough rock	fauna	flake tools	other prehistoric	hist. pottery	charcoal	brick	nails	other hist.	Total
Mound 1 surface	6	5	12	5	14	169	0	1	0	0	19	7	0	3	241
Mound 5 surface	2	0	0	0	1	22	0	0	0	0	0	2	0	1	28
exposed Mound 5 pit	1	0	1	0	1	4	3	0	0	0	0	0	0	1	11
lawn between Mounds 1 and 2	4	2	0	0	2	0	0	0	0	0	0	0	0	0	8
large garden surface	10	16	106	2	47	73	0	6	1	0	0	1	0	1	263
small garden surface	2	4	7	0	8	11	2	1	0	0	0	0	0	0	35
well house	20	2	19	0	7	23	11	2	0	0	0	0	0	0	84
Surface Total	45	29	145	7	80	302	16	10	1	0	19	10	0	6	670
Test Unit 1 0-10 cmbs	0	0	0	0	2	50	0	0	0	2	5	4	5	3	71
10-20 cmbs	0	0	2	0	1	39	12	0	0	6	50	7	2	8	127
20-30 cmbs	1	0	3	0	2	50	15	0	0	11	2	3	9	0	96
30-40 cmbs	2	0	1	0	1	3	0	1	0	2	0	4	0	0	14
Test Unit 2 0-10 cmbs	0	0	3	1	4	99	13	0	0	9	12	14	9	2	166
10-20 cmbs	3	0	1	0	1	87	0	0	0	2	22	0	1	0	117
Test Unit 3 0-10 cmbs	4	0	3	0	7	2	2	0	2	0	0	0	1	0	21
10-20 cmbs	4	1	0	1	0	1	1	0	0	0	0	0	0	0	10
20-30 cmbs	0	0	1	0	3	0	0	1	0	0	0	0	1	0	6
30-40 cmbs	0	2	0	0	0	0	0	0	0	1	0	0	0	0	3
Test Unit 4 0-10 cmbs	1	0	1	1	1	16	5	0	0	4	1	2	3	1	35
10-20 cmbs	6	0	1	0	1	29	7	0	0	2	2	0	13	1	62
Test Unit 5 0-10 cmbs	2	0	1	0	3	15	4	0	0	1	1	0	12	1	40
10-20 cmbs	2	1	0	0	0	1	0	0	0	2	0	0	8	2	16
20-30 cmbs	2	2	1	0	0	11	20	0	0	0	0	0	4	0	40
Test Unit 6 0-10 cmbs	10	0	12	8	6	46	0	0	0	0	0	4	0	1	87
10-20 cmbs	3	2	1	2	4	19	0	0	0	3	0	3	0	0	37
Test Unit 7 0-10 cmbs	0	0	0	0	1	154	0	0	0	1	37	3	0	5	201
10-20 cmbs	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Test Unit 8 0-10 cmbs	10	0	0	0	0	0	0	0	0	10	0	0	0	0	10
Test Unit 9 0-10 cmbs	0	1	8	0	4	36	1	0	0	7	33	5	3	5	103
10-20 cmbs	1	0	1	0	4	58	0	0	0	0	2	1	3	8	78
20-30 cmbs	10	0	5	0	5	200	0	0	0	2	28	0	5	1	256
Excavation Total	62	6	45	13	50	916	80	2	2	94	187	48	79	36	1620
Total	107	35	190	20	130	1218	96	12	3	94	206	58	79	42	2290

limestone. Secondary reduction flakes are also large, but flat with a ridged back, and exhibit cortex on 25% or less of their surface. Secondary flakes often exhibit flake scars that indicate that flakes were either intentionally modified into tools or incidentally modified in the course of using unmodified flakes as a tools. Tertiary flakes have the same general morphology as secondary flakes, but are smaller, because these flakes were primarily made by shaping a finished tool. Bifacial thinning flakes are treated here as a subclass of tertiary flakes. Shatter consists of chert fragments broken into a number of shapes and sizes. Cores, as the term is used in this study, are the final disposed lithic by-product from which no more flakes can be or have been removed (tools may also be cores, but when that is the case, they are not described with the debitage). Unmodified rock is any lithic material that has not been flaked or ground, but has been moved or used by humans, such as in laying a structural foundation, paving a walk, chinking a postmold, etc. Unmodified rock may also be brought into the archaeological record through the inadvertent extraction of rocky material in large scale earth moving.

The surface collection contains 716 artifacts, the bulk of which is lithic debris. Most of the surface collected materials were recovered on or around Mounds 1 and 5, and in the gardens identified in Figure 1. Dense ground cover and access to other parts of the site prevented collection in most other areas. Mississippi Plain and Mulberry Creek Cordmarked are the most common ceramic types in the surface collection, each represented by 18 sherds. Baytown is represented by three sherds; Old Town Red and Kimmswick Fabric Impressed by two sherds each. In addition, one plain, grit tempered sherd and one grog tempered sherd are present in the collection.

The excavations produced 1,598 artifacts. Test units were dug at arbitrary 10 cm levels, in the absence of any clear natural stratigraphy. Test Units 1-4 were placed between Mounds 1 and 6, near the site's western bluff edge (Figure 1). The crew placed Test Units 1-3 along an azimuth of 320°40' east of north from Temporary Datum 2.

Test Unit 1 was dug to 40 cm below surface, where material culture ran out. Each arbitrary level contained both historic and prehistoric materials in mixed matrix with no clear depositional layers. Datable artifactual material from this unit comes from two periods of activity: (1) Late Prehistoric habitation and (2) nineteenth and twentieth century construction and demolition. Forty-three prehistoric items include one flake cutting tool, six secondary reduction flakes, and six pieces of lithic shatter. One Mississippi Plain sherd was recovered from the level 20-30 cm below ground surface; one sherd each of Old Town Red and Mulberry Creek Cordmarked were recovered from the next level down. Historic items numbered 123, consisting mainly of charcoal, with 57 pieces, followed by 21 ceramic fragments, 18 brick fragments, and 16 nails.

Materials not dated with certainty include unmodified rock and faunal remains. Unmodified rock outnumbers all other classes of material from Test Unit 1, comprising 43% of recovered material. Although the unmodified rock cannot be dated with certainty, its location appears to be correlated with other historic material culture.

Faunal remains numbered 27 pieces. On initial inspection, none of these items appear to exhibit any butchering characteristics that would indicate whether they date to prehistoric or historic times; ongoing analysis may reveal some as yet unrecognized markings. It is unlikely that any of the fragments contains enough organic material to subject to current methods of radiocarbon testing, and, since the matrix from which they were recovered is at least partially disturbed, little would be gained from such an analysis.

Test Unit 2 was dug to 30 cm below surface, the lowest level producing no material. As in Test Unit 1, there was no natural stratigraphy. Thirteen prehistoric items include two secondary reduction flakes, four pieces of lithic shatter, and three Mississippi Plain sherds. Historic items include 34 pieces of charcoal, 14 brick fragments, 12 ceramic fragments, and 10 nails. Again, the largest category of material culture from this unit was unmodified rock, comprising 64% of this unit's assemblage. Thirteen pieces of faunal remains were recovered.

Test Unit 3, dug 40 cm below surface to sterile matrix, contained much less material than the previous two excavation units for a total 47 items. The largest category of material culture was prehistoric lithics: one flake cutting tool, three primary reduction flakes, four secondary reduction flakes, one tertiary sharpening flake, ten pieces of shatter, and two cores. Prehistoric pottery includes six Mississippi Plain sherds, three Mulberry Creek Cordmarked, and two Old Town Red. Historic items included nine ceramic fragments and two nails. Unmodified rock was scanty in this unit, with only three pieces. The disproportionately smaller amounts of both historic material and unmodified rock are consistent with an interpretation that the unmodified rock deposits are historic. There were also only three pieces of faunal material.

Test Unit 4 was situated 5 m from the southwest corner of Test Unit 3 on a bearing 50° east of north. Excavated to sterile ground at 20 cm below surface, the unit produced little cultural material, found in no apparent natural stratigraphy. Twelve prehistoric items include seven Mississippi Plain sherds, two secondary reduction flakes, one tertiary sharpening flake, and two pieces of lithic shatter. Historic items numbered 34, with 16 nails, 11 ceramic fragments, and two brick fragments. Unmodified rock comprised 44% of the material from this unit. Fauna numbered 12 pieces and charcoal three pieces.

The southwest corner of Test Unit 5 was located 5 m from Test Unit 4 on a bearing 140° east of north. The crew dug the unit to 30 cm below surface to sterile matrix. Prehistoric lithics include two primary reduction flakes, two secondary reduction flakes, and three pieces of shatter. Prehistoric pottery includes five Mississippi Plain sherds and one Mulberry Creek Cordmarked sherd. Historic materials dominated this unit, with 24 nails, five ceramic pieces, and one brick fragment. Twenty-eight percent of the material from this unit was unmodified rock. Twenty-four pieces of faunal material were recovered.

Test Unit 6 was located 1.5 m west of Temporary Datum 4, in a wooded lot on the bluff. Dug to sterile ground at 20 cm below surface, this unit produced 124 cultural items deposited in no apparent natural stratigraphy. Prehistoric objects otherwise dominated this unit, with 11 Mulberry Creek Cordmarked sherds, two Mississippi Plain sherds, two primary reduction flakes, 13 secondary flakes, 10 tertiary flakes, and 10 pieces of lithic shatter. Historic items included three ceramic fragments and seven pieces of brick. The largest category of material culture from this unit was again unmodified rock, comprising 52% of the material from this unit.

Test Unit 7 was located 1.5 m east of Unit 6. This unit was dug to 20 cm below surface, 99% of the material coming from the upper 10 cm. The only prehistoric materials were one Mulberry Creek Cordmarked sherd and one piece of lithic shatter. Historic items included 37 pieces of charcoal, two ceramic fragments, and three piece of brick. Unmodified rock comprised 76% of the material from this unit.

Test Unit 8 was situated on a ray shot north from Temporary Datum 5, in the same wooded lot as the two previous units. This unit was dug to 30 cm below surface, the upper two levels revealing disturbed soil consistent with historic or modern construction. No artifacts were recovered from the upper levels. The lowest level produced only 20 items, including three Mississippi Plain pot sherds, three Mulberry Creek Cordmarked sherds, four grit tempered plainware sherds, and 10 historic ceramic fragments.

Test Unit 9, the final excavation unit, was located at the southern edge of the wooded lot along a small ridge. Dug to 40 cm below surface in arbitrary levels the unit contained both historic and prehistoric materials in mixed matrix exhibiting no clear depositional layers. Datable artifactual material again originated during historic through late prehistoric times. Forty-three prehistoric items include one flake cutting tool, six secondary reduction flakes, six pieces of lithic shatter, and one sherd each of Mississippi Plain, Old Town Red, and Mulberry Creek Cordmarked. Historic items numbered 103, including nine ceramic fragments, 18 brick fragments, and 16 nails. Sixty-seven percent of the material from this unit was unmodified rock.

Although somewhat more historic material in the test units was recovered near the surface, most levels contained both historic and prehistoric items, indicating considerable mixing of the deposits. In addition to the artifacts enumerated in Table 1, a considerable amount of historic charcoal was encountered in the test units. Test Units 1 and 2 contained roughly the same proportions of prehistoric and historic artifacts from the top level to the bottom, with no obvious intact features that could be attributed to either prehistoric or historic occupations. At about 5 cm below the surface, Test Unit 3 contained a lens of brick and charcoal associated with cores, flakes, and potsherds. Below this lens, in levels 10-20 cm and 20-30 cm below ground surface, all materials were mixed, indicating historic period turbation predating the structure represented by the bricks and charcoal. Test Units 4 and 5 both contained pieces of limestone in an arrangement suggestive of a foundation or walkway, below which were an assortment of historic and prehistoric artifacts.

DISCUSSION

The goals of Canton Site project were twofold. First, we hoped to place the site and others from the lower Cumberland River valley in a regional culture context. The second goal of the project was to test the accuracy of Rafinesque's nineteenth century description of the site.

As for the first goal, recognition of Canton's probable role in the regional Mississippian system is confirmed by this study. Particularly in terms of the vast size of the site and its location relative to Mississippian mound centers in the Tennessee-Cumberland and lower Ohio valley, Canton reveals itself as an important player in a regional, multitiered sociopolitical and economic system. Chronological control over Canton or the Tennessee-Cumberland region as a whole is not much improved by the results of this investigation, primarily because of historic disturbance of late prehistoric deposits. Nevertheless, recovered material culture does provide some basis for broad late prehistoric temporal delineation.

Following the two-phase cultural chronology devised by Clay (1979) for the lower Tennessee-Cumberland vicinity, ceramics present in the assemblage are consistent with both Jonathan Creek and Tinsley Hill phases. None of the pottery types identified by Clay (1979) as diagnostic of the Tinsley Hill phase (i.e., Kimmswick Plain, Matthews Incised vars. Beckwith, Manly, and Matthews, Nashville Negative Painted vars. Nashville and Angel, O'Byam Incised var. Stewart, and Tolu Interior Fabric Impressed) was identified in the Canton assemblage. Bell Plain and McKee Island Cordmarked types, diagnostic of the Jonathan Creek phase, are also missing from the assemblage; however, Baytown Plain, Kimmswick Fabric Impressed, Mississippi Plain, Mulberry Creek Cordmarked, and Old Town Red are present.

The absence of diagnostic Tinsley Hill phase materials certainly does not prove the site had been vacated by this later phase, especially given the lack of site integrity and wide variation in the frequencies of represented ceramic types in test locations. However, it does suggest that early Mississippian occupation might have been more intensive in the tested areas or that later deposits (i.e., upper levels) were removed through historic landscaping activities, which are known to have been extensive in portions of the site. The pottery fragments from this investigation are generally so small that determination of vessel form was not possible; therefore, temporal assessment based on typical pottery forms was impossible. Finally, no appendages were recovered, so the loop handles and lugs indicative of Jonathan Creek phase deposition, as well as the wide strap handles attributed to the Tinsley Hill phase, are absent from the assemblage.

Thus, although it seems likely that Canton was occupied before and into the Jonathan Creek phase, the question of later occupation is open. The lack of certainty regarding the later phase unfortunately contributes nothing to the regional question concerning the Vacant Quarter Hypothesis (Eisenberg 1989; Lewis 1982, 1986, 1988, 1990a; Morse and Morse 1983; Wesler 1991; Williams 1980, 1983, 1985, 1990), which argues that populations from a small region, including western Kentucky, migrated elsewhere or at least abandoned their mound centers by A.D. 1350-1400.

The project's second objective, testing the accuracy of Rafinesque's site description, was nearly fully realized. Although the Canton Site had been visited by pot hunters and on several brief occasions by professional archaeologists in the years since Rafinesque described it, the present study was the first to engage in field operations that would confirm the early account. It is our conclusion, based primarily on the examination of the site's architectural remains, since limited testing of the highly disturbed midden revealed little to substantiate or refute anything other than the presence of late prehistoric occupation, that Rafinesque's map and description of the site plan and earth architecture are essentially accurate and as precise as nineteenth century portable field equipment would allow.

Based on what this project was able to corroborate with field work (i.e., the existence, size, and relative placement of mounds) and informant interviews (i.e., episodes of mound modification and possible locations of now-disturbed burials), it seems likely that further, more intensive excavations around the modern town's perimeter, especially those areas with no record of nineteenth or twentieth century building construction, would yield the plowed under remnants of the site's palisade, as described by Rafinesque. Perhaps the palisade would be surrounded by village midden, which would have been overgrown in the early 1800s and difficult for Rafinesque to discern as habitation areas of the Mississippian community. Given the poor site condition in the portions with mounds, future work might prove more capable of generating anthropologically meaningful information if it were conducted in the farmland south of the mound cluster overlooking Lake Barkley and in the gardens and lots in the sulcus east of Mound 1.

The modern town of Canton, although small, is indeed a living community with a rich history in addition to its prehistory, and therefore has been physically altered to suit the needs of generations of residents. Fortunately, much is still remembered of the changes that have been made in this century, and it would benefit future generations of archaeologists, historians, and the public to record the recollections and memorabilia of the older members of the community.

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The Mississippian town of Canton is listed in the National Register of Historic Places. In keeping with policy regarding listed properties, this report further documents the significance of the site as a reservoir of late prehistoric indigenous culture. Unfortunately, it also documents the tremendous damage the site has suffered in the last century or more. In addition, property on which the site is located is divided between several owners,

some of whom denied archaeological crew members access to the portion of the site in their ownership and others who were not available at the time of the study period to provide access to their property, suggesting a clear potential for incomplete coverage in the historic place designation. Additional properties within the Mississippian site boundaries had already been registered as historic places for their historic significance at the time of the 1992 investigations.

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A NEW LOOK AT THE MISSISSIPPIAN LANDSCAPE AT WICKLIFFE MOUNDS

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ABSTRACT

The 1992 excavations at Wickliffe Mounds (15Ba4) revealed two deposits near Mound C that contrast with the surrounding soil profiles, and that appear to be small mounds now hidden by midden and backfill. Ceramic analysis indicates a Middle Wickliffe (A.D. 1200-1250) date for one mound, while the stratigraphic position of the second is identical to that of Mound C. These data indicate that Mound C was part of a complex of mounds, and underscore the Middle Wickliffe period as the most active time for major construction projects.

INTRODUCTION

The 1991 excavations at the Mississippi period Wickliffe Mounds site (15Ba4) concentrated on Mound C, a small, rounded mound in the northeast sector of the site. Mound C is best known for its association with a cemetery, first excavated and placed on public display in 1932. In 1991, Wickliffe Mounds Research Center excavators removed human remains from exhibit, recording as much as possible about their original context. The project demonstrated an unpredicted complexity to Mound C, in which the cemetery was only the last of several stratigraphic events.

The 1992 excavations continued investigation of the cemetery with two goals: to test hypotheses about the contexts of Mound C, and to delineate the perimeter of the cemetery. Test excavations at the northeast and southwest corners of the project area revealed anomalous deposits, now interpreted as additional mounds. The data add to a developing picture of the changing landscape of the Wickliffe Mounds village, and indicate even more complexity to Mound C and its environs than had been known previously.

The full significance of the 1992 findings must be understood in the perspective of the entire Wickliffe excavation program, and the current model of village development during the period A.D. 1100-1350.

EXCAVATIONS 1984-1991: VILLAGE EXPANSION

The Wickliffe Mounds Site was excavated first in the 1930s by an entrepreneur and relic collector, Fain W. King (Wesler 1988). King excavated in six areas of the site, which he designated Mounds A through F. Mounds A and B were platform mounds, D a long, saddled mound that may have been an elite burial mound

(Wesler 1990), F a rounded mound of unknown function, and E a village area of uncertain location. Mound C turned out to be a cemetery, which became the most dramatic part of a set of displays that King opened to the public. King's field notes have not been located, and only artifact labels and very sketchy notes from the first months of the project (September-October 1932), curated at Mound State Monument, Alabama, and in the University of Alabama library archives, survive to document his project.

When the site, collections, and tourist facilities were donated to Murray State University in 1983, the Wickliffe Mounds Research Center (WMRC) was formed to improve the exhibits and public education programs and to renew research on the site. Annual excavations since 1984 have been designed to sample the site and to reevaluate the original excavations, with the goal of analyzing as well as possible the extant assemblages from King's work.

Between 1984 and 1990, WMRC investigations studied remnants of Mound A, B, D, and F, and placed a transect across the northwestern sector of the site in search of Mound E (Figure 1) (Wesler 1985, 1989, 1991a, 1991b, 1991c; Wesler and Neusius 1987). Stratigraphic, radiocarbon and ceramic data helped to define a three-period, intrasite chronology: Early Wickliffe, assigned to A.D. 1100-1200; Middle Wickliffe, A.D. 1200-1250; and Late Wickliffe, A.D. 1250-1350. Although the original definition of the Wickliffe periods was based on shifting ratios of red-filmed and incised/punctate pottery (Table 1), typological and formal (handle and plate rim) markers tie the Wickliffe periods into horizons that characterize much of the lower Ohio Valley (Clay et al. 1991).

As test excavations sampled west-to-east transects across the central and northwest sectors of the site, chronological analysis allowed the delineation of a model of village expansion throughout the Wickliffe occupation. No mounds have been identified for the Early Wickliffe period, during which domestic occupation clustered tightly around a central plaza. The subsoil under the (later) platform mounds reveals much less complexity of intersecting wall trenches and other features than subsoil areas elsewhere in the village, suggesting that these locations already served special functions in the Early Wickliffe period.

In the Middle Wickliffe period, the platform mounds A and B were constructed on the west and north sides of the plaza, respectively. Mound A, the larger platform, appears to have been primarily ceremonial in function, while Mound B supported a residence, interpreted as an elite dwelling due to its position on the mound summit, a higher ratio of serving vessels (bowls and plates) to cooking vessels (jars) than documented elsewhere (Wesler 1992), and indications of better cuts of venison (Kreisa and McDowell 1995). The domestic area expanded, especially along the high ground of the ridge, in part displaced by the platform mounds.

The Late Wickliffe period saw the village expand to its greatest area, crowding to the edges of the bluff. The final stages of the platform mounds were added during the Late Wickliffe period, while Mounds D and F were constructed or completed. There is no indication of substantial village deposits postdating A.D. 1350, suggesting village abandonment at the end of the Late Wickliffe period.

This reconstruction of village founding, expansion, and abandonment takes on added significance when interpreted within a model of chiefly cycling. Recent discussions of chiefdom societies have emphasized their inherent instability, due to competition for power among rival elite lineages (Anderson 1990; Scarry 1990; Wright 1984). Chiefdoms often exhibit a cycling pattern, in which one chiefly center rises as another declines.

At Wickliffe, several measures indicate that the time of greatest consolidation was the Middle Wickliffe period. Middle Wickliffe was the most active period for mound construction, in which five of six Mound A stages and three of four Mound B stages were deposited. Only the final stage of each platform was added during the Late Wickliffe period. The remnant margins of Mounds D and F were created in the Late Wickliffe period,

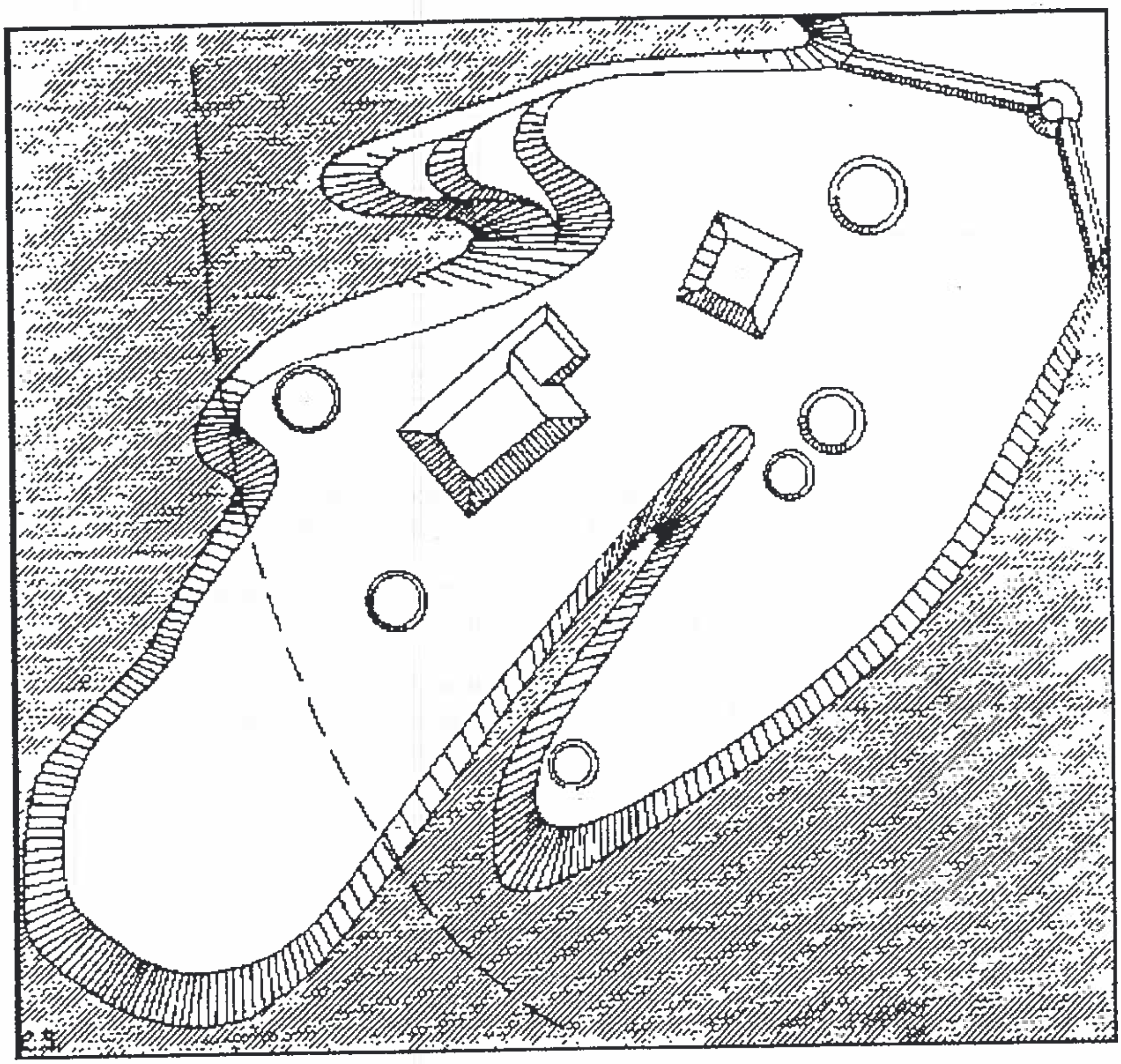


Figure 1. Wickliffe Mounds. Morgan style map by Charles B. Stout. Used by permission of the Western Kentucky Project, University of Illinois-Urbana.

Table 1. Frequency Ranges for Wickliffe Mounds Ceramic Sequences

	Early Wickliffe[1] %	Middle Wickliffe[2] %	Late Wickliffe[3] %
Mississippi Plain	80.0-91.0	82.7-88.5	78.8-92.8
Incised	.5-.9	1.3-2.6	1.1-3.6
Bell Plain	2.9-13.4	2.2-10.9	3.8-15.5
Nashville Negative	0 - .3	0 - .4	0 - .5
Red Filmed	2.3-3.5	1.6-3.0	.1-.6
Kimmswick	1.5-4.1	2.0-4.3	.8-2.1
Wickliffe	.2-1.6	0 -1.0	0 -2.6
Cordmarked	0 - .1	0	0 - .4
Other	0 - .6	0 - .3	0 - .4
Sample size ranges	307-821	230-1289	423-11,529

[1]Early Wickliffe samples are from the Mound A midden (Westler 1985); Mound D North midden and subsoil features (Wesler 1989a); and North Village, 1988 and 1989 samples (Wesler 1990b).

[2]Middle Wickliffe samples are from the Mound A core (Wesler 1985); Mound D South features (Wesler 1989a); and North Village, 1988 and 1989 samples (Wesler 1990b).

[3]Late Wickliffe samples are from the Mound A outer mound (Wesler 1985, 1989a); Mound F subsoil features, midden and mound (Wesler and Neuisus, 1987); three mound Dsamples, Feature 112, and the East Midden (Wesler 1989a); and the North Village, 1988 and 1989 samples (Wesler 1990b).

but each may have been more complex than present data can show; even if both are Late Wickliffe constructions, Middle Wickliffe was the more active mound-building period.

Other indicators highlight the Middle Wickliffe period: the largest proportions of decorated (red-filmed plus incised/punctate) pottery, serving vessel rims, ornaments, and specialized tools. None of these measures appears significant in itself, but the concatenation of all of them in the Middle Wickliffe period suggests a "high point" in the history of the village. The data fit a scenario of village founding ca A.D. 1100, strongest consolidation during the Middle Wickliffe period, and decline to dissolution during the Late Wickliffe period: a single cycle in the life of a chiefdom (Wesler 1992).

In 1991, the Wickliffe researchers turned to Mound C, the cemetery. A decision to remove the human remains from public display, and to replace them with a new exhibit, prompted the completion of the cemetery excavation begun in 1932, with the goal of documenting as much as possible of the original cemetery context.

Mound C turned out to be much more complex than expected, and the cemetery was only one of several major depositional events. The central feature of the stratigraphy was the basket- loaded mound, Mound C proper (Figure 2). The zone beneath the basket-loaded mound was a midden, best documented in deep tests in the center of the old excavation floor. Stratigraphically continuous with the basal midden, there was a greyish mound, whose soil and artifactual contents resembled a midden. Lenses and the generally ashy nature of this mound suggest that it was a refuse mound with several burning episodes. The basal midden and the ashy mound both belong to the Middle Wickliffe period, approximately A.D. 1200-1250.

The basket-loaded mound was built on top of the Middle Wickliffe midden and ashy mound. It, in turn, was engulfed and covered by a Late Wickliffe midden, into which the cemetery apparently was intrusive (Wesler and Matternes 1991)(this interpretation must be verified by direct dates on the cemetery). The basket-loaded mound, in 1991 samples, did not contain temporally diagnostic materials, but is sandwiched between Middle and Late Wickliffe middens, and so should date to around A.D. 1250.

MOUND C: 1992

Research resumed in the Mound C area in 1992 to pursue some of the interpretations from 1991. The 1992 project had two major goals: to test the stratigraphic reconstruction of the remnant mound, which is to the north of the exhibit building, and to find the edges of the cemetery. Tracing the cemetery perimeter is crucial both for demographic analysis, to allow some estimate of the total population buried here, and for management reasons, to protect the cemetery from further disturbance.

Analysis of the cemetery is in progress. Initial analysis of stratigraphic contexts has focused on the south and west sides of Mound C.

Over most of the area surrounding Mound C, the stratigraphy is visually consistent. A first look at the cultural deposits in this area came in 1989, when a trench toward the cemetery from the west discovered its edge. The primary deposit is a deep, loamy midden, which is the Late Wickliffe midden into which the burials intrude (Figures 3, 4a). In part of this trench, there is a distinguishable transition to a lighter-colored, Middle Wickliffe midden at the base, overlying subsoil.

The westernmost 1992 excavation unit was 46-47N 16-18E, directly south of the 1989 trench, approximately 1 m from the southwest corner of the exhibit building. Except for the absence of burials, the

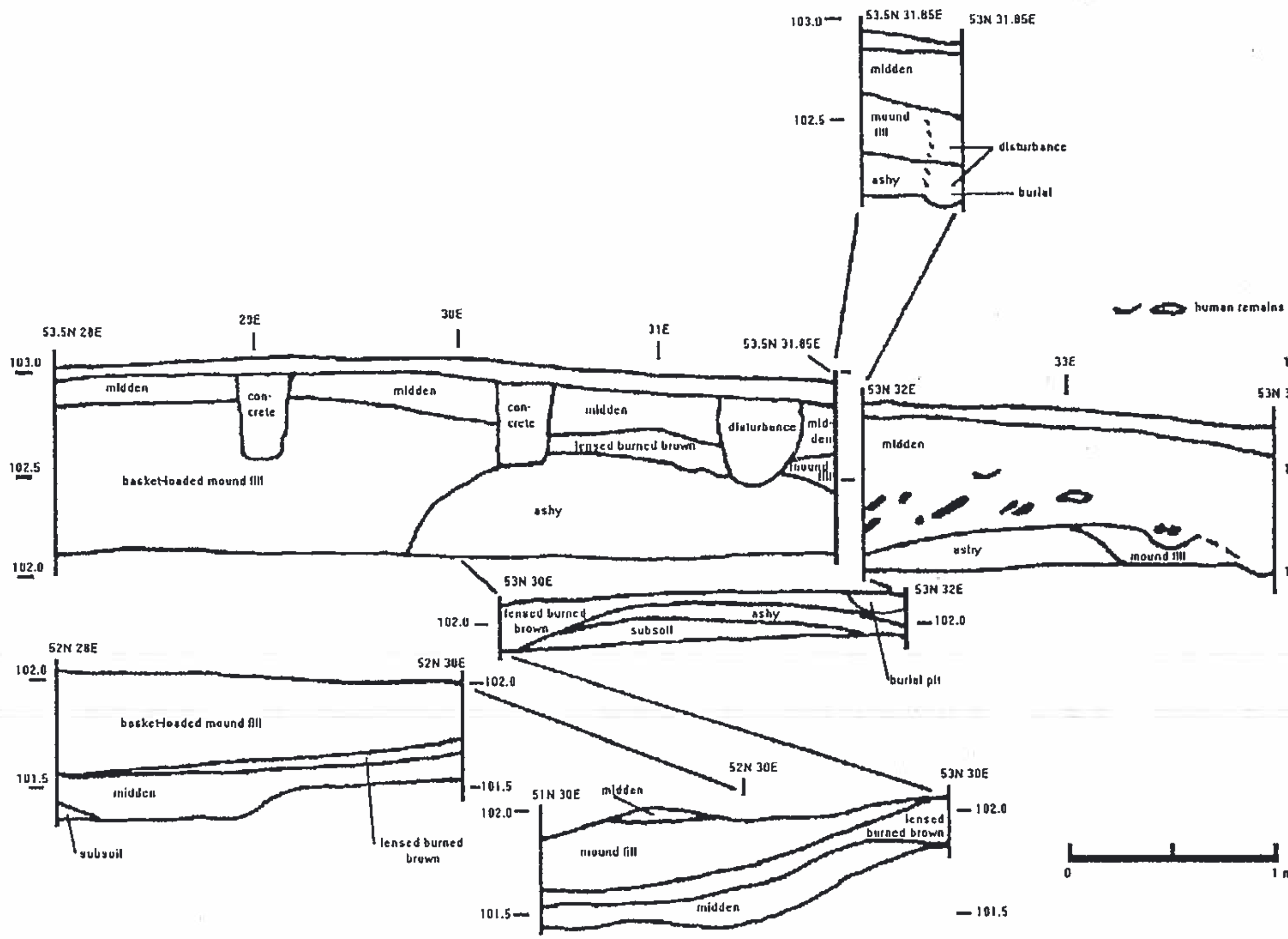


Figure 2. Mound C, Composite Stratigraphy.

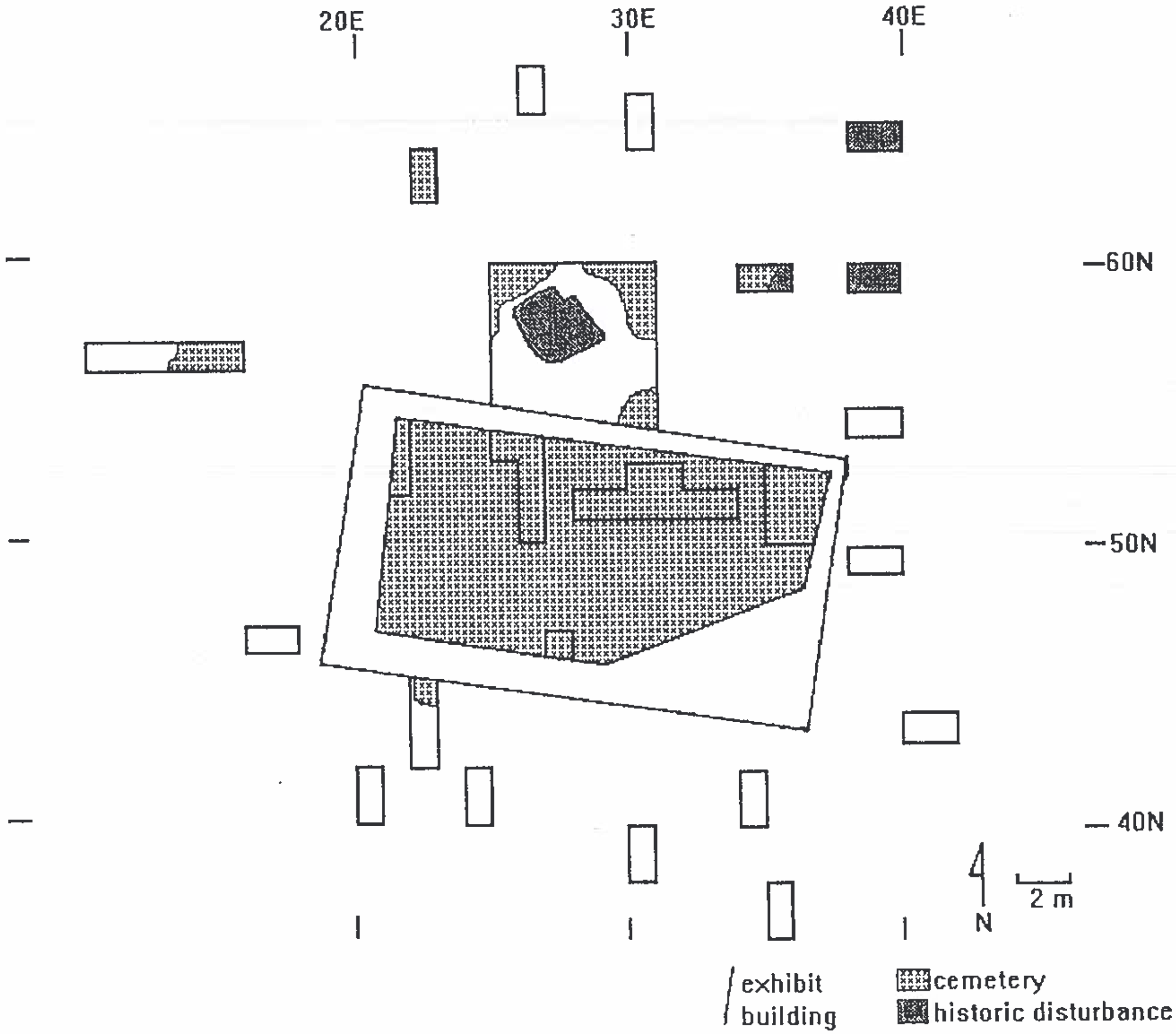
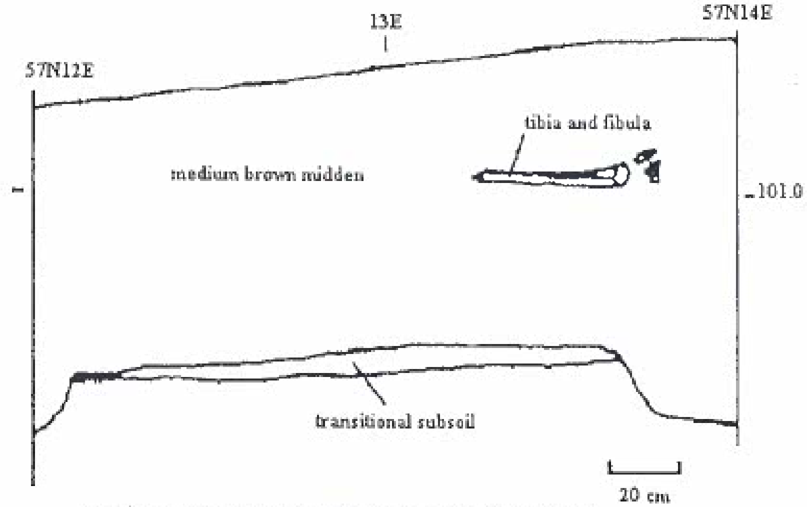
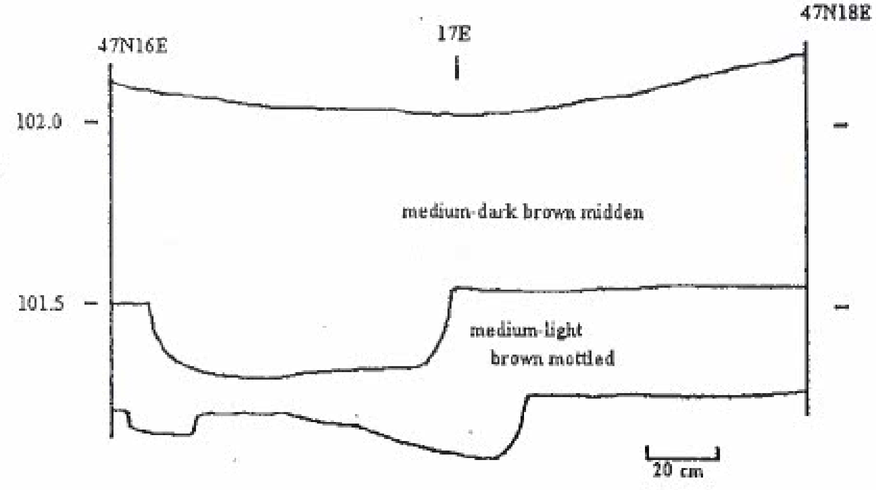


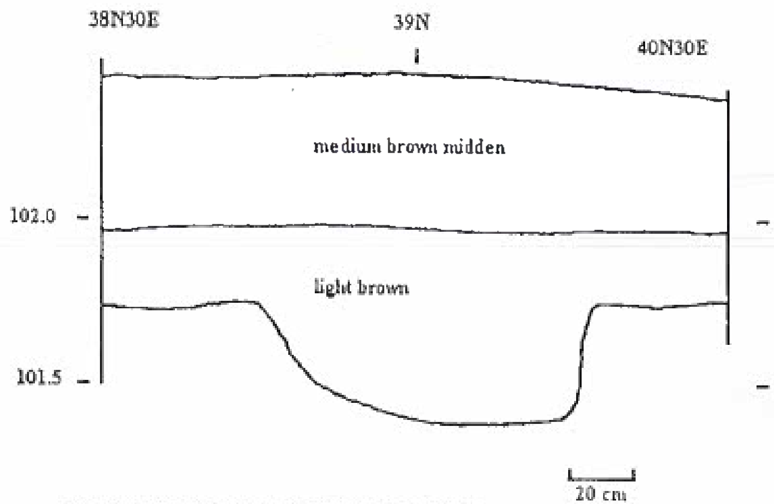
Figure 3. Cemetery Project: Excavation Plan 1989 and 1992.



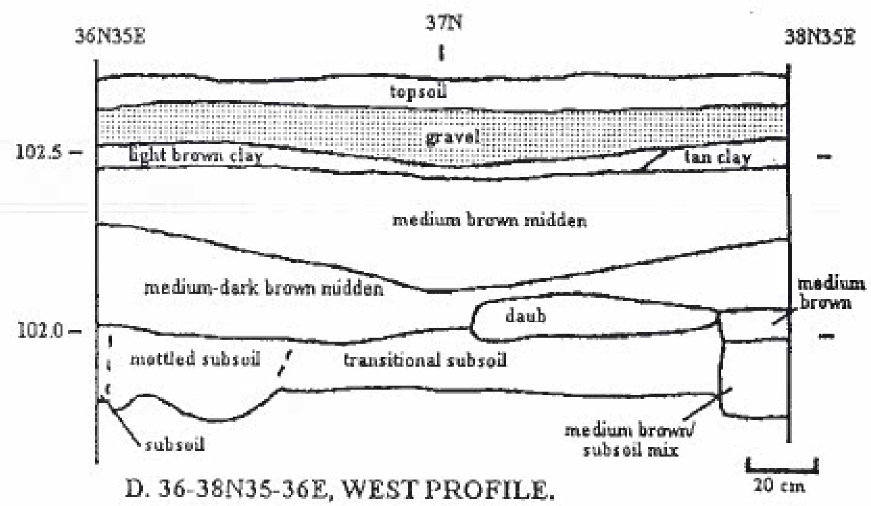
A. 56-57N12-14E (1989), NORTH PROFILE.



B. 46-47N16-18E, NORTH PROFILE.



C. 38-40N30-31E, WEST PROFILE.



D. 36-38N35-36E, WEST PROFILE.

Figure 4. "Normal" Stratigraphy of the Mound C Vicinity.

stratigraphy (Figure 4b) is the same: a deep, Late Wickliffe midden over a lighter-colored, Middle Wickliffe midden. The most interesting artifact from this unit was half of a marine shell spider gorget. Spider gorgets are characteristic of the Middle Mississippi Valley, though rare (Esarey 1990). This one was piece-plotted in the Middle Wickliffe midden, and will be one of the best documented spider gorgets in the region. Although such artifacts are expected to be burial associations, no human remains were encountered in this unit.

Excavations south of Mound C documented similar cultural deposits. In 38-40N 30-31E, south of the center of the exhibit building, there is much the same stratigraphy, Late Wickliffe over Middle Wickliffe midden (Figure 4c). This unit has two significant attributes. First, the upper levels are historically disturbed to a greater depth than expected. There is a thin plow zone over most of the Wickliffe Site. In this unit, a disturbed zone lies above the plow zone, which apparently represents backdirt from the King excavation in the cemetery. The King backdirt could be identified through much of the 1992 excavation area by the random teeth scattered through it.

The other interesting feature was a well-preserved wooden post. The base of the post was flat, and had a metal tag. It is almost certainly one of the stakes used to secure King's circus tent, which covered the cemetery excavation before the exhibit building was constructed.

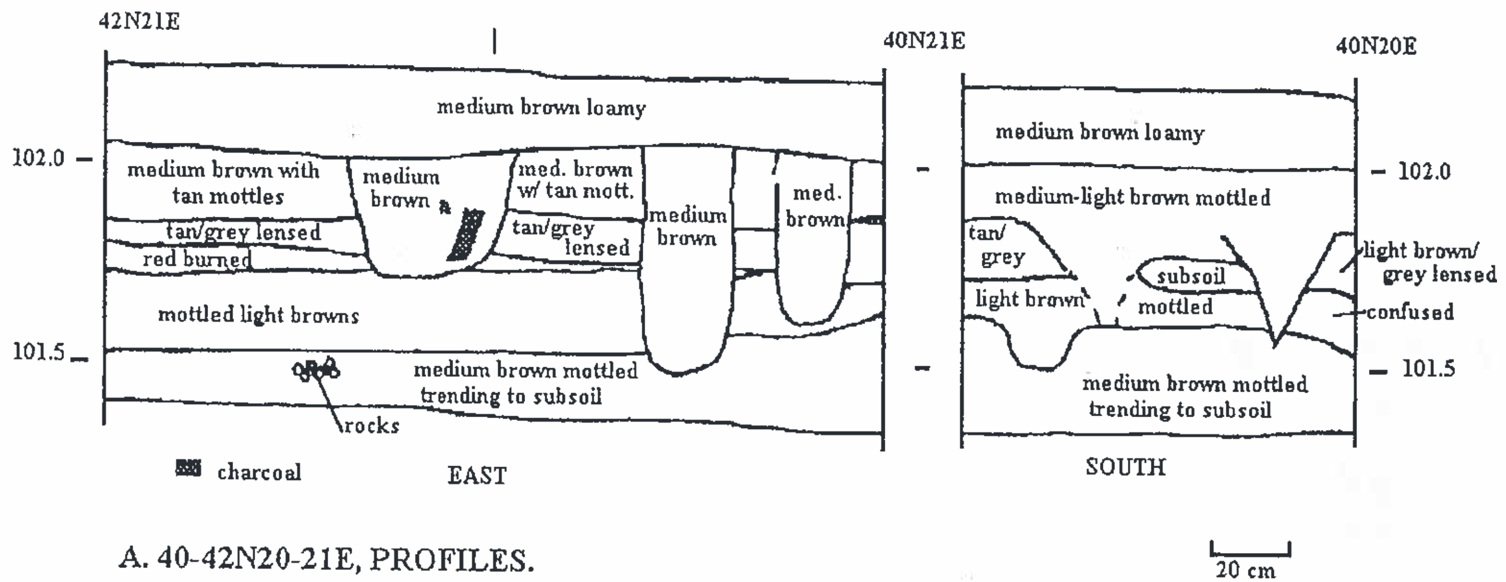
In the next test unit west, 36-38N 35-36E, the undisturbed stratigraphy (Figure 4d) is consistent with the units already discussed, a deep Late Wickliffe midden over a shallow Middle Wickliffe zone. In this case, a gravel road protected the midden from the backdirt overburden. A 1932 photograph shows the road newly cut, without gravel, and given the lack of backdirt, we can probably date the road to 1932 or early 1933.

In the perspective of this very predictable midden stratigraphy, the units south of the southwest corner of the exhibit building are a puzzle. In 40-42N 20-21E, the plow zone and Late Wickliffe midden reach only two levels deep, about 20 cm (Figure 5a). Under that, there is a lighter-colored soil with noticeably fewer artifacts. This is not, however, the top of subsoil, which was encountered another seven levels (65 cm) deeper. The profile is clearly at odds with those discussed above, which are considered "normal" for this area of the site.

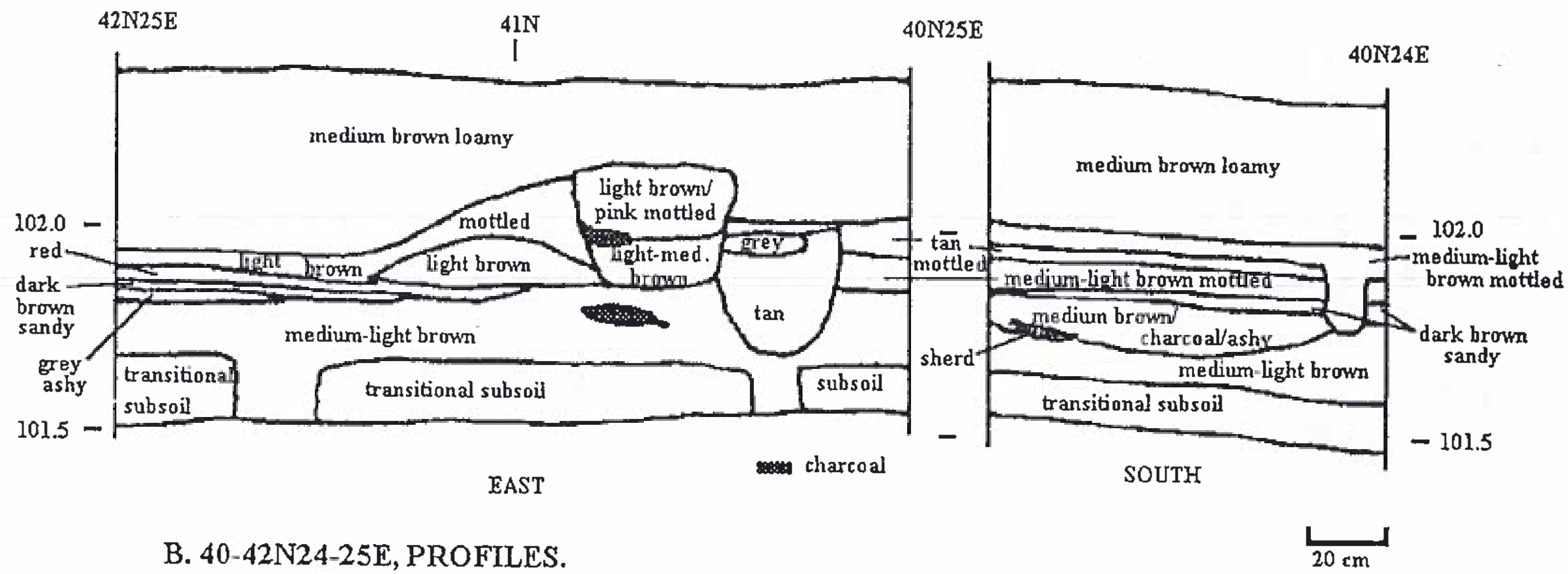
The next unit was 4 m directly east, at 40-42N 24- 25E. Again, the profile is anomalous (Figure 5b). The dark zone at the top is deeper than the last one, reflecting more King backdirt; a fragment of a glazed brick occurred in Level 3, confirming disturbance to that depth. Directly under the backdirt, however, is the lighter soil. The next unit west from this one was the unit with the tent stake, in which the Late Wickliffe midden reached a depth of approximately 50 cm (Figure 4c).

At this point in the project, the primary concern was that there was no evidence of the cemetery, despite proximity to the exhibit building. Excavators placed a new test between those last two, closer to the building, at 42-44N 22-23E (Figure 6). This unit exposed a burial, or part of one--the only burial recorded to the south or east of the exhibit building. A set of postholes at the base of the deposit appeared to delineate the south side of the burial (Figure 6). A ceramic pipe was noted at the north side of the unit, but after a further extension north to the wall of the exhibit building, the pipe could not be associated with a burial. An eastward extension created an inset that exposed more of Burial 258 to allow more thorough study. Fortunately, the excavators were able to define a burial pit, and in the inset, they excavated only the upper disturbed/Late Wickliffe zone and the burial pit fill.

Defining the burial pit established several points of interpretation. First, it confirmed that burials occur in intrusive pits, some--like this one--quite deep. Second, it dashed hopes of using the posthole line to identify a cemetery perimeter, since the postholes' point of origin is at the subsoil, much deeper than the origin of the burial pit. The alignment is accidental. Third, the visibility of the burial pit highlights the fact that the deep



A. 40-42N20-21E, PROFILES.



B. 40-42N24-25E, PROFILES.

Figure 5. Anomalous Stratigraphic Units, Southwest of Mound C.

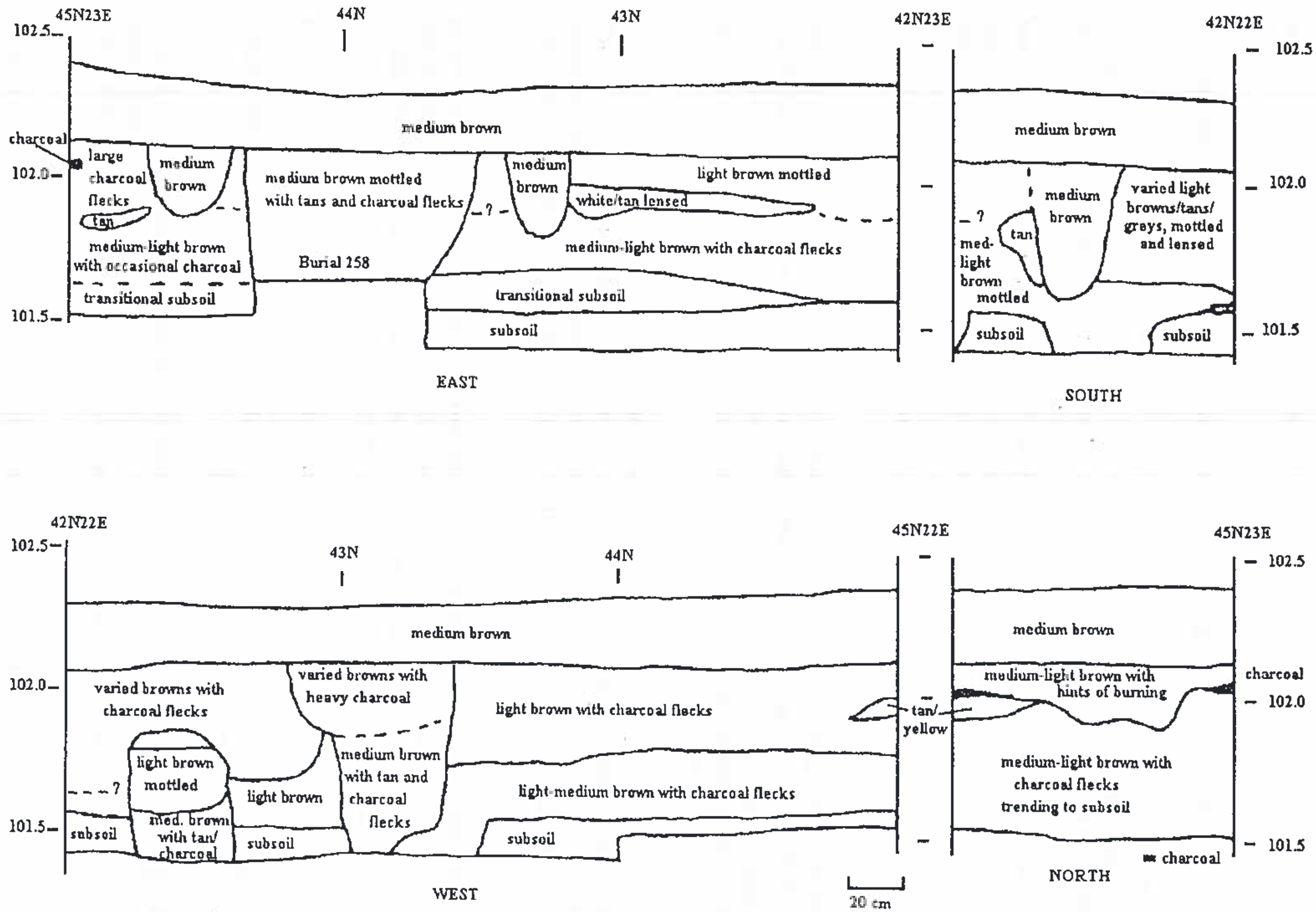


Figure 6. Plan and Stratigraphy of 42-45N 22-23E.

deposit here is not the dark, Late Wickliffe midden, but the lighter, anomalous deposit of the flanking two test units. What, then, is it?

Several recent observations about Mississippian earth moving have indicated strongly that such activities were not confined to mound construction. Electromagnetic surveys, followed by test excavations, in Cahokia have demonstrated extensive landscaping in the central palisaded area. The natural topography there is a ridge-and-swale floodplain, which was cut and filled to create a large level plaza area (Dalan 1991:1284). "Massive earthmoving, in addition to mound construction, was initiated during the Lohman phase, creating a `ritual landscape'" (Holley et al. 1989:345). R. Barry Lewis (personal communication) has informally noted that the Adams Site, in Fulton County, Kentucky, almost seems to be a constructed island, with deep middens rising above surrounding swamp, which formed a natural moat. In this, the Adams Site resembles the Parkin Site, in northeast Arkansas, which also has deep middens and rises like a shallow mesa above the surrounding area. At Etowah, the plaza rises above a surrounding moat. It is reasonable to suspect that these are not accidents or coincidences, but that Mississippian landscaping beyond mound building is widespread, and was conducted on a scale not yet recognized.

Given the compact, bluff top situation at Wickliffe, large-scale earth moving to fill low areas or to create a raised plaza seems unlikely. The most that might be expected would be some scraping to level the small plaza, which would be difficult to document since the plaza is now covered by a paved parking lot. However, in considering the deposit to the southwest of Mound C, the question must be considered: is this a Mississippian fill episode, to create a smoother landscape or to fill a gully?

The ceramic assemblages from the anomalous deposit argue against such an interpretation. The contrast between the two zones is clear. Ceramics from the dark upper zone fit the Late Wickliffe pattern (Table 2). The assemblage of the lower zone, however, is a bit ambiguous. The relative proportion of red- filmed to incised sherds is slightly high for a Middle Wickliffe deposit, but slightly low for an Early Wickliffe deposit. If seriation works, it is a late Early to early Middle Wickliffe deposit.

In fact, it is likely that seriation does work here. There are two flared bowl rims in the deposit, which are Middle Wickliffe markers. Two sherds of Nashville Negative Painted *var. Kincaid* are also present in the assemblage, and there is no good evidence for the introduction of negative painting before A.D. 1200, that is, before Middle Wickliffe. The anomalous zone therefore can be considered a Middle Wickliffe deposit.

On the other hand, something is missing in this profile. As noted above, under the basket loaded Mound C proper, there is a distinct Middle Wickliffe midden. No such zone is visible under the anomalous deposit to the southwest. This suggests that the deposit in question was created before much Middle Wickliffe midden developed in this area, thus, early in the Middle Wickliffe period.

The idea that a gully through Late Wickliffe midden was filled in the Middle Wickliffe period, then, is not supportable. The anomalous deposit is not a landscaping infill, but an early Middle Wickliffe mound, which was engulfed by midden and King backdirt so deep that there is no longer any surface indication of it. This mound is currently designated Mound C_1.

A test unit at the opposite (northeast) corner of the exhibit building, in 54-55N 38-40W, encountered a surprisingly similar set of deposits (Figure 7). In each descending floor of the arbitrary levels, the excavators noted a shifting boundary between dark, Late Wickliffe-like midden at the west side, and tan, almost artifact-free, subsoil-like soil on the east side. The transition shifted westward as the test unit deepened. At the base of the unit, under the tan soil, a pair of wall trenches forming the corner of a rectangular structure appeared. Study of

Table 2. Anomalous deposit (southwest): ceramic frequencies.

	Upper deposit[a] #	Upper deposit[a] %	Lower deposit[b] #	Lower deposit[b] %	Total #	Total %
Mississippi Plain	2176	80.5	1828	84.9	4004	82.5
Incised	49	1.8	15	0.7	64	1.3
Bell Plain	394	14.6	169	7.8	563	11.6
Nashville Negative	1	--	2	0.1	3	0.1
Red filmed	19	0.7	26	1.2	45	0.9
Kimmswick	28	1.0	91	4.2	119	2.5
Wickliffe	20	0.7	8	0.4	28	0.6
Cordmarked	--		--		--	
Other	15	0.6	14	0.7	28	0.6
Totals	2702	99.9	2153	100.0	4855	100.1

[a] Includes 40-42N 20-21E Levels 1-2; 42-45N 22-23E, Levels 1-2; 40-42N 24-25E Levels 1-3 (note that a fragment of glazed brick was recovered from Level 3).

[b] Includes 40-42N 20-21E Levels 3-9; 42-45N 22-23E, Levels 3-8; 40-42N 24-25E Levels 4-7.

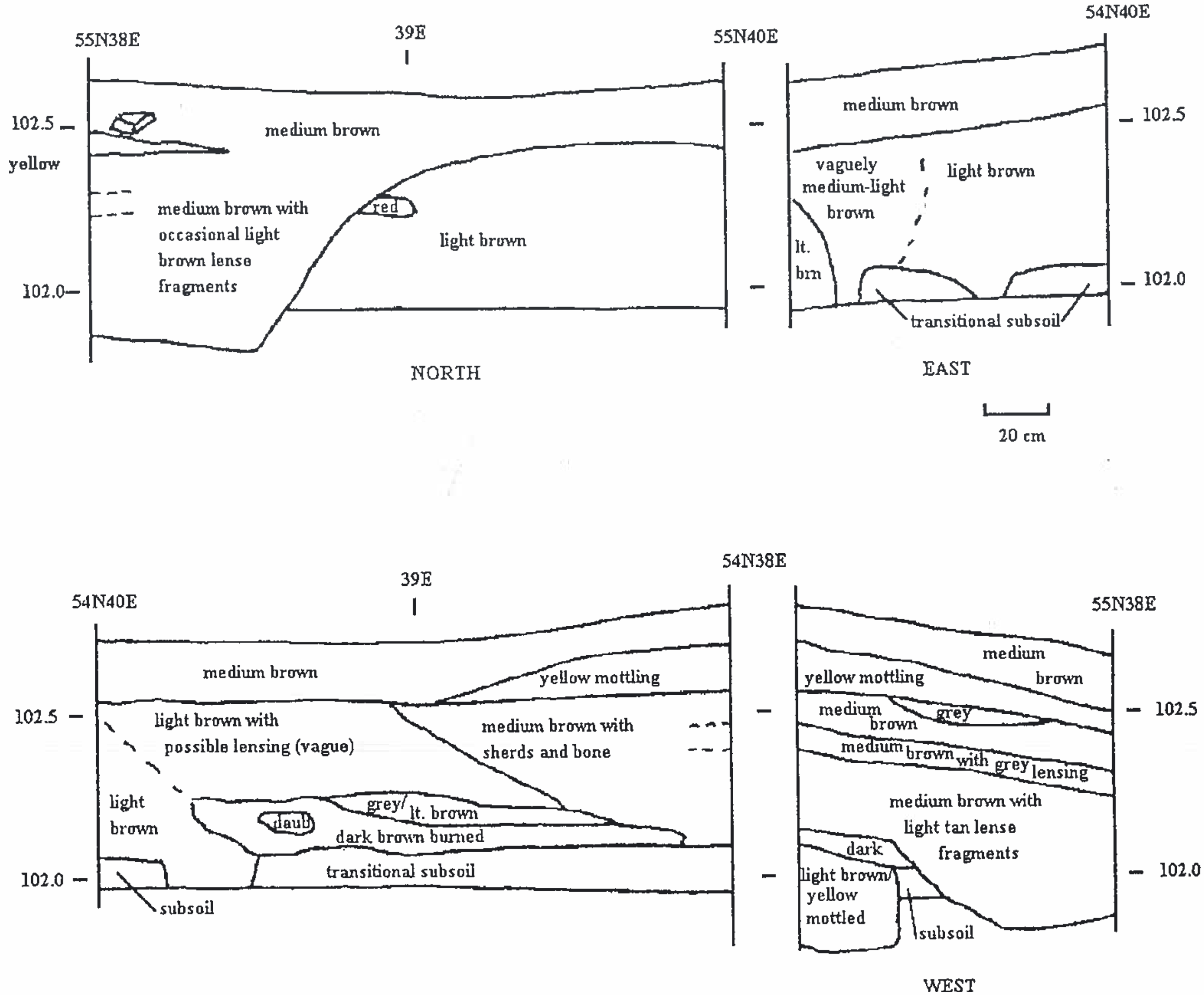


Figure 7. Anomalous Deposit Northeast of Mound C.

the profile reveals that the shifting boundary between dark and light soils in fact followed the slope of a mound. Like Mound C_1, the northeast mound (designated Mound C_2) was overburdened by Late Wickliffe midden and, with the additional complicating factors of post-1932 construction activities in the immediate vicinity, is not visible on the surface.

Based on preliminary assessment, the structure beneath Mound C_2 belongs to the Middle Wickliffe period. Sandwiched between a Middle Wickliffe structure and a Late Wickliffe midden, Mound C_2 occurs in the same stratigraphic position as Mound C, and should be roughly contemporaneous.

CONCLUSIONS

The Mound C/cemetery excavations of 1992 have provided a new look at the northeast sector of the Wickliffe village, and both supplement and modify previous ideas about the village landscape. The new data fit the village expansion model well. The basal deposits in the vicinity of Mound C are Middle Wickliffe middens, representing an extension of the village away from the plaza center and along the highest ground of the ridge.

Mound C, on the other hand, provided some surprises. Mound C was not an isolated mound, but part of a complex of mounds. Mound C_1, southwest of Mound C, may predate Mound C proper, but the shallowness of the Middle Wickliffe midden in the area suggests that C_1 may have been visible when C was constructed. Mound C_2 occurs in the same stratigraphic position as Mound C. Thus, all three mounds probably were visible, and are likely to have been in use contemporaneously. The function of this mound complex is still under investigation.

As noted earlier, most of the mound construction at Wickliffe occurred during the Middle Wickliffe period. These mound episodes include five of six stages in Mound A, the larger platform mound; three of four stages in Mound B, the smaller platform; the middeny and basket loaded Mound C; and now, Mounds C_1 and C_2. Mounds C and C_2 contain too little artifactual evidence to date them securely to the Middle Wickliffe period; however, capped by deep Late Wickliffe middens, they surely date no later than the early Late Wickliffe period.

Thus, only the last stage of each platform mound was constructed in the Late Wickliffe period, and even if Mounds D and F belong entirely to Late Wickliffe, mound construction was more active in the Middle than in the Late period. Middle Wickliffe seems to have been the strongest stage of cohesion in a boom-and-bust cycle in the development of a small chiefdom.

In sum, analysis of anomalous deposits southwest and northeast of Mound C has documented what appear to be small mounds, no longer visible on the surface. In the absence of clear evidence for the social function of this mound complex, this is perhaps not an exciting discovery. It does, however, provide a new perspective on the dynamics of change in the landscape of a small Mississippian town.

ACKNOWLEDGMENTS

Grants from the National Park Service, U.S. Department of the Interior, administered by the Kentucky Heritage Council, have offered consistent support of the Wickliffe Mounds Research Center and especially the cemetery project. I thank Kathy Lyons for pointing out that the Mound C_1 deposit resembled mound fill, even if I did ignore her comment at the time.

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LATE PREHISTORIC MORTUARY BEHAVIOR IN THE JACKSON PURCHASE: EVIDENCE FROM MOUND C, WICKLIFFE MOUND GROUP (15BA4)

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ABSTRACT

Very little is known about Late Prehistoric mortuary programs in the Jackson Purchase. At the Wickliffe Mound Group (15Ba4) the mortuary deposits associated with Mound C display a diversity of grave and body preparations. Most graves contained extended in-flesh interments; however, a notable complement of bundled, disturbed and possibly cremated skeletal assemblages were also recovered. According to Wesler and Matternes (1991), graves were placed in the mound, rather than the mound being built around them. Sheets of carbon and fragments of untreated wood were noted; these suggest the use of grave liners. Stone has been found in association with graves, but it was not common. If the application of grave linings was important to the mortuary ritual, then use of less durable materials was favored. These data also suggest that use of a durable receptacle to inter and subsequently recover bones, for constructing a secondary burial, was not part of the Wickliffe mortuary tradition, but disinterment of nonlined graves may have been practiced. The burial forms seen in Mound C do not follow any particular Late Prehistoric mortuary pattern, but may reflect an acculturation of burial concepts from the surrounding regions.

INTRODUCTION

Despite all the preventive measures that cultural and biological adaptations provide, humans die. Cultural reactions to this biological phenomena are not random, rather they are very expressive and meaningful (Huntington and Metcalf 1979). Death in a community encompasses a wide range of social, symbolic, material and political reorganization, whose impact has some effect on most of the community's members. Death's transformation of both the physical and the social state requires that decisions be made as to how the deceased is to be physically manipulated into a culturally satisfying and biologically safe environment. Minimally, the choice of appropriate mortuary treatments involves consideration of the deceased's rank and position in the community, size and composition of the community, familial affiliation, wealth, sex, age, mode of death, location of death, and cultural subsistence pattern (Binford 1971; Braun 1981; Brown 1995; Fenton 1991; Hofman 1986; O'Shea 1984). Ultimately, these choices have a profound effect on how, where, and if the deceased will enter the archaeological record. Unfortunately, most of these factors do not leave a uniquely definable archaeological signature, hence this paper focuses on a very small portion of mortuary activity: that associated with the actual interment of the dead.

While a considerable amount of anthropological interest has been focussed on interpreting the Late Prehistoric cultural pattern expressed in the Jackson Purchase and the Cairo Lowland regions, very little is known about their mortuary programs. Previous investigations have explored numerous avenues of data, including site form (Pollack and Railey 1987), settlement patterning (Kreisa 1988, 1995; Lewis 1986; Smith 1978), ceramic and artifactual chronologies (Butler 1991; Lewis 1988; Wesler 1991), subsistence patterning (Kreisa and McDowell 1995; Schurr 1994), resource acquisition (Carr and Koldehoff 1994) and biological representation (Black 1979; Matternes 1995; Wilson 1993). Very little attention has been paid to the archaeology of this region's Mississippian cemeteries as an avenue to learn about past human behavior. This is partly due to the limited amount of information available.

One of the first steps toward developing an understanding of the Late Prehistoric mortuary program associated with Jackson Purchase Mississippian sites is to determine how the deceased's physical remains were manipulated prior to placement in a cemetery context and what form of grave receptacle was provided. Perhaps the best available source comes from the cemetery associated with Mound C of the Wickliffe Mound Group (15Ba4). Little to no valid quantifiable data have been made public since excavations exposed human remains in the 1930s. While pilot studies have demonstrated that viable skeletal data could be recovered from these exposed interments, many graves could not be used as accurate models for reconstruction of the original mortuary program (Matternes 1996). Historically compromised graves were therefore excluded from this sample. Subsequent excavations in Mound C have encountered numerous undisturbed graves. These graves, plus some of those originally excavated in the 1930s with reliable information, are the the sample from which the mortuary phenomena described in this paper are drawn. A total of 201 graves are considered in this analysis (Table 1).

The purpose of this paper is twofold; first, I will assess how the mortuary program in Mound C has been presented, relative to data recovered during the 1991-1994 field seasons. Evidence indicating how the dead were prepared for burial will be described and the forms of mortuary facilities constructed will be reviewed. Secondly, the ramifications of this information will be considered in relationship to how the dead were buried in Mound C. The goal of this study will be to provide information pertaining to how the dead in Wiekliffe and other less documented Late Prehistoric burial areas in the Jackson Purchase may have been interred.

MORTUARY STUDIES IN THE JACKSON PURCHASE

Despite the great number of reported and undocumented mortuary sites in the Jackson Purchase management area of western Kentucky, as regionally defined by Pollack (1990), only a handful of reports communicate any information about the region's mortuary practices. From an examination of human remains recovered from the Adams Site (15Fu4), Allen (1986) has been able to discriminate at least thirty individuals. He suggests that these data reflect an age segregation: most infants were buried as primary, extended interments beneath house floors, while adults are interred throughout the village area. This same pattern is reflected in excavation and demographic data from Wickliffe and is probably present at Turk (15Ce6) and McLeod Bluff (15Hi1) (Matternes 1995; McGill 1985; Webb and Funkhouser 1933). This segregation may reflect a difference in social identity: inclusion in the non infant burial pattern requires survival past weaning (Matternes 1994).

Adult Mississippian period interments appear to be buried in areas which were set aside for cemeteries. Details of how adult burials were distributed across various sites are a little more uncertain than the infant pattern. Allen (1986) and McGill's (1985) adult samples consist largely of scattered, disarticulated adult bones recovered from midden deposits or surface locations; precise mortuary activity cannot be differentiated from the postdepositional effects of agriculture and taphonomy. Plowing and other historic human impacts upon Late Prehistoric mortuary sites have served to greatly obscure much of what information was originally present. Webb

Table 1. Body Treatment/Grave Form Expressed in the Mound C Cemetery, Wickliffe Mound Group (15Ba4).

Body Treatment/ Grave Form	Quantity	Body Treatment/ Grave Form Total
Primary Interments:		136
- Single Individual	120	
- Multiple Individuals		
- Primary-Primary	7	
- Primary-Secondary	9	
Secondary Interments:		65
- Bundled Interments		
- Single Individual	24	
- Multiple Individuals (Bundle-Bundle Only)	25	
Indeterminant - Disturbed Interments	16	
	Total Sample:	201

and Funkhouser's (1933) investigations at McLeod Bluff were able to distinguish that at least some of the interments in the cemetery were primary inhumations; however, grave looting had severely compromised their ability to extract additional information.

There is some evidence that social rank and/or status may have played a key role in determining where individuals were buried. Depression era investigations of Wickliffe's Mound D, as reported by Blanche and Fain King, noted that both primary and secondary interments were encountered with a large number of grave goods (B. King 1937; F. King 1936). The details of these finds, however, are lacking.

To date, Matternes (1994) has found little or no distinct evidence of status affiliation within the Mound C assemblage. In a review of the surviving documentation, Wesler (1990) has postulated that status affiliation is reflected in grave location and content differences between the mounds C and D interments. Mound D grave morphologies are not well known. In the absence of excavations notes, photographs, and verifiable skeletal provenience, the exact composition of both the interments and the grave forms from Mound D must be seriously called into question.

For these same reasons, much of the information the Kings present about the Mound C cemetery must be judged very critically (B. King 1937; F. King 1934, 1936). The only known records surviving from these excavations are those made by the staff of the Alabama Museum of Natural History during their brief stay at Wickliffe in 1932. These documents and photographs record the presence of about 25 burials; however, they detail little more than how these skeletons were positioned in the mound.

In short, there is insufficient information available from any Mississippian sites within the Jackson Purchase to accurately identify what cultural behaviors are associated with deposition of the dead. As a result, much of what is inferred about the Jackson Purchase's Late Prehistoric mortuary pattern must be either gleaned from other regional Kentucky reports or extrapolated from cemeteries outside of the state. Recent investigations at Wickliffe have provided an opportunity to consider treatment of the dead with more regionally specific data.

BODY TREATMENT IN WICKLIFFE'S MOUND C

Excavations in the Mound C cemetery commenced early in the 1930s as part of a commercial enterprise, capitalizing on the public interest in Native American relics and prehistory (Wesler 1988). Unlike most archaeological field methodologies, which emphasize documentation and recovery of materials for further examination under controlled conditions, visually spectacular artifact and skeletal assemblages were left in place for public display. The exposed skeletons remained on exhibit for well over half a century, without the benefit of any substantive analysis or interpretation.

Most of the early literature, which was written during or shortly after Mound C's initial excavation, includes numerous photographs of the cemetery; however, only a few very sketchy cultural interpretations were ever made. Fain King noted that Mound C "contains three types of burials, intermingled and nonintrusive: the prone or extended, the bundle or basket, and almost in the center of the mound, a crematory basin containing charred human bones" (1934:16). King's statements suggest that interments in Mound C do not reflect a uniform manner in which the dead were prepared for burial. Examination of the data from Mound C has supported King's identification of extended and bundle burials; however, the presence of intrusive burials and a lack of evidence for a crematory basin do not support his conclusions.

PRIMARY BODY TREATMENT

Skeletal assemblages exhibiting primary body treatment (primary interments) result from cultural decisions to dispose of an individual prior to the onset of any advanced degree of decomposition. Primary body treatment involves only a minor amount of manipulation of the corpse's physical form as part of funerary and burial rituals. Individuals were fairly intact when interred. In Mound C, this type of treatment is evidenced by burials in which the skeleton was arranged in correct anatomical order. In general, the deceased were laid in an extended position, arms to the side, face up, and usually resting on their back. These primary interments represent approximately 67% of the grave sample.

Primary body treatment appears to be a consideration separate from organization of the grave. This is exemplified by how primary interments are associated with other types of body treatments. The majority of graves with primary interments contain single individuals; however, 16 multiple interments were also observed. Seven of these contained two individuals, who had both received primary body treatment, in the same grave. Since none of these multiple interments show differences in skeletal articulation, the possibility of grave reopening, or an extended period of surface retention until the death of the second individual, is extremely remote.

Placement of these individuals in the same grave at the same time is evidence that death occurred at about the same time. Since physical evidence for the cause of death could not be determined in any of the multiple interment cases, coinciding death would have to have been caused by agents which do not affect the skeleton. Relethford (1994) notes that acute communicable diseases are likely candidates for multiple death. These agents are suspected to have been a particular hazard among sedentary agriculturalists (Blakeley and Detweiler-Blakeley 1989). Multiple interments indicate that the rules for burial did not require that separate graves be prepared for each individual receiving a primary body treatment.

Another variant was the practice of including disarticulated skeletal elements with primary interments. At least nine graves displayed this form. Loose inclusions, such as the two disarticulated human tibiae in Burial 264 or the cranial fragments placed directly on Burial 262's legs, are presented as evidence of this pattern (Figure 1). These skeletal elements could not be traced to other possibly disturbed burials, suggesting that the bones had intentionally been added to the grave at the time of deposition. Cut marks were not observed on these bones, indicating that they were mostly unfleshed at the time of interment. The possibility of these inclusions as grave goods and not interments cannot be ruled out; however, the elements and their condition are inconsistent with other observed cases (Nash 1972; Perino 1971). Inclusions were not limited to single/paired element representations; in Burial 272, several limb bones from a single individual were placed with this primary interment.

The presence of a primary interment does not preclude the addition of other individuals, regardless of burial treatment, in the grave. Treatment of the body during the funerary ritual does not appear to dictate this aspect of the burial ritual. What is interesting to note among these graves is that none of the primary graves, with additional primary or secondary interments, contained more than two individuals. This suggests that the presence of an individual with primary body treatment may limit the number of people placed in a grave at one time.

SECONDARY BODY TREATMENT

Secondary body treatments (secondary interments) are also represented in Mound C. Their presence is evidence that aspects of funerary and/or burial practices involved manipulation of the corpse after decomposition had occurred. Secondary interments are collectively defined as concentrations of human bones that do not follow an accurate anatomical arrangement. The lack of approximate skeletal articulation indicates that soft tissues were

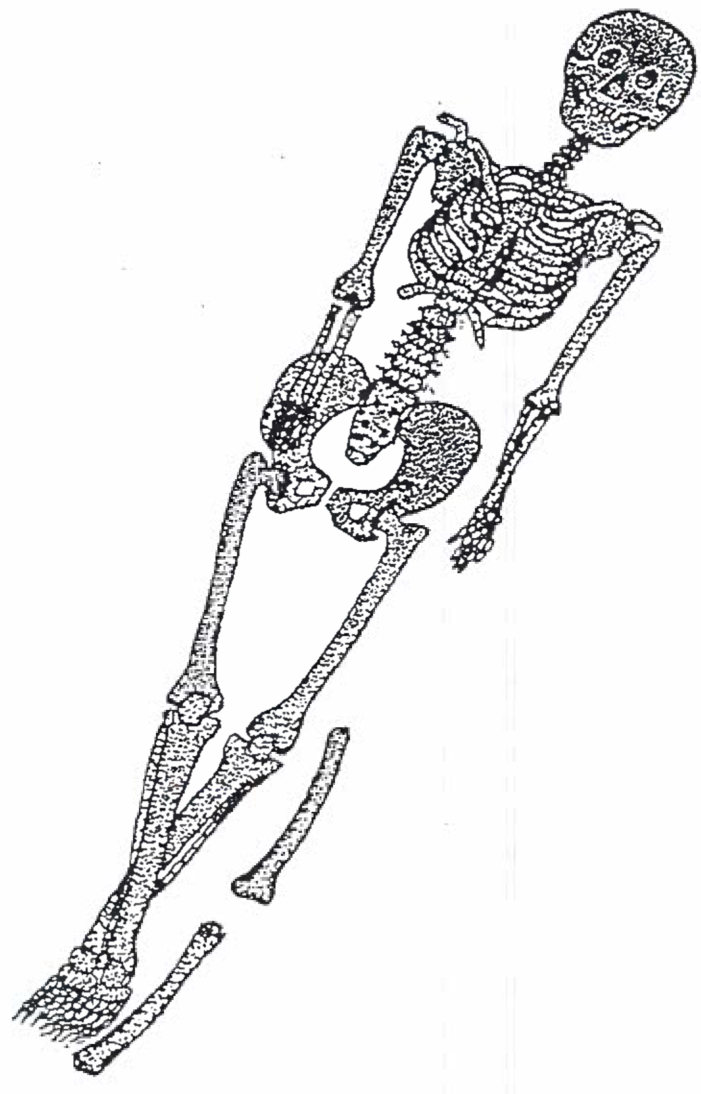

Figure 1. Reconstruction of Burial 264. Note the presence of primary and secondary burial treatments in the same grave.

not limiting movement of these bones prior to final interment. There is a variety of secondary interment forms present in Mound C. Among these, bundle burials formed the most cohesive unit; other amalgamations of bone were determined to be evidence of prehistoric disturbances.

The bundle burial, comprising about one-fourth of the grave sample, consisted of bones massed together in a stacked, linear arrangement and buried as part of a single depositional event. Inventories of these burials noted consistencies among the bones represented. Bundle burials generally contained several long bones, large cranial fragments, and a few of the larger, irregularly shaped skeletal elements. A comparison with the surrounding interments indicated that bundled bones often duplicated many of the skeletal elements present. Therefore, bundled assemblages do not appear to have been formed by grave disturbance.

Note that the definition applied to Mound C's bundle burials is based partially on grave shape. Bundle burials show that intentional care was taken in the arrangement of bones. The long bones are usually stacked in distinct piles at the base of the grave with smaller and irregularly shaped elements interspersed on top or to the side. Cranial elements are placed at one end of the bundle. As a result, most bundles tend to be rectangular, when viewed from above. In Burial 218, two discrete piles of long bones were distinguished within the assemblage, suggesting that some segregation of individuals within the grave may have been employed.

Examination of the bundled bones provide clues to their manipulation prior to final interment. As depicted in Figure 2, the remains present tend to consist of the larger elements of the human skeleton. While it is unclear whether the missing smaller elements were not present as a result of soft tissue reduction, or were selectively retained, it is evident that emphasis was not placed on burial of the entire individual. In some bundles, the inclusion of only a few bones from a clearly unique individual is suggestive of a strong symbolic need for representation in the cemetery.

Bundled burials can consist of single or multiple interments. Excluding bundles associated with primary interments, the frequency of these two forms is about equal. Multiple bundled interments have been recorded with as many as five individuals in the same grave. Bundling, therefore, does not seem to be as restricted by the number of individuals who can be interred as primary interments. Individuals may be buried when deemed ready for burial, or purposefully excluded from the burial ritual until the remains of others are appropriately sanctioned for interment.

Many bundled elements were noted to have lost or severely eroded articular surfaces. Most crania exhibited post-mortem dental loss. Hill (1980), Krogman and Iscan (1986), and McKeon and Bennett (1995) have noted that these features result when bones have been allowed to weather and then were physically manipulated, particularly in a surface environment. These data are consistent with models proposing that Mississippian bundle burials result from bone collection when death occurs away from the permanent burial area, or when storage of the dead in specialized mortuary structures is part of the post-mortem body treatment (Clay 1984; Schwartz 1961).

Other concentrations of disarticulated bones were observed; however, these were not as well-constructed as the bundle burials. These disturbed secondary interments can best be defined on the basis of their irregular shape and variable content. Most can be positively associated with surrounding graves. Despite King's assertion that none of the burials are intrusive, these disturbed forms are clear evidence that prehistoric burial intrusion did occur in Mound C. Disturbed interments may contain as few as one element, or as many as several dozen. While aboriginal activity is believed to be the agent behind most of these disturbances, some singular representations may have been caused by animals. None of these interments are the result of historic human activity.

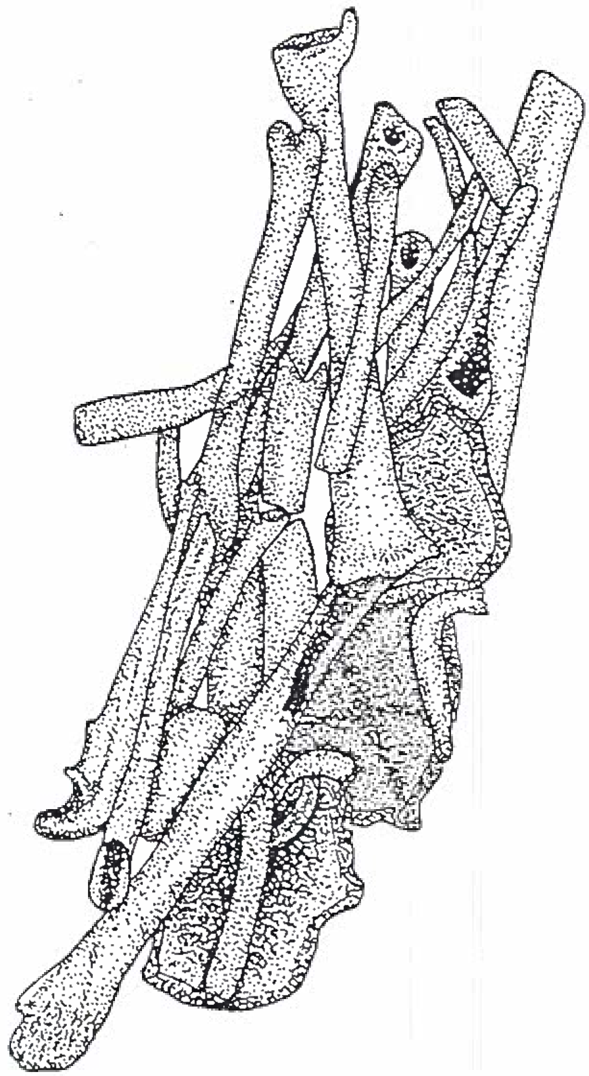

Figure 2. Reconstruction of Burial 267, A bundle Burial.

Disturbed interments tend to contain sequentially articulating sections of a skeleton, rather than just the larger unrelated elements. Examination of the surrounding graves often demonstrates that elements missing as a result of prehistoric intrusion could be accounted for in these assemblages. Sixty percent of disturbed bone clusters could be linked to the construction of new graves. Probably as a result of their larger surface area, primary interments were the most frequently disturbed; however, material scatters indicate that bundled and combined primary-secondary interments were also encountered. The remaining 40% of disturbed graves could not be accurately classified; their importance will be discussed later.

The range of care applied to the previously interred is expressed in how aboriginally disturbed skeletons were treated. In some instances, disturbed bones were neatly piled to one side of the new interment, while in other circumstances the disturbed remains were more haphazardly reinterred as unconsolidated masses (Figure 3). These variations suggest that treatment of disturbed remains may not have possessed a rigid cultural norm and may have been treated idiosyncratically by those preparing the grave. Use of a grave, despite encounters with other interments, indicates that burial within the confines of the mortuary area was more important than placing each grave in an isolated subsurface environment. This position lends additional support to the argument that burial in Mound C reflects a distinct community affiliation.

Perhaps one of the most important aspects of the disturbed interment is its representation of time. Evidence for the intrusion of one grave over another demonstrates that burial events are not contemporaneous and may indicate that the mound was used for burial long enough for surface traces of individual graves to be lost. Since disturbed remains often involved removal of whole bones from the new grave pit, their movement would have displaced any of the articulating bones, had soft tissue been present. No evidence for soft tissue displacement was observed, indicating that enough time had passed between burial episodes for skeletonization of the initial burial. In general, aboriginally disturbed graves indicate that the cemetery accumulation period in Mound C was probably an accretional process that occurred over a considerable length of time.

Primary and secondary burial forms comprise the vast majority of Mississippian body treatments. They are not unique to Mound C; rather, they can be found in cemeteries throughout the Central Mississippi valley. To determine whether the rules governing mortuary activity varied regionally from those employed by the Mound C burial community, frequencies of body treatment, multiplicity, and forms represented in multiple interments were calculated from a variety of Late Prehistoric cemeteries in the Middle Mississippi valley. An independent comparison of primary and secondary treatment frequencies in Mound C and each mortuary sample was accomplished using a Fisher's Exact Test. In Table 2, the results indicated that all sites varied significantly from Mound C in terms of primary versus secondary treatment. To learn whether the number of individuals present in each grave and their body forms were similar, a Chi Square Test was employed. These results likewise demonstrated that Mound C's rules of grave content varied from those in the region. Chi square values were generally robust and were supported by low P values. Human representation in a grave from Mound C is not the same as found elsewhere. These results strongly suggest that none of these sites should be used to accurately model the Jackson Purchase mortuary program.

CREMATION

As noted earlier, King and others have asserted that cremation was part of the Mississippian mortuary ritual. Reducing a human body by fire does not appear to have been common within the Mississippian culture; however, there are a few documented cases in the Middle Mississippi valley. Cremations have been reported at the Parkin Point sites in southern Missouri and northern Arkansas (Holland 1991). Chapman and Evans (1977) encountered two cremations at the Lilbourn Site in southeastern Missouri. The bones from several of these interments were still articulated, indicating that thermal alteration and burial occurred in the same feature. A

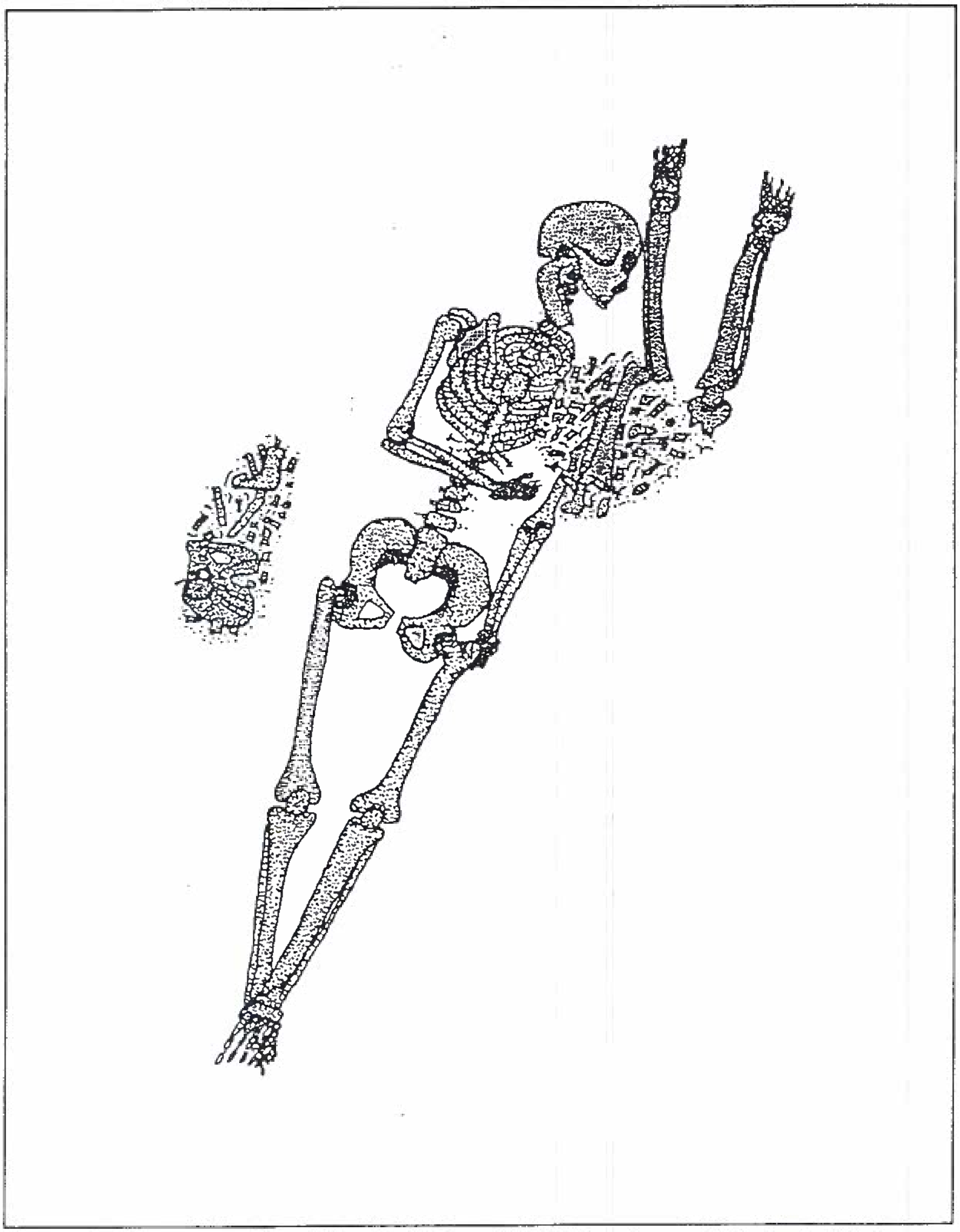

Figure 3. Reconstruction of Burials 263 and 264: Intruding and Disturbed Primary Interments. Note the unconsolidated mass of disturbed remains.

Table 2. Treatment Comparisons Between Mound C and Regional Cemeteries.

	Frequency					
Body Treatment/ Grave Form	Mound C	Turner	Lilbourn	Tolu	Duncan	Tinsley Hill
Primary Interments:						
- Single Individual	120	21	88	16	57	24
Multiple Individuals						
- Primary-Primary	7	12	0	2	3	2
- Primary-Secondary	9	10	0	0	0	4
Secondary Interments:						
- Single Individual	24	1	0	0	0	16
- Multiple Individuals (Bundle-Bundle Only)	25	4	0	0	2	8
Test 1 (Primary vs Secondary):						
Results of Fisher's Exact Test:						
P Value		0.020	<0.001	0.016	<0.001	0.012
Test 2 (Treatment by Number of Individuals):						
Chi Square Value		39.66	38.91	9.04	20.43	10.37
Degrees of Freedom		4.00	4.00	4.00	4.00	4.00
P Value		<0.001	<0.001	0.060	<0.001	0.034

partial cremation was also reported at Kinkaid (Cole et al. 1951). In the protohistoric and early historic record, there is considerable evidence that cremation occurred among many southeastern Native American groups for a variety of different reasons (Hofman 1986; Swanton 1946; Yarrow 1881). While no Mississippian period cremations have been reported in Kentucky, the possibility of such a practice cannot be dismissed.

In Mound C, however, there is very little evidence present to support the concept of insitu cremation. Cremations reportedly were executed in a pit near the center of the cemetery's floor exhibit. Fain King (1934) reported finding burned human bone throughout this feature.

A reexamination of the "cremation pit" found no suggestion of use as a crematorium. While several centimeters of the mound fill in its vicinity did appear to have been scorched and contained a notable amount of ash, the pit matrix loses any indication of thermal alteration several centimeters below its rim. This indicates that if cremations were part of the mortuary program, consumption of the body by flame occurred outside the final resting place, or in a shallower feature than King's excavated pit.

Clearly some form of thermal alteration occurred in Mound C. Intentionally or unintentionally, this resulted in burned human bone. Burned human bone has been positively identified among the material recovered from intact mound deposits in the vicinity of King's "cremation pit". These bones, however, are not in primary association with this pit; rather, they are more affiliated with the thermally altered mound fills.

An examination of these bones reveal that they tend to be either smoked or completely calcined. The best provenienced calcined human bones came from Pedestal 79 and represent the upper cervical vertebrae and basal portions of a skull. These bones are relatively complete, exhibit considerable superficial checking and only a minor degree of thermal warping. These conditions are extremely suggestive of thermal alteration after a considerable amount of the bone's organic content has been lost (Binford 1963; Buikstra and Swegle 1990). Their complete condition stands in contrast to the highly fragmentary nature of calcined bone more typically found in human cremations (Dokladal 1970). This suggests thermal alteration in an environment, which limited air contact and fragment mobility, yet which provided enough thermal conduction to allow chemical reorganization of the bone to occur. Calcination in a soil matrix is a reasonable environment for such an event.

The ash-soil deposit immediately south of the "crematory pit" was excavated to reveal the isolated remains of a smoked, articulated human foot. Carbonized soft tissue residue was identified, indicating that the individual was at least partially fleshed at the time of firing. The original orientation of the legs can be interpreted to place this individual over King's cremation pit; however, this flexed position would be unique to the cemetery assemblage. If this were a cremation, it would have been placed in a considerably shallower pit than Fain King infers, and probably would have resulted in an articulated burned interment. These features contradict what King has reported, but do not eliminate cremation as a burial treatment/mortuary ritual practiced by the Mound C community.

Skeletal and contextual evidence supports the conclusion that human remains came into contact with fire; however, it is more likely that most, if not all, of these remains do not represent cremations as a distinct funerary ritual. Rather, the skeletonized and fleshed interments may have been thermally altered when portions of the mound were burned. As no other burials show evidence of thermal alteration, it can be concluded that the burning King associated with a mortuary practice occurred before the mound had accumulated most of its burials.

GRAVE MORPHOLOGY

Soil conditions in Mound C have hampered many efforts to identify what type of grave facility was prepared to receive the dead. Inability to define distinct grave pits may have served as the basis for Blanche King's assertion that the dead "were placed on the ground, rather than in it, the surface soil being scraped away slightly and the body covered to a depth of one or more feet" (1937:97). This cemetery development plan would view the mound's construction as a gradual process accomplished by accretional accumulations of bodies and earth, similar to the method postulated for the development of many Woodland burial mounds (Charles 1992; Dragoo 1977). While King's method of construction accounts for the distinctive layering of the burials one atop another, it cannot account for the lack of mortuary activity in the central core of the mound, or the prevalence and degree of aboriginally disturbed burials. There is no evidence that substantiates Mound C's construction as solely from use as a cemetery.

Most Late Prehistoric graves excavated in the Central Mississippi valley were not constructed by placing soil over the top of the individual, but by excavation and construction of grave receptacles. The majority of Mound C's graves were placed within one meter of the ground's surface. Pit outlines have not been definable. The thick surface deposits are very dark and exceedingly rich in organic material; bioturbation has eradicated the visibility of any features which might have been present. Burial pits could be defined only in those cases where graves were dug into the less organic, lighter shaded loesses that constitute the mound's central fill. Grave pits appear as very narrow, form fitting receptacles. A profile from Burial 251, provided a cross section of an intact pit feature which demonstrates that the graves were probably wider at the surface than they were at their base.

GRAVE LINERS

Mississippian graves throughout much of the southeastern United States provide ample evidence that various material resources were utilized to line the grave pit (Brown 1981). The most prevalent liner in Mound C appears to have been wood. This is evidenced by carbonized and preserved wood fragments. Eight graves were positively associated with continuous sheets of wood carbon (Table 3). Bundled interments 270 and 281 were placed directly on top of several carbonized strips of wood or bark. These would account for Lewis's observation that "layers of charcoal are to be seen under some burials and in such close association as to cause one to wonder if the corpse had not been placed upon a fire or bed of coals" (1934:27). None of the bones accompanying these carbonized wood deposits show even the slightest indication of fire exposure, nor did the surrounding matrix possess any indications of thermal alteration. Among the primary interments, a nearly continuous thin sheet of wood carbon was encountered over the top of Burial 261, and forming a vertical base in Burial 305 (Figure 4). These burials indicate that the use of wood is not limited to a particular body treatment. Firing undoubtedly occurred prior to the wood's use in the grave. It is not known whether charring the wood's surface had a functional or symbolic purpose.

Uncarbonized wood liners were also encountered; however, they are extremely rare and incompletely represented. These delicate artifacts have been singly recovered in association with both primary and secondary interments. Wood liners are not unique to Mound C. Similar burial facilities were reported in adult burials from Mound D (B. King 1937). Thomas (1985) noted the presence of bark coffins among Nodena Phase burials at Pecan Point. Cole et al. (1951) encountered similar structures at Kinkaid; and Brown (1981) has identified several variants at other Mississippian sites in the southeastern United States. It should be noted, however, that in many instances artifacts associated with grave liners have been attributed to higher status burials and, as noted earlier, little to no indication of status differentiation has been demonstrated among the burials in Mound C.

Table 3. Distribution of Grave Liners in Late Prehistoric Cemeteries in the Central Mississippi Valley

Grave Liner Form	Frequency					
	Mound C	Turner	Lilbourn	Tolu	Duncan	Tinsley Hill
Wood Used in Graves:						
Unburned Wood						
- Primary Interments	1	0	0	0	0	0
- Secondary Interments	1	0	0	0	0	0
Carbonized Wood						
- Primary Interments	4	0	0	0	0	0
- Secondary Interments	4	0	0	0	0	0
Stone Used in Grave Lining:						
- Primary Interments	3	0	0	0	60	20
- Secondary Interments	4	0	0	0	2	17
- Primary-Secondary Interments	0	0	0	0	0	4

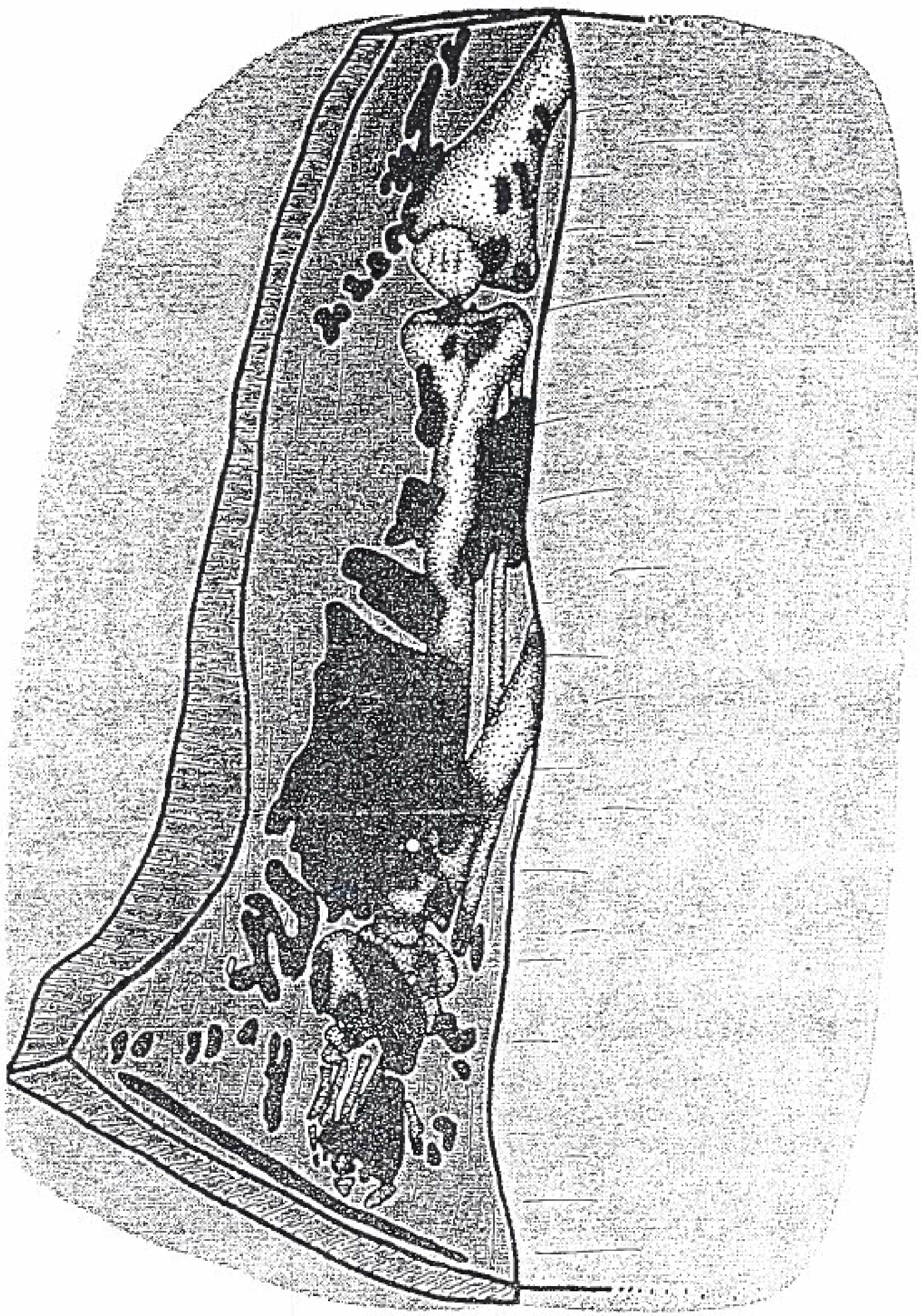

Figure 4. Partial Excavation of Burial 305 Exhibiting a Carbon Sheet Over Top of the Body. Note the presence of a vertical foot panel.

Wooden liners are not the only artifacts suggesting that the Mound C community separated the deceased from the surrounding earth. Probably the most frequently occurring liner materials in Kentucky's Mississippian cemeteries are stone slabs. A review of the Mound C literature failed to find mention of aboriginal use of stone liners. Gildersleeve and Roberts (1945) report that there are no naturally occurring deposits of stone which may be suitable for constructing a liner. Williams (1954) attributes this to why stone boxes do not appear in the Cairo Lowlands.

More recent excavations in Mound C have produced evidence that stone was available and that it was used as grave liners. Distinct stone liners were evidenced in seven graves. In the clearest example, Burial 312, stone slabs were used to form the sides of a small, form fitting receptacle for bundled interments. Similar receptacles have been reported in stone box cemeteries at Tinsley Hill (Schwartz 1961), West (Dowd 1972), and Pulcher (Griffin and Jones 1977). Burial 325, a historically disturbed primary interment, was buried in a narrow stone enclosure reminiscent of many classic stone box graves. Most stones directly associated with Mound C graves do not form complete liners; rather, at best they appear to be partial components of an organic liner. It is suggested that less durable materials were used to complete these liners in the same manner as stone and wood liners encountered at Kinkaid (Cole et al. 1951).

The lithic material used to construct these graves consisted entirely of conglomerate slabs. These combinations of small chert pebbles, embedded in a lithified ferromagnesian matrix, can be traced to the Peoria Loess deposits, which compose much of the underlying soil matrix. While small (less than half pound) fragments of this material can be readily found, a search of several exposures by the author failed to encounter any concretions which approach the size of those used in the cemetery. It is suggested that local mineral resources were recognized in the region as potential grave liners; however, their scarcity may have inhibited widespread use.

If lining a grave was a requirement for proper burial, then cultures inhabiting regions without the necessary resources would need to either adapt what materials were available to fulfill the cultural norm or modify this aspect of their mortuary program. The scarcity of available stone may have been overcome by the use of less durable, but more readily available materials, such as timber. Brown (1981) has observed that numerous late prehistoric sites in the Mississippi River drainage system contain wood or bark graves; these bear remarkable similarity to the stone box forms seen elsewhere. Historically, one of the groups utilizing the confluence region was the Shawnee (Temple 1977). Accounts of the Shawnee life ways note that graves were frequently lined with rough hewn wooden planks to serve as a grave receptacle (Kinietz and Voegelin 1939). This is consistent with the physical evidence in Mound C.

It would be extremely desirable to employ a quantitative test to evaluate the question of regional variation in liner form. Unfortunately, differential preservation, incomplete reporting, and variable excavation and curation strategies preclude obtaining anything but minimal frequencies of these features from the Mound C cemetery. An examination of the frequencies found in a sample of Late Prehistoric cemeteries in the Central Mississippi valley denotes the presence of a considerable degree of variation (Table 3). This information suggests some continuity with Mound C forms, but not enough to use these cemeteries as a model for the mortuary pattern.

If we accept Mound C's stone and wood grave liners as being analogous to other grave liners, then other attributes of this grave form must also be considered. Stone boxes have been viewed as a receptacle for reducing the deceased to a hard tissue state (Clay 1984; Milner 1983). If burial liners were constructed of nonrenewable materials, and secondary burial transformation involved some period of interment, disturbed burials should be identified without the presence of an intruding burial. To date, none of the graves containing liners can positively be identified as having been disturbed prehistorically. This does not mean that bundled interments were not initially buried and then unearthed.

In Mound C, there are 16 disturbed burials whose original form could not be accurately defined, nor could a positive association be made with an intrusive interment. Prehistoric disinterment of these graves for redistribution of the skeletal remains is a likely explanation. Non elite, unlined graves in southeast Missouri and the American Bottom have been argued to represent a similar cycle of burial, exhumation, and reburial at a later time and place (Black 1979; Milner 1984). These patterns are evidenced by small isolated human bones that were recovered from habitation areas. This is strikingly similar to the adult human scatters recovered from the Adams and Turk habitation areas. It is suggested that these remains may easily represent a continuity with the southeast Missouri/American Bottom mortuary cycle. While it is unclear whether disinterred remains were redeposited on the same site or interred in other mortuary settings, initial burial and subsequent disinterment for bundled burial were behaviors that were not limited to either community or habitation burial areas.

Finally, the other viable solution to the problem of stone unavailability would be to adopt a different mortuary pattern. Grave liners are not uniformly associated with all Mississippian cemeteries in Kentucky, nor are they necessarily found in cemeteries on the western side of the Central Mississippi River valley. To the east, Webb and Funkhouser (1931) noted that while suitable stone was present at Tolu (15Cn1), they were unable to locate a single lined grave in the cemetery. Stone boxes were probably not present at McLeod Bluff, as well (Webb and Funkhouser 1933). In light of this, the rarity of grave liners in Mound C may not simply represent a disparity in available materials, but it may also indicate a distinct cultural variation in mortuary patterns.

Distinct changes in mortuary programs have been recorded throughout much of the latter part of the Mississippian period (Griffin and Jones 1977; Milner 1984). Butler (1991) and Cole et al. (1951) note that unlined graves at Kinkaid tend to be associated with late occupation ceramics. This suggests that adoption of new mortuary concepts may have accompanied a shift in ceramic frequencies. Cole et al. (1951) observed that the ceramic types seen at Wickliffe correspond with Kinkaid's later aspects. It can be inferred that grave morphology in Mound C would minimally be contemporaneous with Kinkaid's unlined grave pattern. Wickliffe's ceramic types and frequencies, in turn, are most closely allied with the Cairo Lowlands and more northerly ceramic assemblages (Lewis 1990; Morse and Morse 1983). Strong affiliations with other non-Kentucky groups have been suggested by tracing the source of Wickliffe's lithic raw materials to deposits north of the confluence (Burks 1995; Carr and Koldehoff 1994). There is enough evidence to indicate that mortuary patterning in Mound C may not be entirely based on the same set of cultural ideals as those expressed in other Kentucky Mississippian sites. Rather, they may reflect an acculturation of ideas from other Late Prehistoric communities.

CONCLUSIONS

Cemeteries provide a rich variety of information about the manner in which a culture chooses to manipulate the remains of the deceased. These behaviors are governed by a complex set of rules and social interactions that are as unique as the culture itself (Binford 1971). In the Jackson Purchase there has been a scarcity of information available on the Mississippian mortuary program. The mortuary deposits associated with Wickliffe's Mound C provide at least one substantial resource capable of defining important aspects of the funerary and burial ritual. It can be determined that critical mortuary features were not fully appreciated by earlier researchers and that the burial program is considerably more complex than previously believed.

Mississippian burial areas are not simply places designated for the disposal of the dead; rather, they carry significant social meanings. By examining how the dead were treated, organizational principles underlying the associated community can be studied (Brown 1995). Mortuary data from the Jackson Purchase suggest the presence of at least three social groups in these Mississippian communities: children, elites, and those interred in communal burial areas. Goldstein's (1980) examination of ethnographic records concluded that formal disposal areas for the dead were indicators of a society organized into corporate groups of lineal descent. Whether concentrations of graves within the Mound C cemetery represent familial burial plots has yet to be demonstrated. However, the act of communal burial is indicative that the population viewed themselves as part of a unified social entity.

Part of this unity was the recognition that certain forms of funerary and mortuary activities were more appropriate than others. Rules governing how the dead were prepared for interment indicate a dichotomy: some individuals were permanently buried soon after death, while others did not receive permanent burial until a later date. Availability of a prepared grave in the burial area took precedence over each individual receiving a unique grave receptacle. Likewise, the presence of previous interments in a selected burial area was not enough to deter use of the space for further interment. These factors are seen as evidence of unity within the burial community.

Human remains were not simply interred in a hole in the ground: rather, a burial facility was specially constructed. Use of grave liners may have been restricted to a specific time during the cemetery accumulation period or affiliated with certain individuals. The presence of durable liners suggests a continuity with grave construction patterns elsewhere in Kentucky, but durable grave liners were found in only a small percentage of the graves. Most burials contained no evidence of liners. The lack of substantial supporting evidence requires that any suggestion of acculturation between the Mound C cemetery and liner grave cemeteries be approached with a considerable degree of caution.

It is highly unlikely that any external model can be successfully applied to explain the Jackson Purchase Mississippian mortuary program. While data on this aspect of late prehistoric life are severely under represented, there is little continuity with other regional Late Prehistoric mortuary patterns. In the Mound C cemetery, the present data best supports an argument for acculturation of mortuary practices from communities in and around the Central Mississippi valley.

Mortuary variability within a single cemetery should come as no surprise to any anthropologist; these variations commonly reflect the different social roles and circumstances surrounding the death of community members and changes in fashion over time. Nor should an inability to fit Mound C's mortuary program into established cultural patterns seem odd. Kroeber (1927) has commented that in general death and funerary customs rarely conform to the distribution of other cultural traits. This variation reflects the cultural complexity which governs mortuary programs. How the dead were interred in Mound C should provide at least some insight into the ways that these people thought about their dead and perhaps themselves.

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STRINGS OF SEEDS--FASHION OR FUNCTION? POSSIBLE MEDICINAL PROPERTIES OF *ARISEAMA* SP. SEEDS FOUND WITH A MUMMY, FAWN HOOF

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ABSTRACT

In 1813, nitrate workers unearthed a female mummy from under a flat stone in Short Cave, near Mammoth Cave, Kentucky. Among her grave goods were several hundred strings of small seeds, which were tied up in bunches. This paper discusses the identification of the seeds, their possible significance, and the implications that the seeds may have for making interpretations about the mummy.

ARCHAEOLOGICAL DATA

The occurrence of such a well-preserved female mummy and associated burial goods is very unusual, and a study of these remains has great potential for illuminating prehistoric practices that are not usually preserved. Seldom do such grave goods accompany a prehistoric burial in North America, especially that of a female, suggesting that she was a very important person in life. The unusual circumstances surrounding her death demand that we explore the circumstances of her life.

The body itself is generally intact, most likely because of the effects of the saltpeter that was present and being mined in the cave. The mummy's hair was short, her teeth worn and her fingernails in good condition. She was dressed in two decorated deer skins and covered with a woven bark sheet.

Besides the strings of seeds, there were a pair of moccasins, a woven bag, a woven head cap, seven feather head dresses, the claw of an eagle, two rattlesnake skins, the jaw of a bear, a small bunch of deer sinew, thread and twine, seven needles, two whistles made of cane, and 20 fawn hooves on a string (Meriam 1844). From the last item the mummy gets her name: Fawn Hoof.

Fawn Hoof was removed from the cave in 1815 and was taken through the country as a curiosity (Meloy 1977). During this time, she suffered wear and tear, and a few injuries. The Smithsonian Institution received Fawn Hoof in 1876. She was "[t]ransferred to Division of Physical Anthropology for dissection, Nov. 11, 1914" (Schwartz 1958, cited in Watson et al. 1974:169), and her flesh was removed. The results of this investigation are unknown (Haskins, personal communication 1992), but fortunately photographs were taken of her before the dissection (Meloy 1977). Items that remain at the Smithsonian are a few remnants of the fawn hooves, pieces of the feather head dresses, fabric, string and rope, and a few strings of seeds (Schwartz 1958, cited in Watson et al. 1974:169). At the Peabody Museum a catalogue of some of Fawn Hoof's other burial items, consisting of various fabrics, and strings of seeds, was compiled--apparently by F. W. Putnam (1875, cited in Watson et al. 1974:169).

Valerie Haskins (Kentucky Heritage Council) recently studied the body and has suggested that Fawn Hoof was a small, elderly woman with arthritis (personal communication 1992). Conflicting physical evidence does not yet allow a date of burial to be assigned to the mummy. The wear patterns on the teeth are similar to Late Archaic populations (approximately 3000 B.C. to A.D. 600), but tooth caries patterns suggest a later burial (Haskins, personal communication 1992). Carbon-14 dating will be performed on the bones in the future when funds become available.

A sample of five seeds, still in place on a string of twisted fibers, was sent by Haskins to Gayle Fritz (Washington University in St. Louis). Fritz, in turn, requested assistance from Neal Lopinot (U.S. Army Corps of Engineers) in the seeds' identification. Lopinot made a preliminary identification of the seeds as *Ariseama dracontium* (green dragon).

Each archaeological seed specimen that accompanied Fawn Hoof measures about 4.0 mm along the axis of the string and about 3.7 mm perpendicular to this axis. A comparison of the seeds with the collection at Washington University's Paleoethnobotany Lab showed that they were similar to *Ariseama dracontium* (green dragon) and *to Ariseama triphyllum* (jack-in-the-pulpit). The seeds from the above two species varied in size, but were morphologically similar in other regards.

Montgomery's seed identification guide (1977) has photographs of both *A. dracontium* and *A. triphyllum* seeds. The archaeological specimens resemble the photograph of *A. triphyllum* seeds more closely than that of *A. dracontium* seeds, but this information was not conclusive.

The seeds were then compared to herbarium specimens in the collection of the Missouri Botanical Gardens, which included samples of both *A. triphyllum* and *A. dracontium.* Though many separate specimens are housed in the collection, only a few had been collected while in fruit. The herbarium specimens look very much like the archaeological specimens in size and texture. Shape was quite variable, apparently depending on the arrangement of the one to three seeds within the fruit (Treiber 1980:66). The archaeological specimens were compacted along the axis of the string, and so were not as angular as the herbarium specimens. I believe the archaeological specimens to be examples of either *A. triphyllum* or *A. dracontium*, judging from their size, shape and general appearance. It would be difficult to determine which species, however, because the seeds are very similar in shape and color, and the size of the seeds overlap between the two species, depending on environmental conditions.

BOTANICAL DATA

A. dracontium and *A. triphyllum* are members of the Araceae (Aroid) family. More famous members of this family include *Dieffenbachia* spp. (dumbcane), *Colocasia esculenta* (taro), and *Symplocarpus foetidus* (skunk cabbage). Until recently, *Acorus calamus* (sweet flag) was classified as an aroid. *Acorus calamus* is one of the more famous healing herbs of the North America Indians and people in parts of Europe and Asia.

A. dracontium and *A. triphyllum* plants are similar in appearance. Both species possess the distinctive spadix of either male or female flowers, hooded by a modified leaf called the spathe. From this configuration, the jack-in-the-pulpit gets its familiar English name. The Iroquois called it "cradleboard" because it looked like that device (Moerman 1981:99). *A. dracontium* has a less distinctive spathe, but a long extension of the spadix, which looks somewhat like a serpent's tongue. The fruits of both species consist of a cluster of red berries, which are dispersed by fruit-eating birds and rodents (Bierzychudek 1981:7-8).

Inspection of the archaeological specimens under a microscope showed that the seeds were strung on twisted fibers. Two large fibers composed the string and many small fibers formed the large fibers. The large fibers were twisted in an S- direction (Putnam [1875] stated that the fibers were Z-twisted). No identification of the origin of the fibers has been made.

Because the seeds are so close together on the string, it is hypothesized that the seeds themselves were strung, not the entire fruit. The fruit is bright red when fresh, and would make an attractive decorative string. Without the flesh of the fruit, however, the seeds are stained brown to reddish brown. In addition to the seeds' use as decoration, other possibilities include: some use of the seeds themselves, use as seed stock (whether they would be viable with a hole drilled through them is unknown), or as a symbolic representative of a desirable plant.

ETHNOGRAPHIC DATA

Investigations such as those described in this study often encounter data limitations that require researchers to make certain assumptions, or perhaps to make large, intuitively-guided jumps. Many of the ethnographic studies cited in this discussion are quite old and may not be of the quality expected from studies done today. Another problem is that Euroamerican claims concerning the power and efficacy of native medicines were often more extravagant than claims by the native people themselves (Vogel 1970:419). All of the conclusions must be made with due regard for the source from which the data were drawn.

The bulk of ethnographic information concerning the use of *Ariseama* spp. relates mainly to *A. triphyllum*. Although this is unfortunate, the seeds have been identified only to the generic level and may be sufficiently closely related that the descriptions of one species may be applicable to both. These species were also classified as *Arum triphyllum* and *Arum dracontium* in the past, and unknowingly, references to them by this classification may have been excluded.

Economic Practices

The results of a review of early European ethnographic data and modern ethnomedicinal data indicate that *A. triphyllum* was used as a tool for divination, food, and as medicine to treat a variety of ailments. These findings are discussed below.

Spiritual Uses. A number of Native American groups considered *A. triphyllum* to be a powerful and magical plant (Moerman 1981:99). The seeds were used in divination. When dropped into a cup of swirling water, a floating seed meant recovery for a sick person, if the seed sank, it meant death (Moerman 1981:99).

Food Uses. Many of the aroids, including *Ariseama* sp., contain oxalic acid and raphides of calcium oxalate in their leaves, stems, flowers, and roots. These two substances work together to irritate mucous linings on the inside of the mouth. Accidental doses of these acrid materials are usually not lethal, and can be controlled with proper preparation in food plants such as taro.

Another common name of *A. triphyllum* is "Indian turnip," indicating its use as a root food. The raphides of calcium oxalate discussed above necessitate processing to make the corm edible. The corms were pounded with water and allowed to dry for several weeks before being used as flour (Weiner 1980:66) by an unidentified group of Native Americans. The Shawnee prepared the corms by placing them in a hole in the ground and building a fire over it (Gerard 1896:303).

The spathe and ripe berries of *Ariseama* spp. are both edible. The berries are said to have a peppery taste (Duke 1985), but were nonetheless eaten by the Shawnee (Gerard 1896) and other unidentified Native Americans, who boiled them and the root with meat (Cutler 1903).

Medicinal Uses. Brown (1988:212) states that "poisonous plants are almost always used medicinally, their principles often being therapeutic when administered in appropriate doses and according to certain techniques". *A. triphyllum* was found to have been used medicinally to treat a variety of ailments. The results of the survey of ethnographic data and modern ethnomedicinal data are discussed below.

Medicinally, *Ariseama* spp. were used to treat a variety of illnesses, and usually seem to have produced a stimulating effect. Most commonly, the ground and dried corms were used to treat bowel complaints (Carver 1779:484-85; Loskiel 1794:116). It was used as a purgative (laxative) by the Delaware (Mahr 1955:13-14), and as a carminative (relieves flatulence) by an unidentified group of Native Americans (Cutler 1903). Dried *A. triphyllum* mixed with molasses was prescribed by John Briante, the "Indian doctor," for a sore stomach (Briante 1876:44). A European doctor found the root good for treating flatulent colic (Clapp 1852:877).

A. triphyllum, as well as *Symplocarpus foetidus*, was also used as an expectorant in the treatment of respiratory ailments, including "consumption" (Barton 1810: 29-30), asthma, catarrh (Rafinesque 1828:69), bronchitis (Duke 1985), and whooping cough (Weiner 1980:66). The Osage and Shawnee used a decoction of the root with *Aralia racemosa* (spikenard) and *Glycyrrhiza lepidota* (wild licorice) to treat coughs (Hunter 1957:380). The Algonquins used a similar mixture of *A. triphyllum* with *Prunus sp.* (wild cherry) and *Aristolochia* sp. (snake root) for cough and fever (Duke 1985).

Other uses for *A. triphyllum* include external powders and liniments. The Pawnee rubbed the powder on the top of the head to relieve headaches and as a rubefacient to treat rheumatism and similar pains (Gilmore 1919:17). Rubefacients irritate the upper layers of the skin, stimulating blood and lymph flow (Brown 1988:212). Mohegans used the powdered root in the same way as a poultice for pain (Duke 1985). Smith (1923:23) discusses the Menomini's use of the root as a poultice for sore eyes. He assumes that the fresh root was used, but this is more than likely not the case because of the raphides. The Meskwaki used the root to reduce the swelling of a snakebite (Smith 1928:202). *A. triphyllum* was apparently useful in healing ringworm because it was listed in the United States Pharmacopeia from 1820 to 1893 (Fielder 1975) for treating this illness as well as some of the others listed above.

Many of the above illnesses were also treated with *Symplocarpus foetidus* and *Acorus calamus*. The few references to the uses of *Ariseama dracontium* include the use by "Indians" to cure dropsy by covering the body with the leaves to induce a "universal sweat, or rather vesication" (Barton 1810:29-30). *A. triphyllum* is also listed as a diaphoretic in the *CRC Handbook of Medicinal Herbs* (Duke 1985), and by Smith (1923) in the treatment of "female disorders."

DISCUSSION

Often, the whole area of female medicine is given a cursory treatment. This is not because it was not important to the people practicing herbal medicine, but most likely because male ethnographers were using male informants who did not know about such things or were uncomfortable talking about them. Much information regarding the use of plants in treating specialized female-related illnesses may have been lost.

Even today, it is sometimes difficult to speak openly about emmenagogues (treatments that bring on menses) and abortifacients (treatments that abort fetuses), but women have always wanted a safe and effective way to control fertility. Although different societies have and have had different ideas about the cause of menses and its significance, most of them have had some way to cope with unwanted fertility, regardless of the official laws of the society.

Historically, there are many references to herbal medicines used to control fertility. Jöchle (1974) cites Dioscorides of Anazarbos (Greece) as listing in the first half of the second century A.D. three species of *Ariseama* (sic *Arum* spp.) as being effective in inducing menses, abortion, and delivery (Dioscorides 1959). Other aroids may be represented on the list as well.

Weiner (1980) states that abortifacients were not used by North American natives before contact, but they were used after contact because mixed race babies were too large for Indian women to deliver. However, the pre-contact use of contraceptives was common. There are many reasons for avoiding pregnancy such as "shame or fear among the unmarried, and among the married women inability through poverty to provide for the family, or a loss of previous children" (Hoffman 1891).

There is one reference that states that the Hopi used *A. triphyllum* as an oral contraceptive. It states that one teaspoon of the powdered root in a glass of water that was strained would cause sterility for one week, while two teaspoons of a hot infusion would render the individual permanently sterile (Weiner 1980:43). The original source for this observation is unknown, so the information should be used with caution.

Further research into the use of aroids and contraception revealed that *Dieffenbachia* spp. juice was reported to atrophy the sexual organs of rats for several weeks. In fact, these findings were used by the Third Reich to instigate a regimen for sterilization of concentration camp prisoners (Barnes and Fox 1955). Later experiments showed no shrinkage of sexual organs with *Dieffenbachia* spp. juice (Barnes and Fox 1955).

However, ethnographic data from various parts of the world show that *Dieffenbachia* spp. has been used to promote sterility historically. Brazilian Indians fed it to enemies to make them sterile, and people in the Caribbean grew it under their bedroom windows for the same purpose (Barnes and Fox 1955).

At least three unrelated aroid species occur in South America that are used as oral contraceptives. An American pharmaceutical company studied one of the species, but found nothing of interest. This may have been the result of improper preservation prior to analysis (Brown 1988:219).

Other aroids are reputed to be used as abortifacients, emmenagogues, and for easing childbirth. These medicinal plants are called oxytoxics, and the chemical compounds affect receptors specific to the uterus. *Symplocarpus foetidus* rhizome was used raw by the Makah of the Northwest Coast of North America to induce abortion, and was boiled by the Quileute, also of the Northwest Coast, to ease labor. It appears that the strength of the active ingredient may be altered by heat in order to accomplish the desired strength of uterine contraction (Gunther 1977).

There has always been a fuzzy boundary between treating ammenorrhea (cessation of menses) as a disease and as one of the first signs of pregnancy (Jöchle 1974:425). Native women of Mexico and Central and South America who practice Catholicism take advantage of this ambiguity to control their menstruation (Browner

1979). Native medicine required the use of "hot" and "irritating" herbs to induce menses because of their presumed ability to stimulate the blood (Browner and Ortiz de Montellano 1986:38). Aroids certainly could be included in the list of hot and irritating herbs.

Exactly what kind of chemical, or chemicals, was responsible for the contraceptive and abortifacient effects of some aroids is unknown, but the family contains many volatile oils, alkaloids, saponins, glycosides, and hundreds of other compounds that interested scientists have not yet begun to identify.

I suggest that *Ariseama* spp. have been used by North American natives to treat a wide variety of conditions. Two of the conditions that can be treated are ammenorrhea, which can be either an illness or a sign of early pregnancy, and unwanted fertility. Ethnographic evidence about the use of aroids in the treatment of fertility problems has been provided from around the world and through time. It has also been shown that *Ariseama* spp. demonstrate many of the chemical properties of more well-studied aroids, such as *Dieffenbachia* spp., which have been used to control fertility.

CONCLUSIONS

That the mummy found in Short Cave was an elderly woman begs for the interpretation that she was some sort of "medicine woman." The fact that she was buried with thousands of seeds from a medicinally efficacious plant is consistent with this hypothesis. Judging from the kind of offerings placed in her tomb, she was at the very least a woman of importance.

ACKNOWLEDGEMENTS

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A PRELIMINARY REPORT ON THE MUD GLYPHS IN 15WA6, WARREN COUNTY, KENTUCKY

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ABSTRACT

This paper presents a description of a "gallery" of mud glyphs located in a cave in Warren County, Kentucky. A stylistic analysis is presented of the glyphs in order to determine possible comparative sources suggestive of influence. The placement of the glyphs is discussed in order to determine if an underlying structure is present in the organization of the glyphs, and finally, recognizable motifs are placed in a temporal context in order to determine when the glyphs were made. Although it appears likely that the glyph passage may have been used for hundreds of years, it is argued that the primary use of the glyph passage occurred during the Late Prehistoric. It is suggested that the closest stylistic correlate to the glyphs is the Hightower style of the Late Prehistoric eastern Tennessee Valley area.

INTRODUCTION

The term "mud glyph" first entered the vocabulary of archaeologists in 1982, after Charles Faulkner of the University of Tennessee entered a small cave near Knoxville, Tennessee. Inside the cave, Faulkner and colleagues observed hundreds of drawings and motifs impressed into the soft mud bank of the cave walls. These glyphs represented animals, people, and abstract geometric forms. Also present were motifs found in the Dallas culture of eastern Tennessee, as well as motifs common to the Southeastern Ceremonial Complex (Faulkner 1986). Corrected carbon dates from Mud Glyph Cave range from A.D. 465 to A.D. 1760, with the greatest number falling in the thirteenth and fourteenth centuries (Faulkner 1986:30)

In the next few years, other caves were discovered in Tennessee that also contained glyphs, though only two were found to contain mud glyphs (Faulkner 1988:226). The rest of the caves contained petroglyphs carved into the stone walls, floor or roof. At present, there are ten known glyph caves in the southeastern United States. Cave site 15Wa6 is the eleventh known glyph cave, and the fourth cave known to have mud glyphs.

The dates for the majority of these caves fall between A.D. 1000-1300, except for a cave in Adair County, Kentucky, with a C-14 date of 1610 B.C. (Faulkner 1988: 226; Jefferies 1990:175). The glyphs found in this cave were of a simple abstract style.

ARCHAEOLOGICAL BACKGROUND

15Wa6 was first described by Gerard Fowke in 1922 as a cave nearly a mile in length, which opened from the side of a sinkhole. Fowke states that "quantities of ashes were formerly to be seen on the earth a short distance in" (Fowke 1922:118). However, he did not mention seeing archaeological deposits in or near the cave. Cave site 15Wa6 was first recorded as an archaeological site by Webb and Funkhouser in 1932 as follows:

> A cave...reported to have formerly contained a large amount of ashes and to have yielded artifacts. This cave is quite extensive and has a considerable room in front, but it opens from the side of a sinkhole and is subject to frequent drainage so that it is generally very wet. There is no present indication of prehistoric occupation (Webb and Funkhouser 1932:245).

The site was not visited again by professional archaeologists until the early 1970s, when Jack Schock of Western Kentucky University surveyed the vestibule of the cave and made a collection. Artifacts recovered include: one ground stone bell pestle, one historic machine made bottle neck, one bone awl, one limestone and chert tempered cordmarked potsherd, one piece of mussel shell, seven projectile point fragments, one scraper, and one unidentified tooth.

Animal bones found at the site consist primarily of the remains of white-tailed deer, opossum, raccoon or squirrel, rabbit, and turkey. Two projectile points have been identified. One is a St. Charles, and the other is a Bakers Creek. These points date to the Early Archaic and the Middle Woodland time periods, respectively (Justice 1987:57, 211).

In 1976, Kenneth Carstens of Murray State University placed two test units in the "ash" midden on the west side of the vestibule. This midden extends approximately 20 m northeast, and approximately 10 m east. The depth of this midden is unknown. From artifacts and C-14 dates recovered from these units, Carstens determined that the majority of the occupation in the vestibule occurred during the Early Woodland period (Carstens 1980:183-185).

Carstens recorded a Buck Creek projectile point from an hearth 80 cm below the surface of the midden. This feature yielded a C-14 date of 415±95 B.C. The projectile point has a suggested date ranging between 2000 to 400 B.C. (Carstens 1980:183-185).

A second radiocarbon date of A.D. 30±150 was recovered from this unit at a 51 cm below the surface. This sample came from a concentration of charred vegetable matter. Associated with this vegetal matter was a single sherd of Rough River Cordmarked pottery. Rough River Cordmarked pottery began during the Early Woodland period, and continued into the Late Woodland (Carstens 1980:184). A single sherd of Rough River Simple Stamped was found in the level above this dated context.

Shortly before Carstens completed his investigations, the site was severely damaged by looters. Carstens estimated that over 95% of the vestibule had been extensively vandalized, and was unable to locate his datum or his original test units because of the disturbance. Accounts of the looting indicate that pits were dug so deeply in the midden that ladders were needed to get in and out of the holes. Archaeological resources in the deeper passages of the cave apparently went unnoticed.

While surveying the interior of the cave in 1989, members of the Green River Grotto of the National Speleological Society found what appeared to be glyphs in the soft mud of a low passageway. They reported their discovery to Phil DiBlasi of the University of Louisville, and to Faulkner. In the fall of 1990, Faulkner entered the cave, observed the glyphs, made sketches of them, and concluded they were of prehistoric aboriginal origin.

On September 9, 1991, the author visited the cave with David Doyle, one of the original members of the survey crew that had reported the glyphs. Several of the glyphs were photographed by the author, and photographs were sent to Berle Clay, Office of State Archaeology, and to Thomas Sanders of the Kentucky Heritage Council. On November 23, 1991, the author again visited the site, accompanied by Thomas Sanders and Valerie Haskins of the Kentucky Heritage Council.

Since that visit, several additional trips have been made to study the glyphs, and to further investigate the vestibule of the cave. Each successive trip has generated greater detail on the extent and nature of the glyphs, and enabled the collection of additional knowledge on the use and habitation of the cave vestibule. Items recovered from the vestibule indicate a time span of use and occupation extending from the Early Archaic to the Mississippian period. The most intensive occupation of the vestibule, however, appears to have taken place during the Early Woodland period.

In addition to prehistoric materials, the site also has an extensive historic component. Large cedar water tanks are present in the vestibule of the cave that may have been placed there about 100 years ago. Oral tradition holds that these tanks operated as the water source for the town of Smith's Grove at the turn of the century. Other materials include bottle necks with seams and applied fused lips, blue shell-edge whiteware, and ironstone.

GENERAL DESCRIPTION OF THE CAVE

The cave lies in the area known as the Sinkhole Plain, just to the south of the Dripping Springs Escarpment. This area is part of the Mississippian Plateau, and is also known as the Pennyroyal Sinkhole Plain (Crawford 1989:8).

The total horizontal length of the cave is 2053 m (6737 ft), and the cave trends at a north by northeast axis. The deepest point in the cave is 24 m (78 ft) below the surface. The cave bisects the St. Louis Limestone formation, which is described as "..variably cherty and argillaceous" (Richards 1964). A thin bed of rehydrated gypsum approximately 25 cm thick appears at the west side of the entrance, just above the "ash bed" or midden. Chert nodules occur in the vestibule, and in deeper passages of the cave. Prehistoric use of minerals and chert in caves has been noted elsewhere (Munson and Munson 1990; Watson 1969; 1974), and it is possible that these materials were used by prehistoric peoples in 15Wa6 as well.

Historic graffiti occurs at several locations within the cave, with the first incidence of extensive graffiti at about 350 m inside the entrance, at an area of extensive breakdown. A number of names and dates are legible among the graffiti, and although some are etched into the softer rock, most appear to have been written with a graphite pencil. The earliest date in the graffiti was 1807, but most of the dates tend to cluster around the latter half of the nineteenth century. Groups of names often appear with the dates, as well as the names of towns. Similar graffiti is common in "tour" caves from the turn of the century, and suggests that 15Wa6 may have operated briefly as a commercial cave. This "historic" graffiti continues into the 1930s, with a slight gap until the 1950s when modern vandalism begins. Differences in style and content clearly separates the two periods.

The glyphs occur in the much deeper sections of the cave, and are located in a passage no greater than 1.2 to 1.5 m in height, and three to four times as wide. This section of the cave is fairly dry, though the mud retains its plasticity due to the high humidity, and the possible seeping of moisture through the walls of the cave behind the mud.

The mud in the glyph passage appears orange in its natural color (Richards 1964), but there is a patina that extends over the surface of the mud in all areas, except where recent vandalism has occurred. The reason for this patination is unclear, although it was most likely caused by a mineral precipitate from the ceiling of the cave; areas beneath dugouts and overhangs seem to have less of the covering. In any case, this dark greenish patination covers the glyph indentations in all but the deepest and most jagged gouges.

There was little charcoal or carbonized material present in the cave. This may be due in part to the heavy traffic in the cave as well as the damp conditions of the cave, which would facilitate the decay of organic remains. Other carbonized or burnt materials in the cave include pieces of reed or cane, burnt pieces or sections of wood (probably pine or hickory), and unidentified fibrous materials which are probably the remains of grasses, or even grapevine. The cane or reed fragments were not located on the floor of the cave, but were embedded in the soft mud walls of the cave. Some fragments were observed in the rear of the cave 250 m from the glyph passage.

GLYPH PASSAGE

The glyph passage is about 90 m long, and is no greater than 1.5 m in height at any point in the passage. The width of the passage varies from 4 to 8 m. The typical angle of the cave walls in this area is between 30-45 degrees. Most of the glyphs cluster in the southern half of the passage, but parallel curvilinear glyphs occur throughout the length of the passage. A number of the larger glyphs appear close to scooped out or dug out basins in the clay. No evidence remains of this scooped out clay in the glyph passage, and it is possible that the clay was transported from the cave.

A series of stations, set at 1 m intervals and marked at every 5 m , was placed in the passage to facilitate mapping of the passageway, and to fix the locations of the glyphs in the passage. Through the use of a compass and tape, the length of the glyph passage was mapped, with cross sectional measurements taken at every 5 m. As a clinometer was not available for mapping of the glyph passage, all angles for the cave floor were assumed to be level. A brief description of the major glyphs is given below. This description is keyed to the glyph map (Figure 1), and is presented by east and west wall sections.

GLYPH DESCRIPTIONS

EAST WALL

1. The first glyph identified on the east wall of the passage (moving from south to north) is a horned rattlesnake with the tail, and antlers just to the right of the tail, being the most visible parts of the glyph (Figure 2). The tail is approximately 65-75 cm in length, and is vertically oriented. The "head" of the snake seems to be facing the tail. To the right of this glyph are possible wings and claws. The entire glyph is 2 or more meters wide. Exact measurements are difficult for this glyph, since it is unclear where the identified element ends. The tail and rattle of the snake is depicted realistically. Most rattlesnake motifs in the region date late in the prehistoric period, and are stylized rather than naturalistic (Hanson 1970; Kneberg 1959:230-269). To the south of this glyph, and on the west side of the passage, is a second herpetomorphic glyph that is as yet unmapped. This glyph apparently shows a horned serpent-like creature, with a long abstract body, similar to the herpetomorphic glyphs reported from Mud Glyph Cave (Faulkner 1988).

2. The second glyph is located below the first, and is adjacent to a scooped or dug out basin. This glyph appears to be a monolithic axe, with the distal portion of the axe blade pointing to the right. This glyph is approximately 17-20 cm high and 10-13 cm wide.

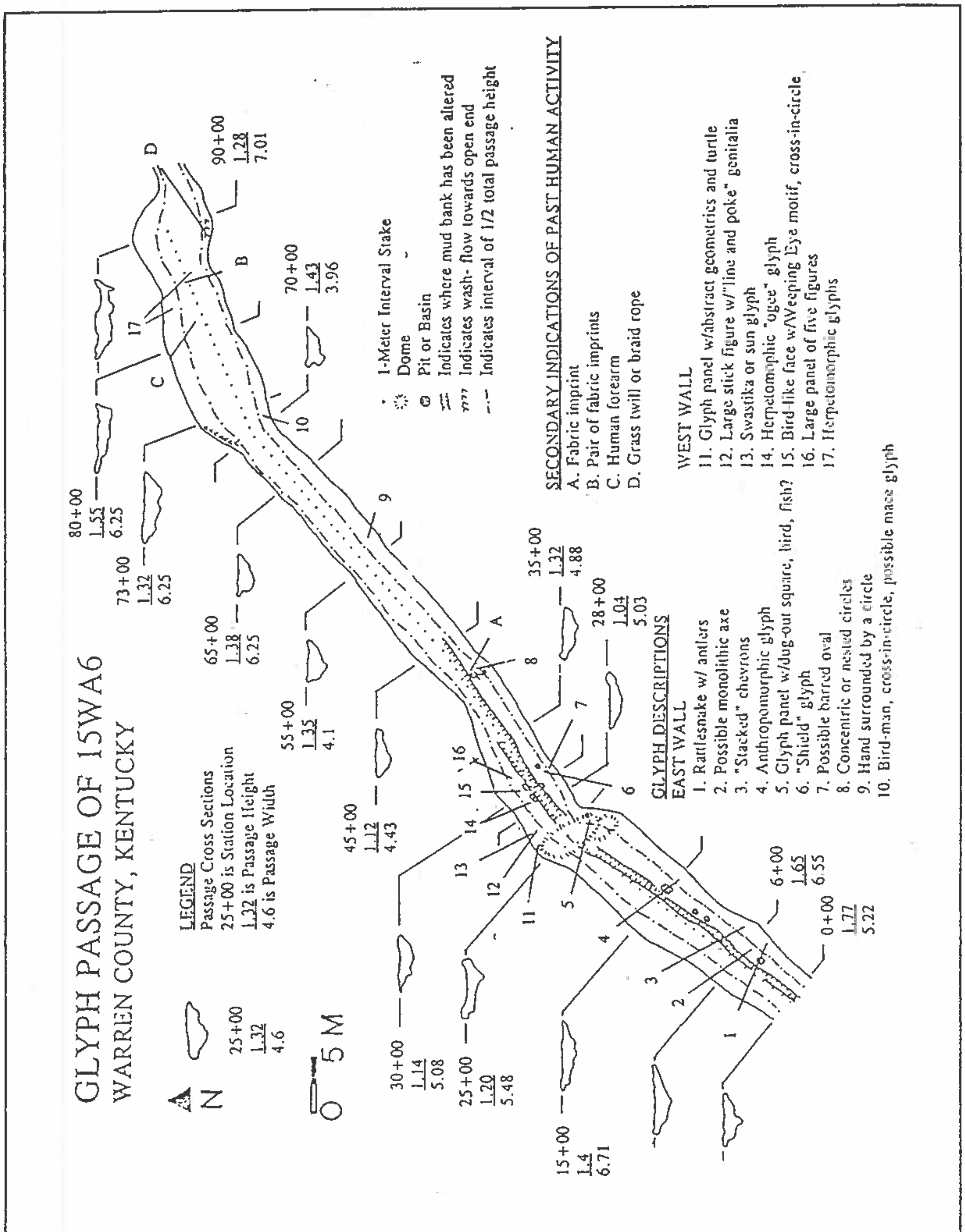

Figure 1. Map of Glyph Passage, 15Wa6.

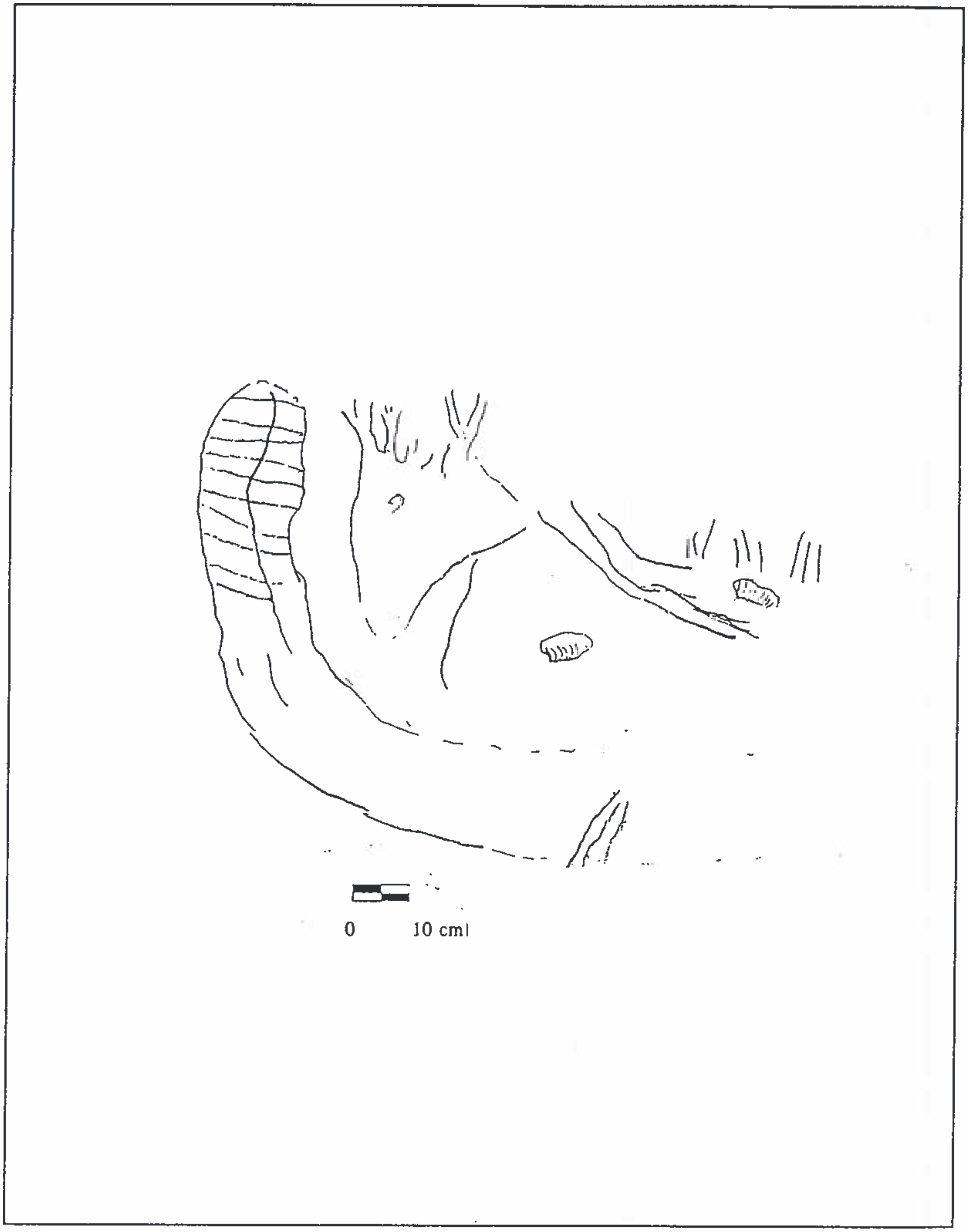

Figure 2. "Horned" Rattlesnake Glyph (Glyph 1).

3. The next glyph is a series of "stacked" chevrons with central axes. All of the chevrons open downward. Similar glyphs have been noted in Tennessee (Faulkner 1988:232, Figure 3). Faulkner (1988:299) felt that the glyphs may have been stylistic representations of eagle beings, or regional variations on this theme. These glyphs differ from those described by Faulkner in that they lack a v-shaped head, or tail, as well as a central squared "body". These glyphs are from 50 cm to possibly 1 m high, and approximately 20 cm wide. Exact measurements are difficult to obtain due to vandalism.

4. The fourth glyph is a singular representation of a human in stick form, with the arms held straight out from the sides, and the legs splayed outward at a 45 degree angle. The central torso is surrounded by a circle, which is placed well above the dugout "hips" of the figure. The central axis of the stick figure connects the hips and torso, creating a skeletal-like figure. The figure is approximately 35 cm high and 30 cm wide. Directly beneath this figure and at the edge of the "path" through the glyph gallery is a large scooped out basin. No evidence of the scooped out clay is found in association with the glyph, or in the adjacent passageway.

5. Glyph number five is actually a series of glyphs placed adjacent to each other and separate from other glyphs in the area. The central glyph of this group is a small dug out pit, showing clear finger marks at the edges. In contrast, most of the larger pits in the passage seem to have dug out with a wide, flat tool. Surrounding the basin is a square or rectangle, which is similar to the "filled" rectangles of Mud Glyph Cave (Muller 1986:61 Plate XIII). However, the rectangle at 15Wa6 has a scooped out center, while the rectangles in Mud Glyph Cave do not. Two converging lines extend from the left side of the rectangle, with the space between the rectangle and the terminus of the lines filled with vertical and angular lines. The overall effect is rather fish-like. The rectangle is roughly 15 cm square, with the overall length of the glyph approaching 40-45 cm. Immediately below this is a faint glyph that appears bird-like in form. The "head" of the glyph is difficult to discern, due to several overlapping lines in the area. Parallel curvilinear lines appear in this area as well. The bird is 15 cm wide and 10 cm high.

6. This glyph occurs almost directly across from a panel of five figures, described in the section below. This glyph is referred to as a "shield", which gives a rough approximation of its shape. Basically, it is rectangular in shape, but it has a narrow apex at the top that creates a bullet-like form. The glyph is bisected by a central, vertical line, with each half of the glyph further divided by several lines running perpendicular to the central axis. The lines on the right half are roughly horizontal, while those on the left are slanted toward the center. This glyph is approximately 50 cm high and 20-25 cm wide. To the left of this glyph are two parallel zig-zag lines that form a series of steps, or a terrace.

7. A possible barred oval glyph occurs to the right of the shield. The bar, however, goes completely across the oval, rather than being centered within the long axis of the oval. The glyph is approximately 25 cm wide and 15 cm tall.

8. This glyph consists of a series of concentric or nested circles. The diameter of the outer circle is approximately 30 cm.

9. This glyph is a representation of a hand surrounded by a circle. The fingers appear vaguely claw-like, with the tips of the fingers slightly curved toward the floor of the cave. The hand is approximately 50-60 cm in length, and 40 cm wide.

10. This group of glyphs is located near the northeast end of the glyph passage, in a slight bend. The central figure in this group is a stick figure 30-40 cm high and approximately 30 cm wide. The arms and legs of this

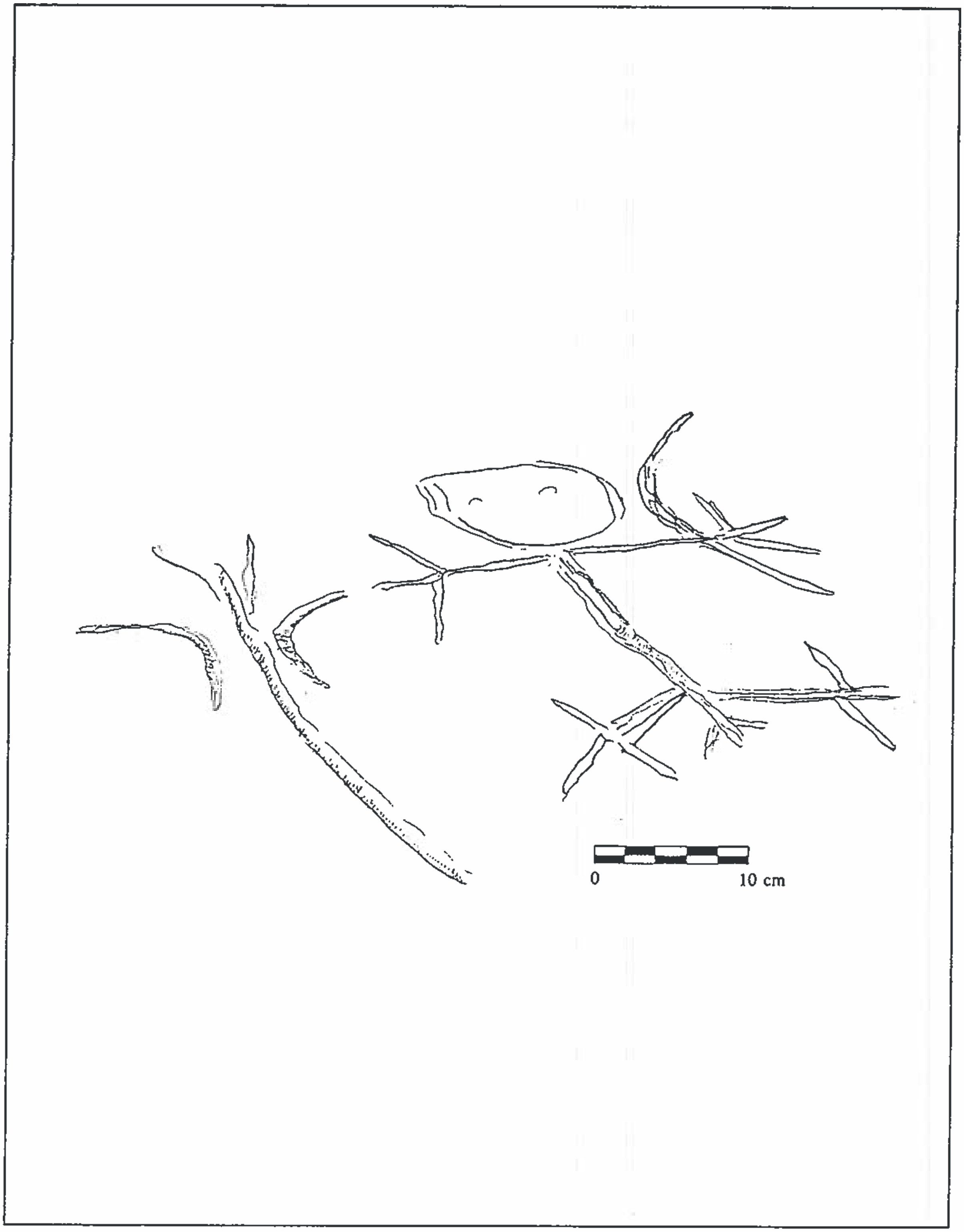

Figure 3. "Eagle-being" and Associated Glyphs (Glyph 10).

figure are both shown extending straight out, and the hands and feet terminate in three curved digits (Figure 3). An appendage extends beyond the legs in the axis of the body and ends in an upside down "v". The arm on the right side of the figure is bisected by a vertical, curving line just befor the wrist and "claws". The greater portion of this line is above the arm. Within the circle representing the head are three raised dots, which seem to represent eyes and a mouth. To the right of this figure is a possible "cross-in-circle". This glyph, like the possible "cross-in-circle" on the west wall, is incomplete. The base of the circle does not close, but rather forms a tight loop. The ends of the loop stray off to the right of the glyph and become a series of unconnected abstractions. This glyph is about 40 cm high and 45 to 50 cm wide. To the left of the stick figure is a glyph with a strong central axis and two semicircles located in the top third of the axis. The arcs of the semicircles face outward, with the backs of the circles next to the axis. At the top of the axis are two very faint lines that lead out from the axis at oblique, upward angles. This glyph is 25 cm high and 10-15 cm wide.

WEST WALL

11. The next glyph is the first of a series of glyphs along the West wall that constitute the largest panel of glyphs in the passage. Fortunately, this section of the glyph passage is also the best preserved. The first glyph in this cluster is a representation of a turtle. Representations of turtles are known to occur in Mud Glyph Cave as well (Faulkner 1988:231). The head of the turtle is extended, and is turned back beneath the body, to the right. The body of the turtle is approximately 25 cm in length and 15 cm high. Below and to the right of this glyph are a series of abstract geometric glyphs, including a "rayed sun", a stacked chevron glyph, a small human figure, several parallel curvilinear lines, and numerous abstract and geometric forms.

12. This is a large stick figure to the right of the smaller stick figure associated with glyph cluster number 11 described above. The head of the figure has been scooped out and removed, and the body is somewhat wider than most of the stick figures present in the cave. Genitals are represented with a "line and a poke". This same form of vague gender representation occurs in Mud Glyph Cave (Muller 1986:56), and suggests stylistic associations with Mud Glyph Cave. The glyph is 70 cm high and 40 cm wide.

13. This glyph is located above the head of glyph number 12, and is a swastika-like design surrounded by spiral/concentric circles (Figure 4). The glyph is about 40 cm in diameter, and is very similar to a design on a copper breastplate from Mound C at Etowah (Moorehead 1932:50, Figure 22).

14. This glyph is herpetomorphic, or serpent-like, in nature, and is somewhat similar to herpetomorphic forms found in Mud Glyph Cave (Muller 1986:58, Plate XI). It is the largest single glyph in the cave as well as one of the best executed. The glyph is very abstract, in that it takes no particular zoomorphic or anthropomorphic form, but it is very structured as well. It was originally designated an "ogee", or a form thereof, but it is a much more involved glyph than implied by that simple geometric motif. The glyph is nearly a meter in length and 40-50 cm high. There is a large basin located directly beneath the "head" of this glyph.

15. This glyph appeared on initial observation to be a profile of a face with a stylized "weeping eye" (Figure 5). The glyph is also herpetomorphic in form, and it is possible that the glyph was drawn with intentional ambiguity in order to represent both motifs. There is a hooked proboscis to the right of the face that may represent the beak of an eagle-being. This glyph is 55-60 cm high and 40-45 cm wide. There are several strike marks associated with this glyph that cross the central portion of the glyph. These short marks are the result of someone striking the area of the glyph with a stick or other object. These strike marks may or may not precede the placement of the glyph. To the immediate right of this glyph is what appears to be a "cross-in-circle" glyph. The base of the circle does not completely close, however, and the result is a tight loop that is open at the base. The ends of the loop stray out below the "cross-in-circle" glyph. This glyph is 30-40 cm in diameter. Below the

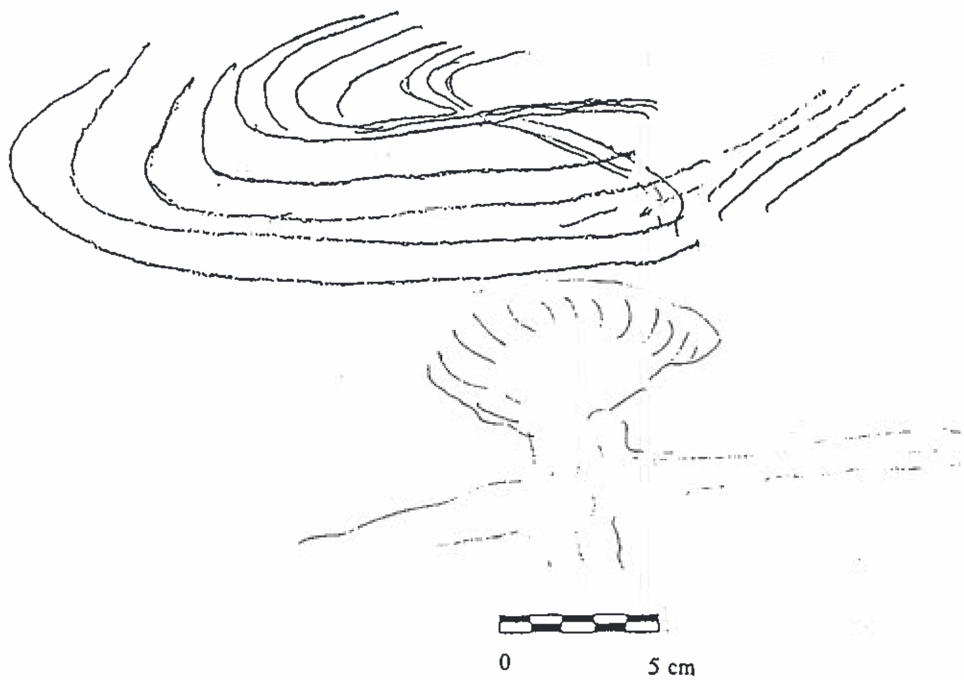

Figure 4. "Rayed Sun" Glyph and Portion of Associated Anthropomorphic Glyph (Glyph 13).

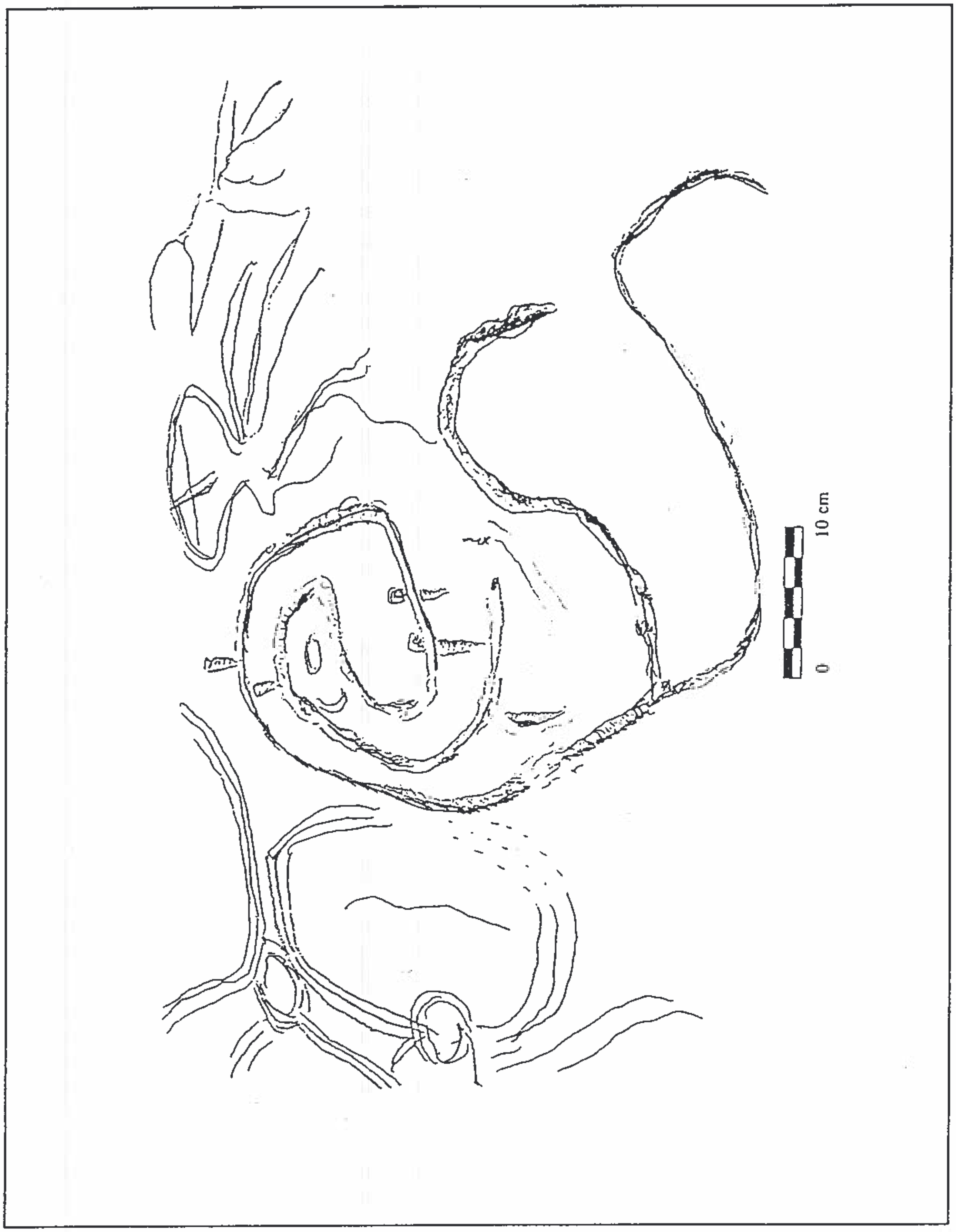

Figure 5. "Weeping Eye" Face and Associated Glyphs (Glyph 15).

"face" and the "cross-in-circle" glyphs is a double pit, consisting of two large basins joined by a narrow neck. Togather, both pits are about a meter wide.

16. This is a series of anthropomorphic figures that appear together as a single panel. In almost every other glyph location in the cave, glyphs or motifs appear as singular occurrences, or as random, disjointed assemblages of figures in no apparent order. This group of five figures is ordered in possible dualistic fashion, with a single central figure being the largest and most prominent (Figure 6). The entire panel is approximately 2.5 m wide and 1 m high. The first two figures have deeply scooped heads and long, deep single line bodies. Limbs for these figures are not well defined, and this portion of the glyph panel is damaged by recent vandalism. However, these figures still appear to be drawn as anthropomorphically ambiguous, and lack the "stick-figure" limbs of other anthropomorphic glyphs in the cave. The central figure in the panel may depict a pregnant female. The head has been scooped out, and a ball of mud has been placed along the top of the interior portion of the head. The midsection has been shallowly scooped out and two small bumps were identified near the center of the scoop. The legs are deeply incised in the mud, and appear to go under all of the other figures present in the glyph panel. This central figure is substantially larger than any of the other glyphs in this panel. The next figure is a smaller version of the central figure, though the head has not been scooped out, and the legs are not as long. The gender of the figure seems less obvious, however, due to the addition of a "line and a poke" as a possible representation of genitals. This same form of androgynous depiction is seen in Mud Glyph Cave (Muller 1986:56). The final figure in the panel is oriented at a 45 degree angle to the other figures, with the head toward the central figure. The trunk of the body is much wider than the other figures, but is very shallow in depth. The head has not been scooped out on this figure, and the "line and poke" described above is present as well. A large area of crosshatching appears along the base of all the figures. It is unclear as to whether or not the cross hatching is contemporaneous with the panel of figures.

17. This glyph appears herpetomorphic in nature, and a number of parallel curvilinear glyphs appear as a border. This is the last of the large glyphs in the passage. It is nearly 60 cm high and 25-30 cm wide. A single herpetomorphic glyph had been located in this area on a raised mud-covered rock in the center of the passage, but is now virtually obliterated by traffic through the cave.

SECONDARY INDICATIONS OF PAST HUMAN ACTIVITY

There are a number of indentations or impressions located through the passageway other than the glyphs. While most of these secondary indications of past human activity are fairly recent in nature, a number of the indentations appear to be prehistoric in nature. Fabric impressions from modern materials are relatively easy to discern due to manufacture style of seams, buttons, the appearance of pockets, etc. Further, in areas of recent contact (at least 100-150 years), the patination referred to earlier is broken, and the underlying orange color of the soil is exposed. A small number of the indentations show no breakage in the patination or exposure of the underlying soil. In one location, the imprint of a human forearm is evident with no break in the patination or exposure of underlying soils. The following is a list of locations, and a description of various impressions and indentations which may be prehistoric in origin. Future research in the cave may be directed at locating and identifying similar signs of human activity in the cave.

A. This imprint is located on the east wall, and appears to be a fabric of fairly tight weave. The impression is light, but is about 20 cm square, and no breaks in patination are evident.

B. This is a pair of diamond shaped imprints located near the end of the glyph passage on the west wall. If these impressions were made by some type of aboriginal container, it is suggested that the container may have

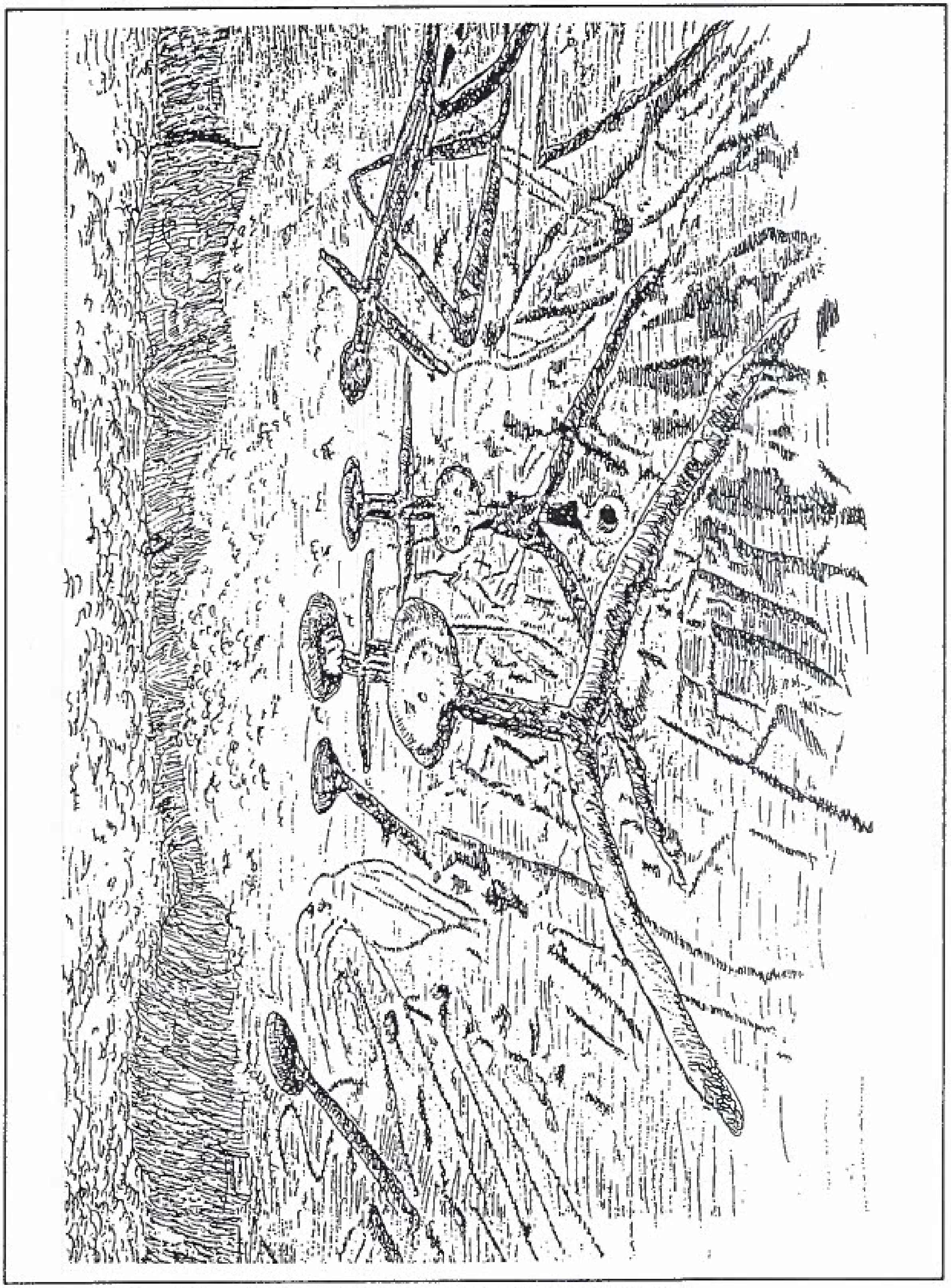

Figure 6. Glyph Panel of Anthropomorphic Figues (Glyph 16).

been a conoidal, wickerwork basket (Brown 1976:9, Figure 5). The imprint of what appears to be wickerwork strips are 1.5 cm wide.

C. This is an imprint of a human forearm. Hair, wrinkles in the skin, and major blood vessels were all apparent in this impression. While the age of the imprint is undetermined, the patination in and around this area is not broken, and it is assumed to be prehistoric in age, though the length of time for patination is unknown.

D. This is the imprint of a grass twill or braid rope. The fiber of the rope is very clear. Again, the possibility exists that this imprint is modern or historic in origin. Further study of all imprints in the cave should be undertaken by a researcher well versed in historic and prehistoric textiles.

SUMMARY

This section of the paper addresses two issues of primary concern regarding the glyphs: style and structure. Style in this regard is based on the definition of elements or motifs represented in the glyphs of 15Wa6 that can be associated with a particular set of elements or motifs that occur in specific spatial and temporal contexts. Structure refers to the internal organization of the glyphs, both individually and as a group.

By determining the "style" of the glyphs, it is possible to place particular glyphs in a specific temporal framework, and against a background of larger cultural systems operating throughout the southeastern United States.

By determining the "structure" of the glyphs, it may be possible to eliminate certain social groups which may have been responsible for the creation of the glyphs. Social groups in this paper are either secular, totemic, or shamanistic (Layton 1990:1-11). Art created by secular groups would lack symbolic structural form, and may appear in random locations. Art utilized by totemic groups is generally used to create a unique identity for that group, and would therefore show a greater degree of structural symbolic form. Totemic art can be found in border locations, so as to signify group territorial boundaries. Shamanistic art should have rigid symbolic structure, and should be in locations of either high public visibility or removed from public areas altogether. Repetition of form in shamanistic art, or the recurrence of motifs, may depend on such factors as trade, migration, or shared ideologies.

STRUCTURE OF THE GLYPHS

The ideology of structure in cave art is exemplified by a study conducted by Leroi-Gourhan (1986; 1967), in which he analyzed over 60 caves containing pictographs. Recurring placement of motifs in these caves suggested that "female" motifs were consistently bordered by "male" motifs.

Unfortunately, a similar, large scale examination of cave art in the southeastern United states is not, at present, possible. Only a few caves in the southeastern U.S. contain mud glyphs, pictographs or petroglyphs, and of these, only three caves show any organization in placement of glyphs. These caves, Indian Cave, Devil's Step Hollow Cave, and Mud Glyph Cave, are all located in Eastern Tennessee (Faulkner 1986; 1988). None of these caves show similar forms of organization or placement of glyphs; each cave has a relatively distinct organizational structure for glyphs. It is suggested here that the glyphs in 15Wa6 display an organizational structure for glyph layout that is ordered and unique among the glyph caves.

First, in 15Wa6, the main glyph passage appears bordered at either end by herpetomorphic glyphs. With the recent discovery of a new, unmapped glyph on the west wall, it appears that the herpetomorphic glyphs occur in pairs at either end of the glyph passage. These glyphs occur singularly on opposite walls.

Second, glyphs on the east wall are most commonly individual occurrences, while those on the west wall appear in groups or clusters. This is not a product of available space or location of pliable mud, but seems to be a function of the organization or structure of glyph placement. As it seems unlikely that all of the glyphs were produced during a single episode, an apparently repeated, possibly symbolic structure is implied for the creation and placement of the glyphs.

Finally, a "pattern of ambiguity" can be seen in a number of glyphs that is more suggestive of structure than style. In several of the human figures (though only on the west wall), an abstract representation of genitalia is made through a "line and a poke". This representation is found on both apparent "male" and "female" figures. This structure of ambiguity is carried through a number of motifs in which the central element is not completed, or the figure is purposely obscured or drawn upon an ambiguously "prepared" surface. This element ambiguity is seen in two apparent "cross-in-circle" motifs where the circular element has been left open at the base, with the ends of the circle abstract and unconnected. Ambiguous preparation of a drawing surface, or purposeful obscurement, is realized in the apparent profile or" weeping-eye" glyph. The area in the central portion of the glyph has been repeatedly struck with a blunt object either prior to, during, or after the creation of the glyph.

The examples above reveal an apparent formalized structure of "correct" glyph placement and depiction. What is unclear at this point is whether this symbolic structural organization was inherent in the original design, or if this form evolved through successive episodes of glyph placement. The end result, however, is one of formalized structure.

Most of the larger individual glyphs reveal a bilaterally symmetric form of organization, or at least a form of structural balance. This element of design, that of balance and symmetry, bridges the gap between structure and style. The best example of this type of balance, or dualistic structure, can be seen in the large glyph panel containing five anthropometric forms. These forms are centered on a single figure, which is larger than the rest of the figures and so becomes the perceived focus of the panel. This central figure appears to represent a pregnant female, with an enlarged abdomen. The two figures to the right are stick figures in the same general form as the larger "female", and the first figure adjacent to the center is a smaller copy of the central figure. The furthest figure is pierced through the side by a large triangular object, and both smaller figures have "line and poke" genitalia representations. The figures to the left are very obscure and are not as well defined as the other figures in the panel. They are more amorphous in form, without representations of obvious limbs, or genitalia, abstract or otherwise.

The structure of the panel suggests references on the right to life and death in an apparent genderless context, a large central figure (figuratively and literally), and a counterpoint or balance on the left that appears physically amorphous or vague. The left side of the panel may be a representation of the non-physical, or spiritual world. The panel itself is suggestive of a creation myth, or another singular important myth or group of mythical characters of importance to the creator of the glyphs.

This apparent underlying structure to the placement and organization of the glyphs implies an ideological rigidity that does not seem secular in origin. The placement of the glyphs deep within a cave rules out the use of these symbols as totemic, since totemic forms of art are made for public display and are placed accordingly. In both location and structure, these glyphs fit best the category of shamanistic art.

STYLE OF THE GLYPHS

The idea of style in archaeology has, in general, been a difficult concept to both grasp and define (Conkey and Hastorf 1990; Muller 1966a). In this paper, style will be used to mean recurring elements or components of art found in particular time periods or geographic regions. Through the use of comparison, it may be possible to determine when or how long the glyph passage may have been utilized, and the area of influence for the glyphs themselves.

Geographically and temporally discrete stylistic traditions are generally limited to discussions of projectile point or ceramic attributes, but in the broader sense of style may include almost all artifact classes. In this paper, artistic or stylistic traditions with a broad enough class of materials for comparison to the motifs and glyphs found at 15Wa6 can be limited to three distinct cultural or temporal affiliations.

The first tradition is the Adena, which occurred in Kentucky between 500 B.C. to possibly A.D. 1 (Railey 1990:254; Seeman 1986:567). There are no known Adena sites in the area, however, and the glyphs in 15Wa6 bear no resemblance to any Adena tablets (Dragoo 1963:219), Adena anthropomorphic blocked end tube pipes, or Adena ceramic motifs. While the vestibule of the cave is known to have been occupied during the period suggested for the Adena time period, no Adena or Adena-related artifacts were recovered in Carsten's excavations (1980). Further weakening an argument of association is the fact that while the majority of (if not all) stylistic bearing artifacts in the Adena are associated with burial mounds, no burials are found in the glyph passage. While burials are reported to have occurred in the vestibule of the cave (Dennis Bledsoe, personal communication 1991), this portion of the cave was also a primary occupation area, as evidenced by Carsten's limited excavations. In the Adena tradition, ritual space and living space appear mutually exclusive, and ritual space includes burial locations (Clay 1986).

The second possibility is the Hopewell Tradition, which fares little better than the Adena as a source of possible stylistic influence. The Hopewell Tradition in Kentucky is not well defined, and may overlap with the Adena. It is generally considered to have occurred in Kentucky between 200 B.C. and A.D. 500 (Railey 1990:254). Artistic style for the Hopewell continues a tradition begun with the Adena, but begins to include such motifs as the rattlesnake, the single, open hand and antlered anthropomorphic figures, rendered on shell gorgets (Phillips and Brown 1978:157-162), or incised bone (Prufer 1977:36). These motifs are the roots of many of the themes repeated in the Late Prehistoric.

The Hopewell Tradition is represented in the region by the Watkin's Mound (15Lo1), a burial mound containing tetrapodal vessels, ear spools, mica sheets, and copper which was excavated in 1968 by the Kentucky Chapter of the Tennessee Archaeological Society. The Campbell Mound, a site located in central Warren County that was destroyed in the 1930s, may also have been a Middle Woodland mound (Schock, personal communication 1991). An incised shell gorget with a central perforation was recovered from the site, and shows an antlered anthropomorphic figure (Alvey, personal communication 1991). Most known Hopewell gorgets, however, seem to focus primarily on raptorial birds, or jaguar-like felines. It is difficult to assess the likelihood of Hopewellian influence in the glyph passage of 15Wa6, primarily due to the continuation of certain prevalent motifs from the Hopewell to the Late Prehistoric time periods. However, none of the anthropomorphic figures present in the glyph passage are antlered, and representations of rattlesnakes in Hopewellian art are not antlered, while the primary herpetomorphic glyph in 15Wa6 is prominently so. A case for Hopewellian influence suffers from the same weakness as the Adena argument, with respect to material cultural remains and burials, in that materials bearing stylistic motifs are most commonly (if not completely) associated with mounds or charnel houses.

The final "tradition" occurs in the Late Prehistoric time period, and is specifically associated with the Southeastern Ceremonial Complex, which begins approximately A.D. 1250. The Southeastern Ceremonial Complex is not a "tradition", but rather a set of shared motifs that spread throughout the southeastern United States from the middle of the Late Prehistoric period and lasting until the 1500s in some areas (Hudson 1976:111). While the beliefs concerning these motifs and their use may not have been the same, the artistic styles themselves are well known and widespread. These motifs are not limited to burial sites, and may be found in particular associations within a village setting (Black 1967; Hanson 1970), or even in apparent ritual contexts in remote locations (Henson 1986:81-108).

The Late Prehistoric/Southeastern Ceremonial Complex "tradition" is represented by the Mississippian Jewel Mound Site (15Bn21), located a few miles to the southeast of 15Wa6 (Hanson 1970). This site contained sherds of Angel Negative painted potsherds, with cross-in-circle motifs (Hanson 1970:47, Figure 17).

Other Mississippian mound centers in the region, such as Rowena and Corbin, lack Southeastern Ceremonial Complex motifs, but show a prevalence of checkstamped or Dallas-like pottery that indicates a Southern Appalachian tradition influence (Fryman 1968; Weinland 1980).

THE GLYPHS

At this point, it may be beneficial to review some of the glyphs that show the strongest resemblance to known motifs, and their relation to the traditions mentioned above. By narrowing the selections of temporal and cultural periods, an understanding of some of the simpler problems concerning the glyphs at 15Wa6 may be reached.

The first glyph to be discussed is the large herpetomorphic glyph encountered on the east wall as the glyph passage is entered. This glyph is unusual for its size, as well as its depiction of an apparent winged and antlered rattlesnake. The antlers of the glyph are unusual as well. Antlers on rattlesnakes have been depicted on shell cups at Spiro Mounds, Oklahoma (Phillips and Brown 1978), at Moundville, Alabama (Fundaburk and Foreman 1957), and at the mound site at Hollywood, Georgia (Waring 1968:15-23), though the latter look more like plumes than antlers. The glyph also bears a slight resemblance to a Piasa glyph located near Joiner, Arkansas (Fecht 1985:179). These glyphs all occur in Late Prehistoric, or in the case of the Piasa, contact-era time periods.

The next glyph to be considered occurs over the head of a singular anthropomorphic figure located on the west wall. This glyph is a curved swastika, and is considered to be a form of the "sun circle", or "cross-in-circle". Both are common motifs in the Southeastern Ceremonial Complex (Muller 1986:36-80; Phillips and Brown 1978:157-209; Waring 1968). The glyph is similar to a copper breastplate found in Mound C at Etowah (Moorehead 1932:50 Fig. 22). It should be noted that Muller could find no stylistic difference between the Mound C style at Etowah and the style of gorgets in the eastern Tennessee Valley (Muller 1966b:176,178). The style of the gorgets is defined by Kneberg as early Dallas (1959). The gorgets in Mound C at Etowah also differed stylistically from the repousse copper style with which they were archaeologically associated (Phillips and Brown 1978:184). Muller concluded that the Mound C style at Etowah was "the result of intrusion from the eastern Tennessee Valley" (1966b:176-178).

Phillips and Brown further pursue the theory of intrusion through the comparison of the "bird-man" motif gorgets found at Mound C and in the Dallas culture area. They conclude that the styles are so similar as to "raise the issue of common authorship" (Phillips and Brown 1978:185). The "bird-man" motif is common in the Late Prehistoric, and is present at 15Wa6 complete with inverted "v" tail, taloned hands and taloned feet.

Other recognizable motifs at 15Wa6 include the "barred oval", a possible "monolithic axe", two "cross-in-circle" glyphs, and a series of nested or concentric circles. All of these glyphs are considered to be motifs of the Southeastern Ceremonial Complex (Muller 1986:36-80; Phillips and Brown 1978:157-209; Waring 1968). An apparent "hand-in-a-circle" may be considered diagnostic of the Southeastern Ceremonial Complex, but the fingers, clawed in appearance, are closer in stylistic form to a mica cut out of a human hand depicted at Chillicothe, Ohio.

CONCLUSIONS

The arguments and observations presented in this paper have led to the following conclusions regarding the prehistoric use of the glyph passage in 15Wa6. These conclusions are preliminary, and need further refinement through investigations in the region, and in 15Wa6 as well.

First, it is apparent that the glyph passage was used for ceremonial or ritualistic purposes, removed from observation or interaction by the general population of the area. While this may not have been the original intent behind the initial, possibly non-structured placement of abstract glyphs, by the end of its usage, the passage was ordered and organized beyond apparent secular concerns.

Secondly, glyphs were placed in the passage during the Late Prehistoric period. Several of the glyphs are recognizable as Southeastern Ceremonial Complex motifs, beginning about A.D. 1250, or stylistic motifs that occurred in the Late Prehistoric time period. It is possible, however, that not all of the glyphs were placed in the passage at the same time, and that some of the glyphs may have been drawn hundreds of years prior to others. Not every glyph motif in the passage is recognizable.

Third, the apparent origin of influence for most of the glyphs in 15Wa6 is the eastern Tennessee Valley. From the depiction of certain elements in the cave (such as the "line and poke" representation for genitalia noted by Muller in Mud Glyph Cave), to the stylistic similarity to the Etowah-Dallas, or Hightower style (Muller 1986:67-70), the influence of Late Prehistoric eastern Tennessee Valley peoples is apparent.

Finally, given a recent, uncorrected AMS date of 30 B.C. from the glyph chamber at 15Wa6 (Valerie Haskins, personal communication 1994), it seems likely that the glyph passage may have been used for a long period of time, during which it obtained its current form. While more dates are needed from the passage, it does not seem unlikely that the passage may have been used for a number of centuries, slowly accruing several layers of glyphs.

Although the symbolic aspects and possible interpretations of the glyphs are not discussed here, a possible point of entry for such a study may be in the structure of glyph placement. Through comparison of the placement of the glyphs in a number of caves, it may be possible to locate clusters or groupings of motifs sharing the same theme. Ethnographic accounts of Native American belief systems in the region may supply further meaning to any observed patterns in the glyph caves of the southeast. Of course, the first order of business is locating as many of these caves as possible, before they are eliminated by vandals, accident, or nature.

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SEARCHING FOR FORT JEFFERSON'S CIVILIAN COMMUNITY WITH A METAL DETECTOR

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ABSTRACT

An archaeological reconnaissance using metal detectors was conducted in an area suspected to contain the remains of eighteenth century civilian habitation associated with George Rogers Clark's 1780-1781 Fort Jefferson in Ballard County, Kentucky. No eighteenth century materials were recovered; however, the metal detecting survey did isolate areas of nineteenth century land use not previously documented for the research area.

INTRODUCTION AND HISTORICAL BACKGROUND

Under the auspices of Virginia Governor Thomas Jefferson, George Rogers Clark and the Illinois Battalion constructed Fort Jefferson and the civilian community of Clarksville in April, 1780 (James 1972). The site was built about 8 km below the confluence of the Ohio and Mississippi rivers (Figure 1) (Carstens 1991). Although fort and community were short-lived (they were evacuated in June of 1781), the site was intensively occupied by more than 560 persons throughout their 416 day history (Carstens 1996a). Not all of the persons at the post were assigned to military duty. At least two-thirds of the people living at the post were civilian families and their slaves (Carstens 1996b). Most of the civilians came to Fort Jefferson and the Clarksville civilian community from the Holston Valley of Virginia, fleeing the American Revolution as it moved ever southward (Carstens 1996a).

The fort, as illustrated in the William Clark map (Figure 2) (Draper Manuscripts 1M11), had two bastions, consisted of numerous structures contained within its stockade, and probably measured about 30 m per side (Carstens 1993). The civilian community, which contained more than 40 families, was located east of the fort and consisted of 101 inlots (Carstens 1993). Which inlots were or were not occupied is not currently known, nor is it known who owned which lot, or how each lot was used. Some references do indicate that several individuals built houses on some of the lots. Other lots appear to have been used either for gardens or as military fortifications (e.g., blockhouses) (Virginia State Library, n.d.).

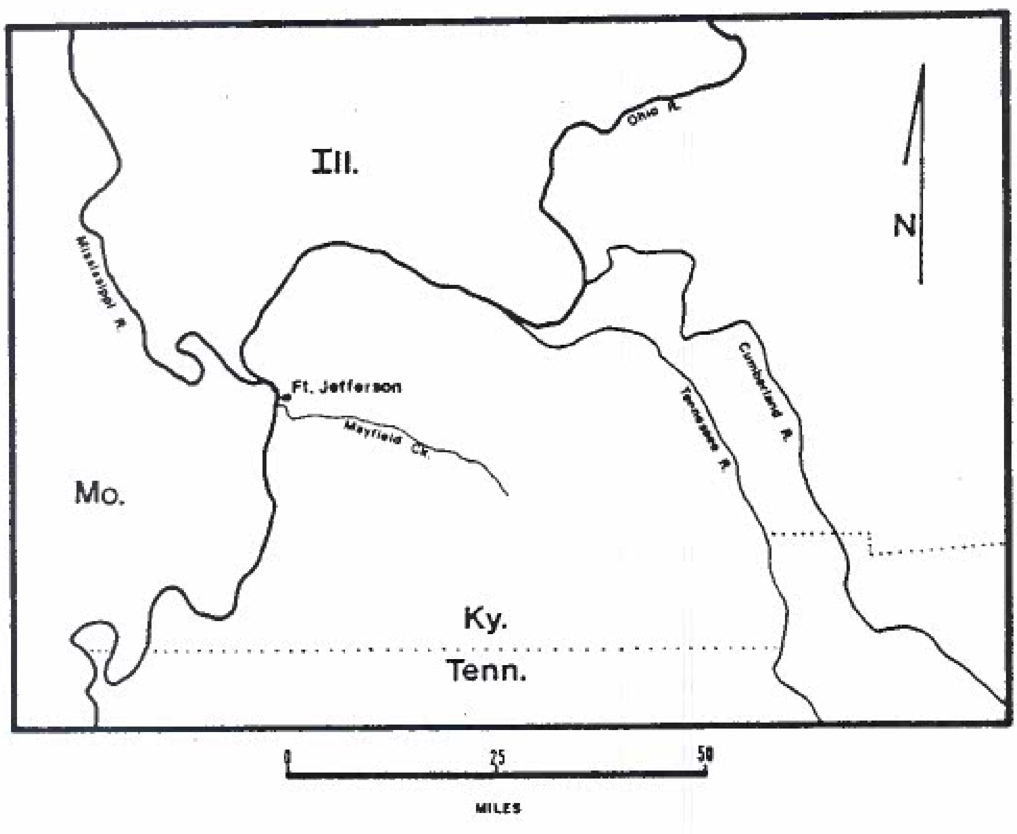

Figure 1. Map of General Fort Jefferson Area, Five Miles Below the Confluence of the Ohio and Mississippi Rivers.

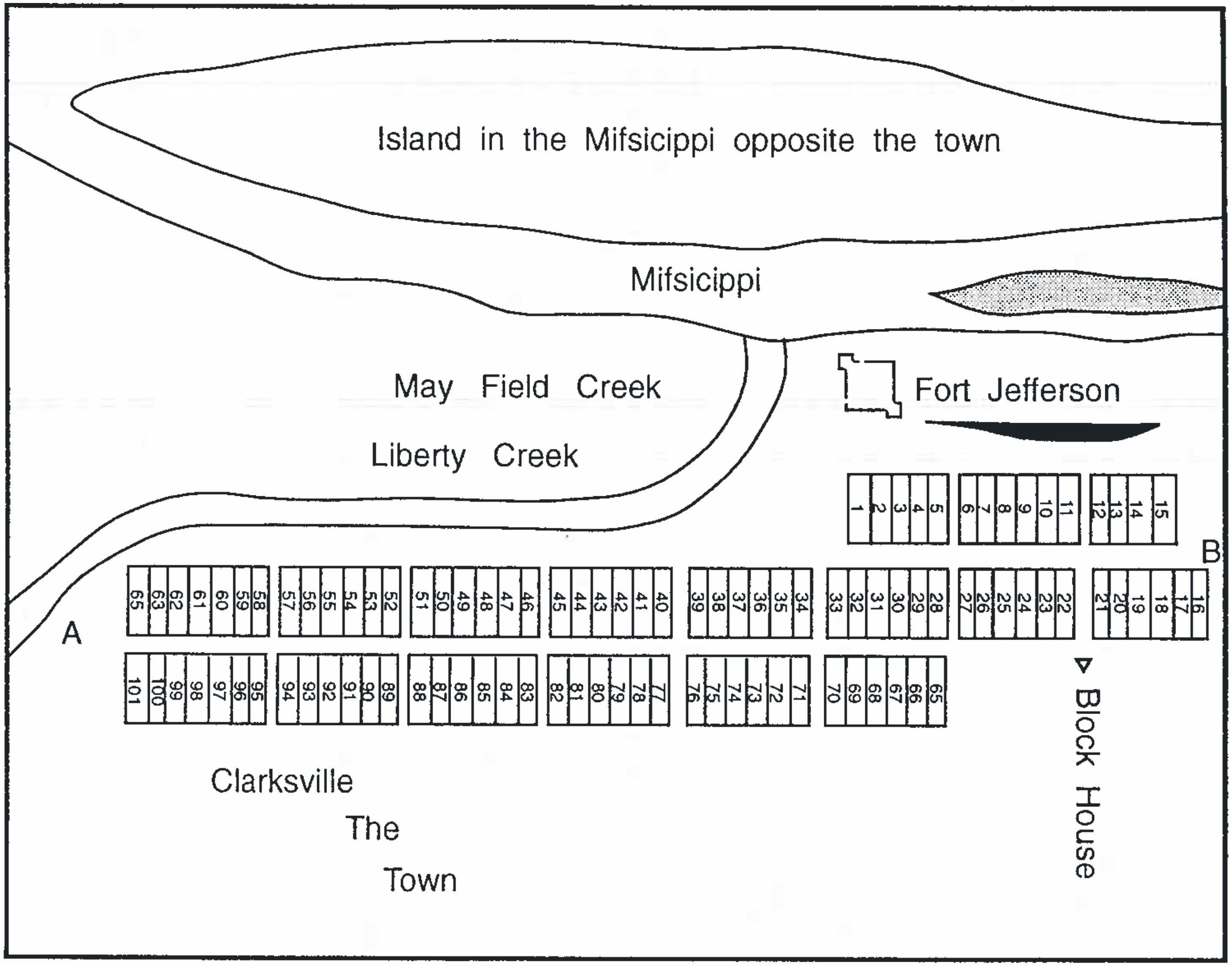

Figure 2. The 1780 William Clark Map, Showing Fort, One of Three Blockhouses, and the 101 Inlots Comprising the Town of Clarksville (redrafted from Draper, 1M8).

Two individuals, Joseph Ford and John Donne, are known to have constructed their homes in the "southern end of town" (Virginia State Library, n.d.). Little is known about Ford, although he appears to have been rather typical of the Fort Jefferson population, being a member of the local militia, a farmer, and the head of a rather large household. John Donne, however, was a slave owner and commissary for Fort Jefferson. He was married and had one son, John, Jr. When viewed against economic information and social position, the Donnes appear to have occupied a much higher socioeconomic position at Fort Jefferson than did the Fords.

Also in the lower end of the town was a blockhouse, which was constructed near Ford's home. The exact location for each of the three structural features in the southern part of Clarksville (Ford's house, Donne's house, and the blockhouse), is not known (Figure 3).

During the fall of 1990, an east to west raked transect was conducted across part of a tree farm on property owned by the Westvaco Corporation of Wickliffe, Kentucky. Earlier attempts to locate the fort northwest of this study area had been hampered by nineteenth and twentieth century disturbances to the area (Carstens 1991; Stein et al. 1983). The purpose of the 1990 raked transect south of the fort area was to determine whether or not similar disturbances occurred in the area thought to be part of the southern end of the Clarksville civilian community. The result of the raked transect revealed no evidence of disturbance, other than field plowing. The presence of prehistoric cultural materials on the surface further indicated that the ground's surface had been stable for a long period of time. The transect also revealed that the ground was densely covered with very thick beds of poison ivy and poison oak.

The study area, which encompassed 3.44 ha, measured about 427 m north-south by 92 m east-west. At least three structures may have been located in this area. Finding the remains of three relatively small buildings, each probably less than 5 m^2 in an area measuring 40,000 m^2 would be a difficult task. In selecting an appropriate method, it was determined that raking would take too much time as would the hand excavation of hundreds of test units. Magnetometer and resistivity surveys could not be employed because of the great expense associated with such work. Metal detecting, however, was determined to be an appropriate survey tool, as it was believed this remote sensing method could pinpoint the location of all metal artifacts in the survey area. The location of artifact clusters would further yield information regarding site type and function. Moreover, any metal found in the study area should date to the eighteenth century and should be associated with the construction of the civilian community of Clarksville. Nineteenth and twentieth century structures are not known to have been built in the study area, nor are any described in nineteenth or twentieth century deeds, or shown on any twentieth century black and white aerial photographs or topographical maps of the study region (A.S.C.S. 1937, 1943, 1950, 1959, 1964, 1972, 1981; Ballard County Courthouse, n.d., 1875; U.S.G.S. 1939, 1951, 1970, 1974, 1983).

METAL DETECTING AND METAL DETECTORS

ETHICS

The ethics of using metal detectors in archaeological field work has been an issue of contention among many archaeologists for many years. Hobbyists using metal detectors have been seen by professional archaeologists as "evil" individuals bent on destroying subsurface contexts for purposes of personal gain. Yet, metal detectors have been recognized as a potentially valuable resource for professional archaeological investigation. Bray used controlled metal detecting to examine the Reno-Benteen defense site in the Custer Battlefield National Monument (Bray 1958; Scott et al. 1989).

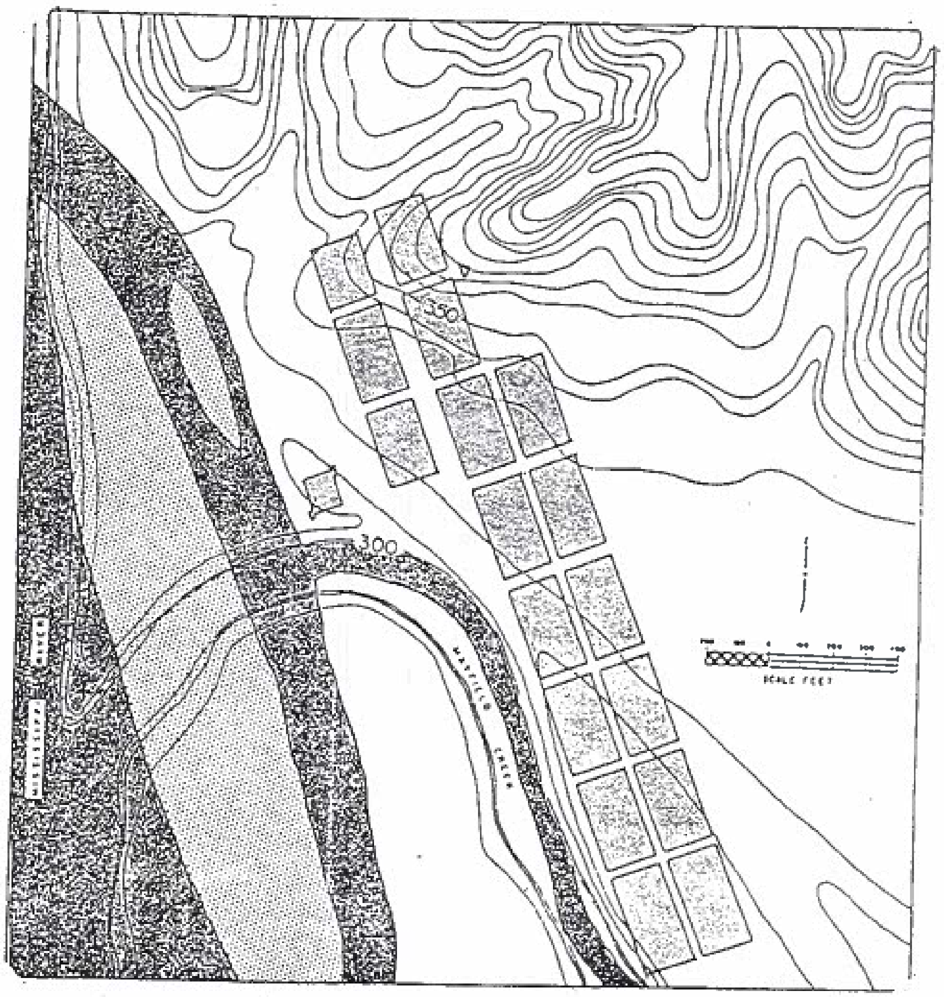

Figure 3. The 1780 William Clark Map Overlying the Modern Topography of the Study Area. The Six Lower Blocks of Inlots Comprise the General Study Area for the Metal Detecting Survey.

Contrary to the metal detecting hobby, metal detectors are simply an electronic instrument no more useful than the operator. As Gregory and Rogerson (1984) state, the metal detector, "is capable merely of indicating the presence of certain objects on or below the soil. It bears no responsibility for human action consequent upon such indications." Numerous accounts are on file where professional archaeologists have solicited the help of amateur metal detector operators to aid research in the field (e.g., Gregory and Rogerson 1984; McLeod 1985; and Scott et al. 1989). The results of these cooperative ventures illustrate that responsible and scientifically meaningful recovery of items can occur with metal detectors.

OPERATION

The metal detector operates on an interference concept. Two types of metal detectors were used during the course of this study: the Bounty Hunter II, and the Micronta VLF discriminator. Both types operate as VLF (Very Low Frequency) as opposed to IB (Induction Balance) instruments. VLF detectors are slightly more sophisticated than the IB machines (Gregory and Rogerson 1984). The effectiveness of both machines depends upon a number of variables: the tightness of the receiving coil wrapped around the detecting arm, the proximity of the detecting head to the ground; and the physical parameters of the sought after objects.

The receiving coil must be wrapped tightly around the metal arm of the detector to produce an inverted cone of magnetic coupling between the transmitter and the coil when the detector is in operation. Subsequently, when this inverted cone moves through an area containing concentrations of metal, interference occurs and registers on the instrument. The depth of penetration of the inverted cone depends totally upon the instrument. The Micronta VLF machines had an operating depth of approximately 10 cm, while the Bounty Hunter II machines had a slightly greater range, 10-15 cm.

The size and orientation of the metal objects also greatly affects the performance of the machine. Larger metallic objects are obviously easier to detect than smaller objects. The shape of the object is also important, as blocky, short objects may be easier to detect than narrow, longer items (Micronta 1985).

Lastly, the topography of the area will also alter the penetrating depth of metal detectors. Irregular surfaces decrease the ease of maintaining the detecting head a uniform height above the surface. Ground clutter and vegetation also hinder the ability of the operator to identify positive readings (Gregory and Rogerson 1984).

THE STUDY

The recovery of artifacts from the area believed to have been the southern end of the 1780 Clarksville community began on April 6, 1991. The objectives of the six person crew were two fold: 1) to test the effectiveness of metal detecting as a survey tool, and 2) to determine the spatial distribution of metallic artifacts. The study area was part of a Westvaco tree farm with trees planted every 3.66 m. Therefore, the existing Westvaco grid was used to map the location of each artifact.

The initial detection of artifacts was done in a "leapfrog" manner, skipping every other survey unit. Subsequent surveys did not skip units. Eventually, all 460, 3.66 x 3.66 m units were surveyed.

When the metal detector was used, the discriminator option was not invoked, because all metal objects were deemed important and were considered a part of the archaeological record. Prehistoric cultural materials from the plowzone, although observed, were not collected.

The survey team took great care to maintain the detector's head a short distance, about 10 cm above the ground, in order to ensure maximum penetration, which is deemed essential for good detection (Gregory and Rogerson 1984). The motion of the detector was lateral in 1 m swaths, overlapping to insure total coverage in each unit.

The survey yielded some metal artifacts. Most of the artifacts were found within the upper 10 cm or less of the soil. As each artifact was detected, its provenience was recorded. Each artifact was then excavated by trowelling. It was then bagged and labeled according to date, site number, unit and transect. Each artifact was also assigned a locus number. After each artifact was recovered, the metal detector was used again in the area where it was found to determine whether additional metallic objects were present. In all instances but one, the metal artifacts recovered were found between the ground's surface and the upper 10 cm of plow zone. One large metal artifact, a plowshare fragment, was found approximately 15 cm below ground level. The relatively large size of the plowshare undoubtedly accounted for its being found at a greater depth by the metal detector.

PRELIMINARY RESULTS OF STUDY AND CONCLUSION

It must be emphasized that the results of this study are, at present, very preliminary. Additional field work and ensuing artifact analysis will not be completed for some time. Clustering and randomness tests will be run on the data to determine the statistical probability of nonrandom occupation associations. Several observations, however, can be made about the work completed to date.

First, approximately one-half of the total survey area has been examined and 63 metallic items were recovered from 460 units (3.66 x 3.66 m) (Figure 4). This yielded an artifact density ratio of 0.14 artifacts per unit. Concentrations of artifacts were present, however. Seventy-eight percent of the artifacts were recovered from the "middle" portion of the site. This area had an artifact density ratio of 0.41 artifacts per unit, which is nearly three times greater than the remainder of the study area.

Sixty-three artifacts were recovered during this survey. These include 13 machine cut nails (21%), 11 large spikes (17%), eight railroad spikes (13%), six metal files (10%), six shackle spikes and links (10%), a combined total of five nuts, bolts, and washers (8 %), two plowshare fragments (3%), one ironstone ceramic sherd (2%), four miscellaneous iron straps (6%), and seven unknown metallic objects (11%).

Architecturally-related items (nails and spikes) overlap in distribution with nails more generally dispersed than spikes. Railroad spikes seem to share a similar distribution to that of the similarly-shaped headless spikes. Whether or not these two artifact groups are functionally related has not been determined. Lastly, some clustering also appears to be present among the chained "shackle" spikes.

The metallic artifacts recovered do not belong to the eighteenth century Clarksville community. A *terminus ante quem* date for the railroad activity is 1870, a date which agrees with an 1883 plat depicting a small railroad servicing station several hundred meters north of the study area.

Although historic records suggest that no nineteenth or twentieth century structures were ever built in the study area (Filson Club 1840), the results of this study suggest that at least one or two late nineteenth century structures may have been present. These structures were probably associated with either land clearing operations, were directly involved with the establishment of the Winford junction rail line, or both. An examination of a 1981 low altitude, color infrared (May scene) photograph, revealed two square anomalies in the area of greatest artifact density. Although it was initially hoped that these anomalies were the remnants of eighteenth century structures,

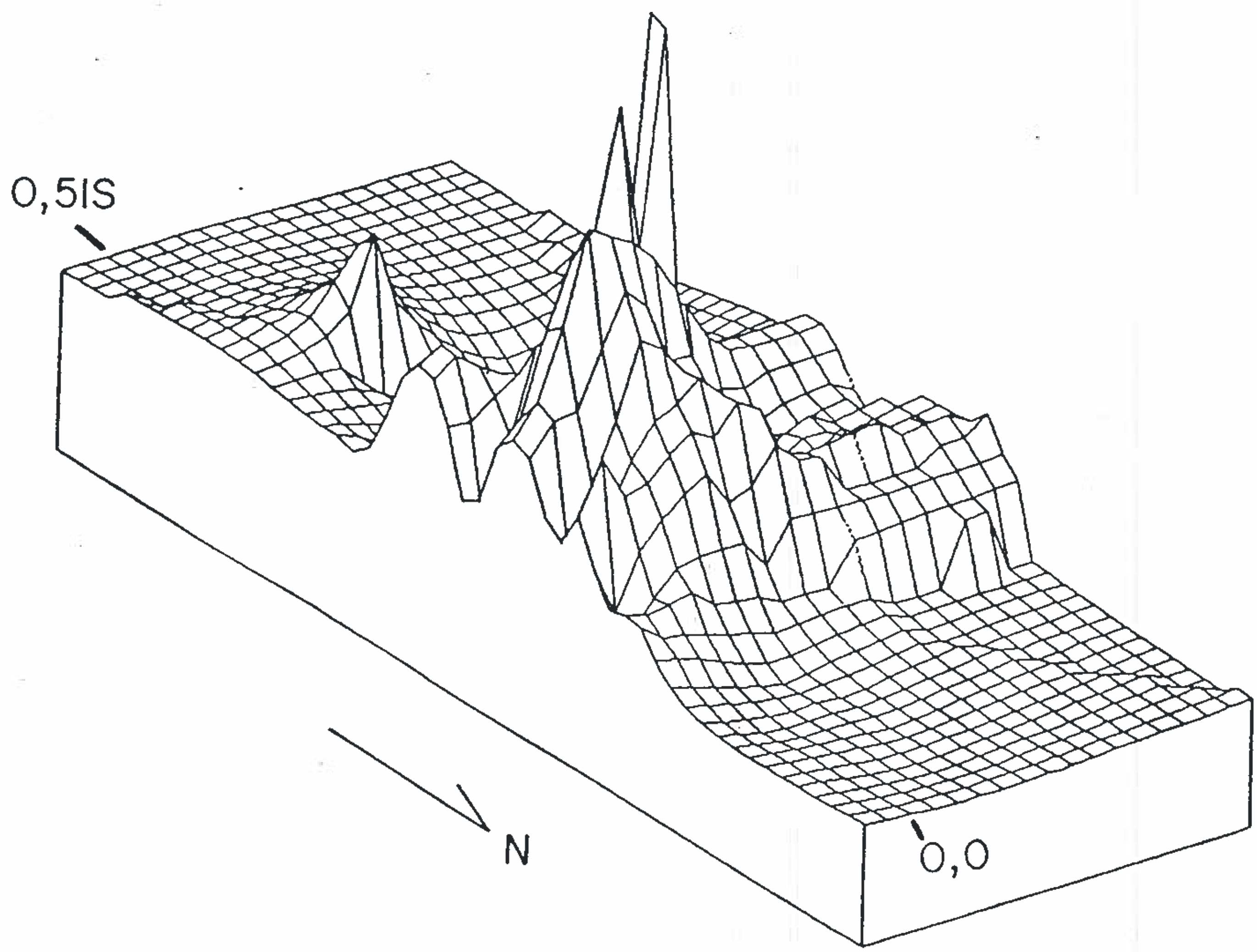

Figure 4. A Three-Dimensional Plot of Artifact Distribution and Density in the Fort Jefferson Study Area. Each square represents a 3.66 square meter area; the highest peak represents a vertical frequency of 5 artifacts.

it would appear that they are not. Subsequent work in the study area may yet locate the remains of structures associated with Fort Jefferson's 1780 Clarksville community.

Lastly, what about metal detectors as a research tool? Are they worthwhile? Yes! Although remains of the Clarksville community were not found, metal objects were located. It must be assumed therefore that had eighteenth century metallic items been present, they would have been recovered also. Several of the nail fragments discovered by the metal detectors were only 1 cm in length and very badly rusted. Yet, they were discovered.

Although there were some difficulties in operating the metal detectors (batteries becoming exhausted or sometimes, simply not knowing whether the device was working), the difficulties were primarily the result of our own inexperience with the detectors. It is possible that more sophisticated and expensive detectors (ours cost $300 each) might have instilled greater user confidence. Yet, because metal was found consistently and within patterns, it must be concluded that the detectors operated correctly. As an aid to archaeological research for historic sites with poor ground visibility, the metal detector is a very efficient research tool that will save both field research time and, in the long run, money.

ACKNOWLEDGMENTS

The authors extend their gratitude to those who have assisted with this phase of the Fort Jefferson Archaeological Project. Permission was granted from Sandra Jones, Public Relations Manager from the Westvaco Corporation of Wickliffe, Kentucky, to work on their property. Financial support for travel and equipment came from an Undergraduate Grants-in-Aid to Dowdy from Sigma Xi, and from the Department of Sociology and Anthropology's Archaeology Service Center at Murray State University. Statistical advice was given by Ken Fairbanks of the Department of Math and Statistics at Murray State University. Advice about metal detecting surveys came from Douglas D. Scott of the National Park Service's Midwest Archaeological Center in Lincoln, Nebraska. Last, but not least, field work for this project was accomplished by very enthusiastic Introduction to Archaeology undergraduate students from Murray State University.

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LITHIC SCATTERS: A CASE STUDY IN RESEARCH DESIGN

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ABSTRACT

Lithic scatters have the potential to contribute significant data to subsistence and settlement pattern studies through the implementation of carefully developed research designs. A research design was developed for investigation of the Fontana Site (15Cr92), a lithic scatter located in Carter County, Kentucky. The research design incorporated a model for debitage analysis developed by Flenniken (1981). Through the analysis of debitage from the excavation of a block of 50 cm by 50 cm units at the Fontana Site, it was possible to reconstruct the lithic reduction technology. In addition, behavioral patterns were discerned for chert procurement, site selection, intra-site activity areas, tool maintenance, subsistence, and settlement.

INTRODUCTION

The Fontana Site (15Cr92) is located in central Carter County, Kentucky on a heavily wooded ridge crest 8 km west of the Little Sandy River (Figure 1). This lithic scatter site, 24 m x 73 m, is situated at the base of a small knob on a southerly oriented ridge that extends some 400 m (Figure 2). At an elevation of 960 feet above mean sea level (AMSL), the ridge crest slopes steeply about 80 m to the valley floor. Nearby on the same ridge system are located three smaller lithic scatter sites (15Cr91, 15Cr93, 15Cr94). A small outcrop of Paoli chert occurs near the valley floor below these sites. A system of ridges provide access to major chert sources of the Newman Formation in the upper drainage of Tygarts Creek, three miles northwest.

Nearly 85% of the Fontana Site was disturbed by logging activities prior to anticipated surface mining. Fortunately, a small wooded area at the base of a knob escaped the bulldozer and yielded a concentration of lithic debitage during the initial survey (Boedy and Carter 1991). Debitage density indicated that further investigation could have the potential to recover diagnostic artifacts, determine technological aspects of lithic bifacial reduction, delineate artifact distributions, identify behavioral patterns, and assess site function (Carter 1992).

Investigations focused on a lithic concentration discovered by shovel test #4 (ST-4) during the original survey. Removal of underbrush and a thick humus mat exposed a shallow topsoil with an average depth of 5 cm, which was underlain by a gravelly, sterile subsoil. An excavation block (Test Unit 1) was expanded to $9m^2$ on a 1 m grid pattern, which was then excavated in 50 cm by 50 cm units. Recovered artifacts consisted entirely of lithics. A total of 662 lithic specimens were recovered using a 1/4 inch mesh screen. This sample consisted of 650 pieces of debitage (98%) and only 12 formed artifacts (2%). An additional 22 pieces of debitage were recovered from a test sample using a smaller mesh screen (0.85 mm). A single projectile point stem fragment was tentatively assigned to the Late Archaic, ca. 3000 to 1000 B.C. (Jefferies 1990; Justice 1987). Preliminary

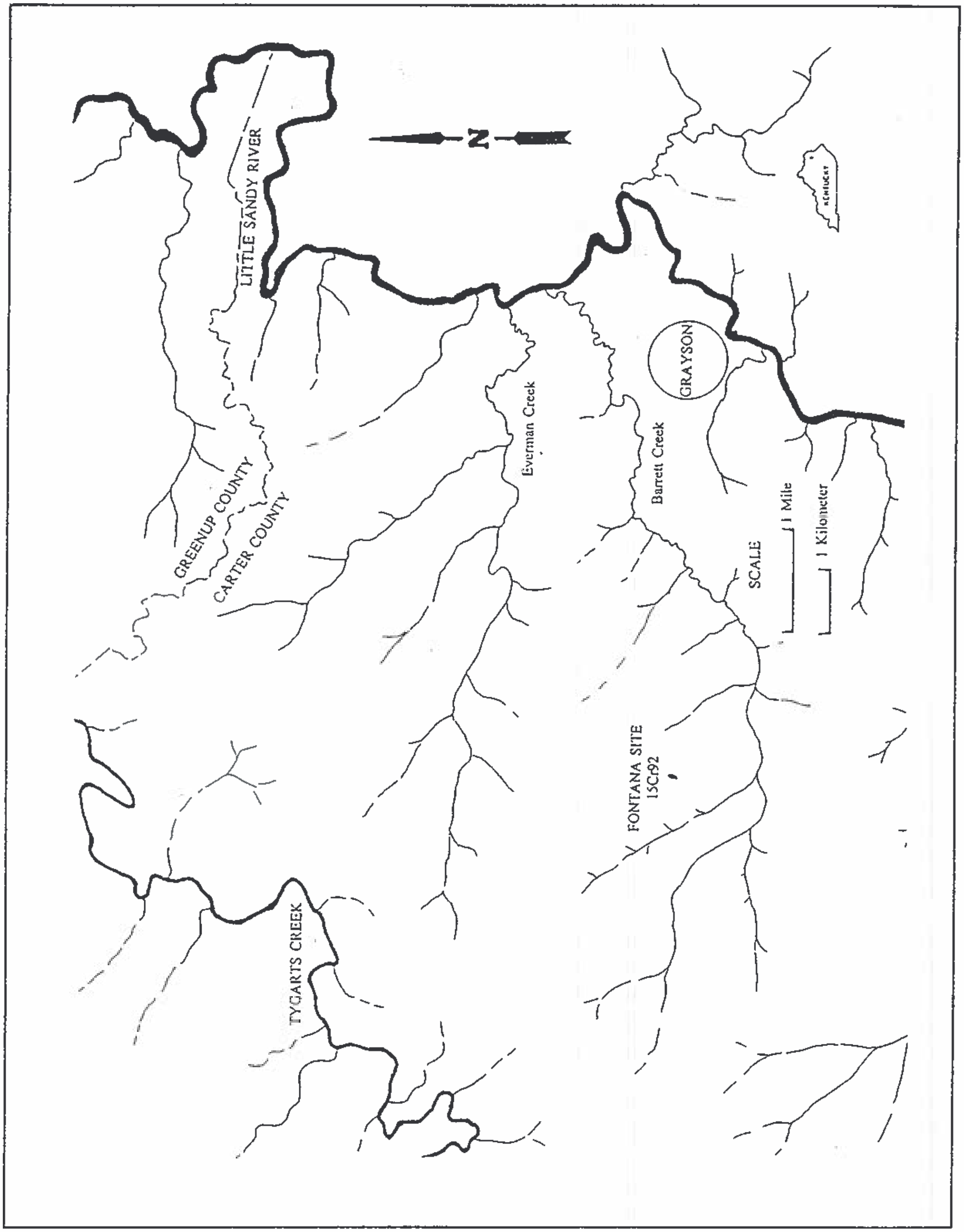

Figure 1. Vicinity Map of Fontana Site (15Cr92).

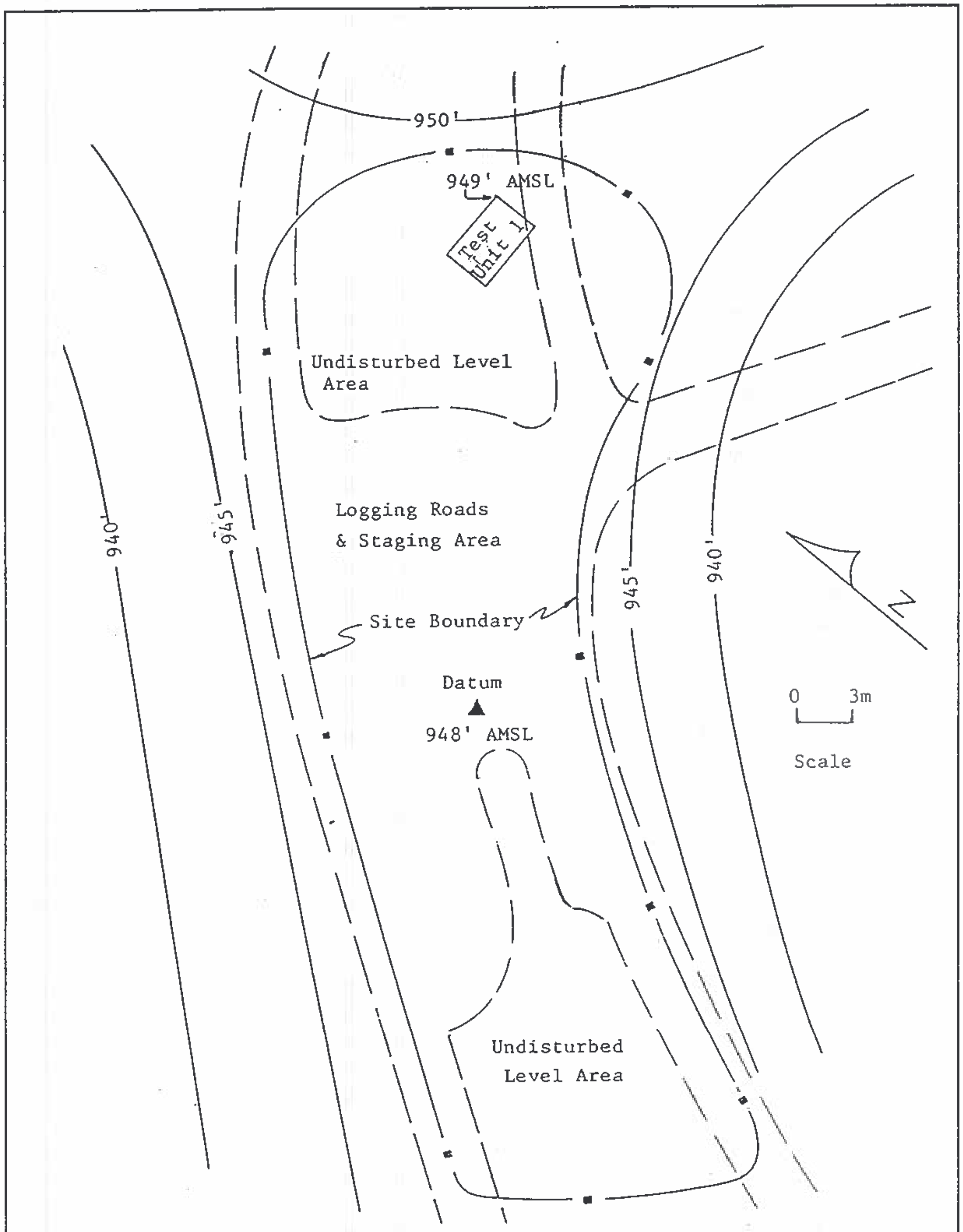

Figure 2. Site Plan Map of 15Cr92.

analysis of debitage demonstrated that the full range of bifacial reduction stages from core reduction to pressure bifacial thinning was represented.

Results of this investigation contribute to research goals identified in the archaeological component of the Kentucky State Historic Preservation Plan (Pollack 1990): 1) Single component upland sites; 2) Research issues related to lithic technology; and 3) Behavioral associated with manufacture, use, and disposal of tools.

RESEARCH DESIGN

The presence of a dense concentration of lithic debitage at the Fontana Site afforded an opportunity to more closely examine a lithic scatter site. Typically, such sites are shallow and generally do not contain midden, subsurface features, temporally diagnostic artifacts, or dense lithic concentrations. Lithic scatter sites are often viewed as temporary or limited activity, prehistoric encampments occupied during hunting, gathering, or chert procurement (e.g. Kluth 1992). Based on site file data maintained at the Office of State Archaeology, lithic scatters constitute a substantial proportion of the site inventory. These "ephemeral" sites are rarely investigated further since they are perceived to have a low potential for data recovery. Talmage and Chesler (1977:1) stress that significant data can be recovered by the use of adequate research designs:

> Small site investigations are particularly necessary in settlement pattern studies where the configuration of the full range of archaeological data must be sampled in order to obtain a viable base to make inferences relevant to prehistoric procurement activities, socio-political systems, culture contacts and demographic patterns. Also, since small sites often represent 'instant' archaeological time (Moseley and Mackey 1972) where assemblages are short-lived, unmixed and 'ethnically pure', investigation of small, limited activity sites should be helpful in establishing artifact distributions unclouded by the complexities of larger sites. After the nature of artifact distributions for specialized activities is delineated, significant patterns of association can be fed back to studies on larger sites.

Small sites devoted to general manufacturing and hunting and butchering have been recognized as significant in settlement systems for well over a decade (e.g. Ison and Railey 1982). The lack of adequate research designs for data recovery and analysis partially explains the meager database on lithic scatters in Kentucky. Intensive investigations at the Fontana Site were implemented, in part, to test a research design that could provide insights into the nature of small sites.

Based on initial investigations, the Fontana Site was considered to represent a possible Late Archaic workshop. Jefferies (1990) observes that Late Archaic sites appear to be less intensively occupied, and are more numerous than earlier Archaic sites. A settlement pattern reflecting seasonally occupied or longer term habitation base camps associated with smaller resource exploitation sites, e.g. hunting, fishing, plant collecting, is offered as a subsistence/settlement model. Lithic scatter sites would fit this model for resource exploitation.

A carefully developed research design for the Fontana Site needed to incorporate a data recovery strategy and analytical model to address specific research issues and topics. Management issues would focus on an upland site with a single component (Pollack 1990). Topical research issues associated with material culture and technology (Jefferies 1990) would be concerned with the reconstruction of the flaked stone tool technology and behavioral patterns related to the manufacture, use, and disposal of tools. The derived database would then serve other research domains, such as classification and culture history, subsistence and settlement patterns, and paleodemography.

Research design topics for the Fontana Site centered on lithic distribution patterns, lithic manufacturing technology, behavioral patterns, and site function (Carter 1992). To delineate lithic distribution patterns, the data recovery strategy involved a field methodology based on the block excavation of contiguous 50 cm by 50 cm units within a 1 x 1 m grid. In retrospect, the use of 3 mm (ca. 0.12 inch) mesh screens, rather than the standard 6.35 mm (0.25 inch) mesh, would have recovered a more representative sample of pressure thinning flakes. The debitage analysis followed that of Flenniken's (1981) Replicative Systems Analysis model. This model correlates specific attributes of debitage with each of the various stages of bifacial tool manufacture in order to determine lithic technology, behavioral patterns, and site function. The following analysis will focus on technological and functional aspects of the lithic assemblage.

TECHNOLOGICAL ANALYSIS

Even though chipped stone tools are not fully representative of prehistoric artifact assemblages, a predominance of lithics can make a definitive statement regarding site function. Given the premise that stone tool production is learned behavior, the end products of a particular process should reflect human behavior patterns.

Table 1 illustrates the relationship between end products of lithic reduction and associated reduction stages within the generalized lithic reduction system (Flenniken and Ozbun 1988:38). Primary, secondary, and tertiary subsystems provide a framework in which to analyze lithic assemblages and correlate debitage and formed artifacts with lithic reduction stages. Primary reduction is associated with Stage 1 Core Reduction and Stage 2 Edge Preparation which prepare cores and blanks for further reduction by means of percussion flaking.

Table 1: Lithic Reduction System and End Products.

STAGE	DEBITAGE	FORMED ARTIFACTS
Primary Reduction: Preparation of lithic materials for reduction		
Stage 1	Core Reduction Flakes	Core
Stage 2	Edge Preparation Flakes	Blanks
Secondary Reduction: Production of tools from blanks and preforms		
Stage 3	Percussion Bifacial Thinnning Flakes	Bifacial Blanks
Stage 4	Pressure Bifacial Thinning Flakes	Preforms/Tools
Tertiary Reduction: Rejuvenation of Tools		
Stage 3	Percussion Bifacial Thinning Flakes	Modified Tools
Stage 4	Pressure Bifacial Thinning Flakes	Modified Tools

Secondary reduction is geared toward producing bifacial blanks, preforms, and formed artifacts by Stage 3 Percussion Bifacial Thinning and Stage 4 Pressure Bifacial Reduction. Tertiary reduction, which is also associated with Stages 3 and 4, results in partial or complete modification of damaged or worn tools during rejuvenation (retooling and resharpening).

Each stage consists of categories refined through replicative knapping experiments conducted by Jeffery Flenniken and associates at Lithic Analysts, Inc. These categories offer the archaeological community a model by which to reconstruct lithic manufacturing technology and gain insight into cultural behavior. The following categories are a consolidation of certain related categories that were identified within the context of the Fontana Site lithic assemblage.

DEBITAGE CATEGORIES

Reduction Stage 1: Core Reduction - Percussion flaking of raw material to produce a core

100.PP — Primary decortication flake with primary geological cortex - flake removed during initial core reduction with cortex over the entire dorsal surface. Raw materials with primary geological cortex are obtained by quarrying bedded or nodular chert resources; river cobbles have incipient cone cortex.

110.SP — Secondary decortication flake with primary geological cortex - flake removed during the final stage of cortex removal that exhibits cortex on a portion of the dorsal surface.

120.IP — Interior flake with primary geological cortical platform - flake removed during cortex removal from the interior of core that exhibits cortex on the platform only.

Reduction State 2: Edge Preparation - Percussion flaking of core to produce a blank

200.B — Bifacial thinning flake with dorsal bulb remnant - a percussion thinning flake removed from the platform end of the ventral surface of a blank that produces a bulb on both sides of the proximal end and is triangular in cross section.

20X.A — Bifacial thinning flake with characteristics of an alternate flake - a flake that is much wider than it is long, triangular in cross section, and exhibits a flat surface on the proximal (platform) end that originates from a square edge.

20X.E — Bifacial thinning flake with characteristics of an edge preparation flake - a flake removed from a blank that prepares margins for further reduction by changing the platform angle or "turning the edge". Flakes are triangular in long section and usually wider than they are long.

Reduction Stage 3: Percussion Bifacial Thinning - Percussion thinning of blank to produce a bifacial blank

30X.M — Bifacial thinning flake with the characteristics of a margin removal flake - semicircular flake produced as a mistake by knapper striking the biface too hard and too far from margin.

30X.E	Early percussion thinning flake - largest thinning flake with few dorsal scars and a slightly curved or twisted long section, and designed to decrease the width-to-thickness ratio and make the biface symmetrical.
30X.L	Late percussion bifacial thinning flake - flake produced to decrease width-to-thickness ratio that exhibits many dorsal scars, near flat long section, feather termination usually, and multifaceted platform.
Reduction Stage 4:	Pressure Bifacial Reduction - Final flaking of bifacial blank to produce preforms and finished tools
40X.E	Early pressure bifacial thinning flake - small flake that exhibits multiple dorsal scars, twisted long section, platform at an angle to long axis of flake, and designed to regularize biface.
40X.L	Late pressure bifacial thinning flake - small flake that exhibits one dorsal arris (ridge), parallel sides, slightly twisted long section, and a multifaceted/abraded platform.
40X.N	Notch flake - small fan-shaped flake that is produced in the final stage of biface or projectile point manufacture. Location of the platform in a depression gives the flake a "gull-wing" appearance in cross section.
Other Debitage:	
99X.SH	Shatter - cubical and irregularly shaped fragments of lithic material and undiagnostic flakes.

FORMED ARTIFACT CATEGORIES

4.	Core (exhausted) - a discarded core that has reached the end of its use-life as a result of flaws or reduction in size.
44.	Dart Point (proximal)- the stem portion (base) of a projectile point.
71.	Complete Unifacial Tool - a stone tool worked on one face or surface only.
9X.	Undiagnostic Biface Fragment - a biface fragment that cannot be assigned to a technological category.

RESULTS OF TECHNOLOGICAL ANALYSIS

Debitage

The analysis of debitage Stages 1 - 4 applies to sufficiently complete flakes that could be categorized (Table 2). These diagnostic flakes represent only one-fourth of all debitage recovered at the Fontana Site. The bulk of debitage (75.5%) has been assigned to the category of shatter, which includes a significant proportion of undiagnostic flakes as well as blocky, irregular flakes. A similarly high percentage (75.3%) recorded at an

Table 2. Tabulation of Debitage (1/4 inch mesh screen).

UNIT	STAGE 1			STAGE 2			STAGE 3			STAGE 4			SH	TOTAL
SECTION	PP	SP	IP	B	A	E	M	E	L	E	L	N		
N1/W2-C*									1				2	3
N1/W2-D		3	1										6	10
N1/W1-A		2	1			1							8	12
N1/W1-B													4	4
N1/W1-C													1	1
N1/W1-D		3								1			9	13
N1/E0-A													2	2
N1/E0-B		1											2	3
N1/E0-C													1	1
N0/W2-C		1			3	2							5	11
N0/W2-D						3								3
NO/W1-A*			1						2				5**	8
NO/W1-B		5	2						1				16	24
NO/W1-C		3				1			3				7	14
NO/W1-D		1	1		1					Table 3			4	7
NO/E0-A		2	2		1			1	2				27	35
NO/E0-B		3	2		1								10	16
NO/E0-C*		3							2				7	12
NO/E0-D*			1			2		2	3				20**	28
NO/E1-A		2	2		1	1		2					49**	57
NO/E1-D*		4	2		2	1		2	3				72	86
NO/E2-A													16	16
S1/W2-C*													6	6
S1/W2-D			1			1							7	9
S1/W1-A		2							2				2	6
S1/W1-B		1											3	4
S1/W1-C													5	5
S1/W1-D		1											4	5
S1/E0-A		1						1		1				3
S1/E0-B*		7	6		1	1		1	3				29**	48
S1/E0-C						1			1				16	18
S1/E0-D						1			2				16	19
S1/E1-A*		4											30	34
S1/E1-B*		2	2		3			4	2				40	53
S1/E1-C	1	1							1		1		27	31
S1/E1-D		2	2		2			1	2		1		33	43
CAT.TOTALS	1	54	26	0	15	15	0	14	30	2	2	0	491 =	650
STAGE TOTALS	81			30			44			4			491 =	650
STAGE %	12.5%			4.6%			6.9%			0.6%			75.6%=	100%
STAGE ONLY	50.9%			18.9%			27.7%			2.5%			N/A =	100%

* = See Table 3 for formed artifacts

** = Shatter specimen with potlid scars

Oregon lithics site was likely the result of post-depositional trampling, burning, frost heaving, and/or bioturbation (Flenniken et al. 1992:56). Included in this grouping are five specimens of shatter that show heat induced potlid scars. Three flakes did not exhibit any cortex and two were blocky shatter with cortex. Flenniken (1981:20, 21) presents a well documented history of heat treatment practices. Chert to be treated is placed in an earth basin and covered by a fire for a period of twenty-four hours. Following an appropriate cooling period, the raw materials (at least certain cherts) have improved knapping characteristics and finished tools hold a sharp edge. Evidence for this procedure is not usually retained in an archaeological context. Therefore, inferences for heat treatment are limited to a "glassy" vitreous appearance, possible color changes, and potlid scars on debitage. Heat treatment of selected raw materials may have improved the quality of Paoli chert for tool manufacture.

Core reduction (Stage 1) categories involve the removal of cortex (decortication) from raw materials by percussion flaking. This activity was a significant component in the lithic reduction sequences at 15Cr92, an amount equal to the combined totals of Stages 2, 3, and 4. The predominantly "stone" nature of cortex remnants, along with limited examples having a thin rind, indicate the raw material (Paoli chert) was originally part of a geological context (i.e. quarried from the Newman Formation or surface collected from slopes or stream bottoms). This finding still begs the question whether quarrying or collection was the primary chert procurement strategy. The most likely explanation would probably encompass an opportunistic strategy for both quarrying and collection. Since fully one-half of the diagnostic flakes were decortication debitage, raw materials were probably first tested at the chert source and then transported to the site for decortication.

Edge preparation (Stage 2) categories are associated with shaping the core into a blank by percussion flaking. A noted absence of bulb removal flakes (proximal bulbs on dorsal and ventral sides of same flake) may indicate the reduction technology practiced at 15Cr92 began with a core nucleus rather than a large flake core. An equal number of alternate and edge preparation flakes were recovered at the Fontana Site, but in substantially less quantity than Stage 1 debitage (30 versus 81, respectively). Core nuclei with blocky, angular features would likely yield this pattern. Flenniken and Ozbun (1988:46) observe that an increased quantity of Stage 2 debitage reflects a flake core technology, as does a high count of remnant detachment scars on dorsal surfaces. The low ratio of Stage 2 lithics and an apparent absence of remnant scars at 15Cr92 supports a technology based on reduction of a core nucleus rather than a flake core. The removal of flake cores requires a chert nodule sufficiently large to produce sizeable flake blanks. The nodular and thinly bedded occurrence of Paoli chert probably restricts cores to a small size. The recovery of one exhausted core with cortex remnants on three sides is probably indicative of fist-sized parent materials. It is interesting to note that a lithic analysis of a Late Prehistoric Pike County site (Kerr and Pecora 1990) did not produce evidence of a flake core technology. At the opposite end of the cultural and temporal spectrum, as well as at the opposite end of the state, a Paleoindian workshop/habitation site (Sanders 1983) produced evidence for both core nucleus and flake core technologies. Perhaps the Ste. Genevieve chert obtained from bedded and nodular deposits, and also water tumbled river cobbles on the Little River, was available in sufficiently large size to allow removal of large flake cores. It would seem the technology of lithic manufacturing by prehistoric peoples is less culturally determined than resource dependent.

Percussion bifacial thinning (Stage 3) categories of debitage reflect an effort to reduce the overall thickness of bifacial blanks by removing large, thin flakes. This final percussion stage yields approximately 50% more flakes than Stage 2, but only half as many as the initial decortication process. Early stage percussion thinning flakes totaled only one half as many as the late stage, perhaps a ratio necessary to prepare the blank for final pressure flaking.

Pressure bifacial thinning (Stage 4) categories regularize the bifacial blank first into a preform (unfinished tool) and then a finished tool. The use of a 0.25 inch (6.35 mm) mesh screen during excavation recovered only four (4) small pressure flakes. The four Stage 4 flakes identified were distributed equally between early and late stages. A screen with a 3 mm mesh (ca. 1/8 inch) undoubtedly would have produced a more representative sample. Even so, the recovery of only four (4) late stage pressure flakes from a single test unit sample using a 0.85 mm mesh screen suggests limited Stage 4 reduction (Table 3).

Formed Artifacts

A total of 12 formed artifacts (Table 4; Figure 3) were recovered during investigations at 15Cr92. The four cores (A-D) appear to be core nuclei rejected and discarded during the manufacturing process due to flaws in the raw material. Three of these (A-C) have cortex on one or more sides. Table 5 presents metric attributes of this limited artifact assemblage.

Five unifacial flake tools (E-I) were manufactured from Stages 1 and 3 reduction flakes and one shatter specimen. All have been pressure flaked along one or two edges that vary in width from 7.2 to 29.0 mm. Modified edge patterns included straight, rounded, and irregular varieties. These are considered expedient tools discarded immediately after use because the selection of a flake to be modified spanned a wide range of debitage categories, and edge modification was limited.

Two bifacially thinned fragments exhibited pressure flaking (J and K), but could not be identified further as either preforms or finished tools. Their fragmentary nature could suggest discards in the rejuvenation process.

The tentative assignment of Late Archaic for the Fontana Site hinges on the association of a dart point stem (L) with other lithics and debitage from Test Unit 1. This parallel sided stem has a width to thickness ratio of 5:2 and a length to width ratio of 6:5. Comparison to projectile point types presented in Justice (1987) and Jefferies (1990) support an assignment to straight-stemmed projectile points characteristic of the Late Archaic. The dart point stem appears to have suffered an impact fracture, breaking at the stem/blade juncture and removing a central flake from the distal portion of the stem.

FUNCTIONAL ANALYSIS

The functional aspect of the Fontana Site lithic analysis addresses lithic reduction technology and intra-site patterns to identify behavioral patterns and assess site function. An excavation unit measuring 50 cm x 50 cm within a 1 x 1 m grid was selected because of greater potential to delineate discrete intra-site activity areas (Figure 4). Results of the lithic analysis demonstrated the validity of smaller units to isolate discrete clusters of lithic manufacturing. As a comparison, debitage was tabulated (Table 6) by combining units A-D within each complete 1 m x 1 m unit. The resulting distribution map for the 1 x 1 m units (Figure 5) depicts only a generalized pattern that does not discern individual lithic concentrations.

LITHIC REDUCTION TECHNOLOGY

The lithic reduction technology at the Fontana Site has been reconstructed in terms of a chert utilization model (Figure 6). Results of the technological analysis are synthesized with respect to primary, secondary, and tertiary subsystems outlined in Table 1. These findings necessarily rely heavily upon debitage rather than formed artifacts, demonstrating the effectiveness of the Flenniken model to replicate prehistoric lithic technologies.

Chert procurement was probably conducted locally in nearby stream valleys, and possibly in the Tygarts Creek valley less than 5 km northwest. Outcrops of Paoli chert found in the Newman Limestone Formation of

Table 3: Tabulation of Debitage (0.85mm mesh screen - one sample).

UNIT SECTION	STAGE 1 PP SP IP	STAGE 2 B A E	STAGE 3 M E L	STAGE 4 E L N	SH	TOTAL
NO/W1-D (included in Table 1)				4	18	= 22

Table 4: Tabulation of Formed Artifacts (1/4 inch mesh screen).

	Core	Uniface	Dart Pt.	Biface	TOTAL
S1/E0-B		1			1
S1/E1-A	1	1			2
S1/E1-B		2			2
N0/E0-C	1				1
N0/E0-D	1				1
N0/E1-D		1		2	3
N0/W1-A			1		1
N1/W2-C	1				1
Totals	4	5	1	2	= 12
Artifacts %	33.3%	41.7%	8.3%	16.7%	= 100%

Table 5. Metric Attributes of Formed Artifacts (mm).

ARTIFACTS	UNIT	LENGTH	WIDTH	THICKNESS
A. Core	NO/EO-C	86.0	44.0	26.0
B. Core	NO/EO-D	63.9	32.5	14.1
C. Core	N1/W2-D	50.3	22.0	13.5
D. Core	S1/E1-A	37.6	26.6	11.0
E. Uniface	S1/EO-B	26.6	18.8	3.9
F. Uniface	S1/E1-A	44.8	26.7	12.4
G. Uniface	S1/E1-B	32.2	29.9	6.0
H. Uniface	S1/E1-B	34.9	30.6	7.3
I. Uniface	N0/E1-D	26.2	14.0	4.2
J. Biface Frag.	NO/E1-D	25.7	15.3	7.1
K. Biface Frag.	NO/E1-D	37.7	31.4	9.1
L. Dart Pt. Stem	NO/W1-A	20.3	16.9	6.9

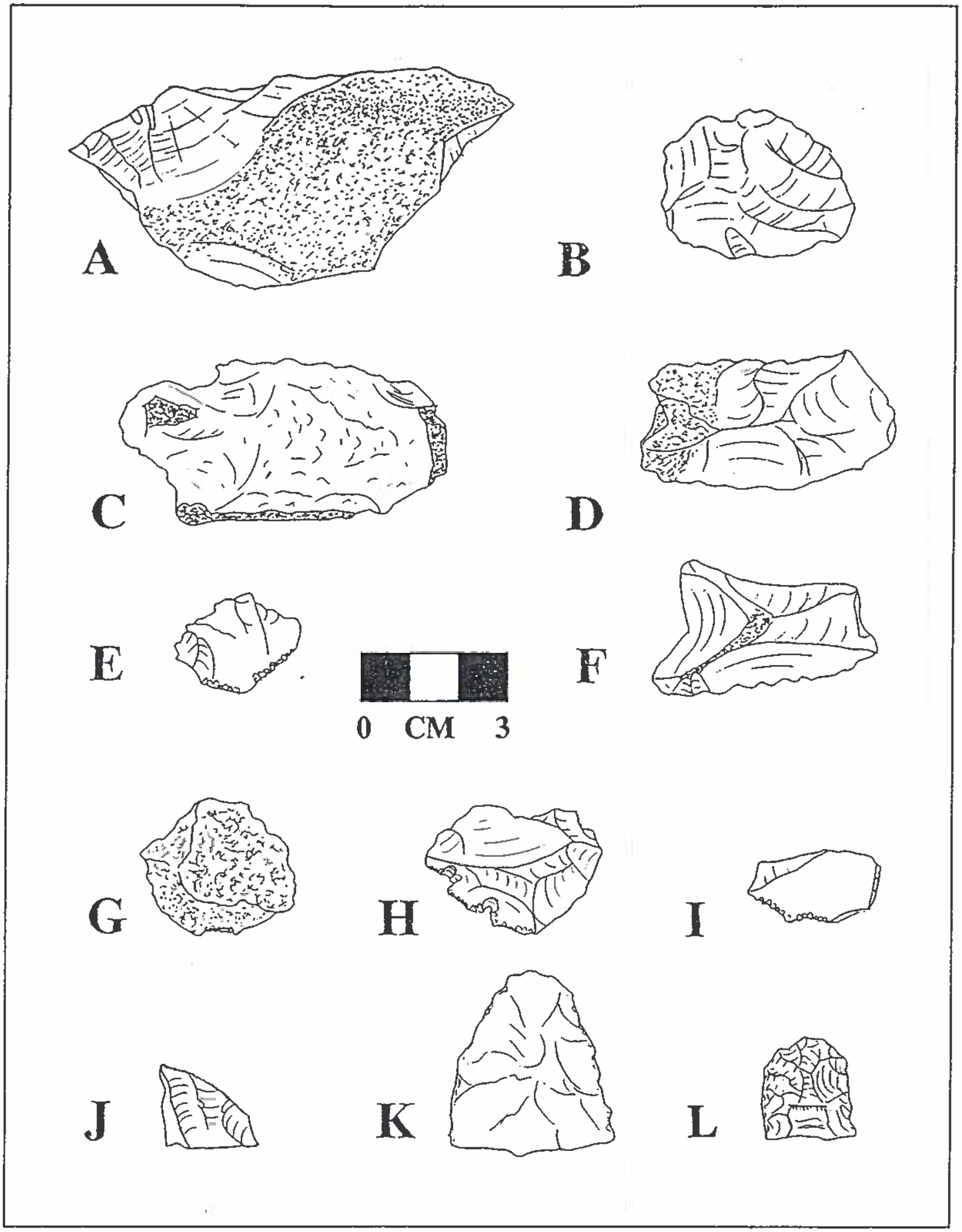

Figure 3. Formed Artifacts: A-D, Cores; E-I, Unifacial Flake Tools; J-K, Biface Fragments; L, Dart Point Stem.

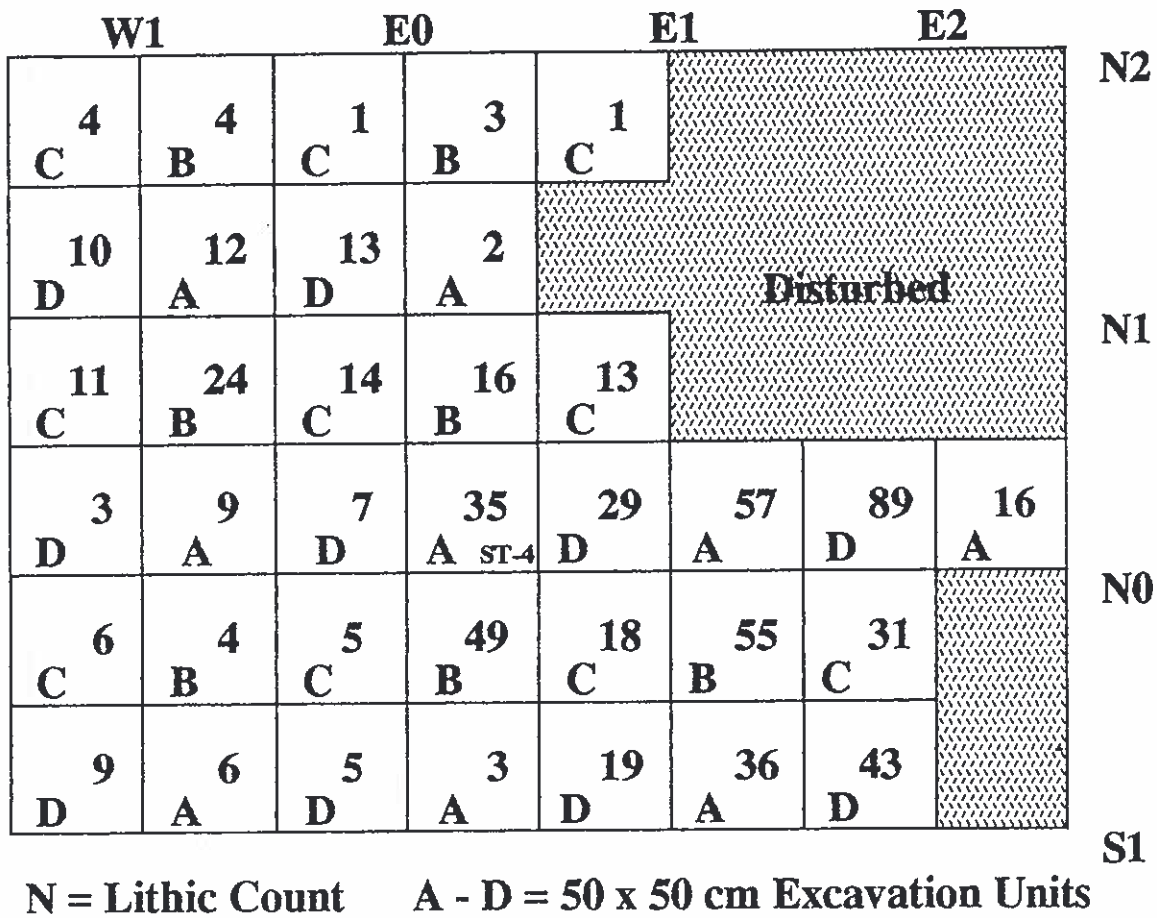

Figure 4. Test Unit 1 Distribution Map - 0.5 x 0.5 Meter Units.

Table 6: Analytical Test Sample - Debitage (1m x 1m Units).

UNIT	STAGE 1	STAGE 2	STAGE 3	STAGE 4	SH	TOTAL
N1/W1	6	1		1	22	30
NO/W1	13	2	6		32	53
NO/EO	13	4	10		64	91
S1/W1	4		2		14	20
S1/EO	14	4	8	1	61	88
S1/E1	14	5	10	2	130	161
TOTALS	64	16	36	4	323	443
1M X 1M	14.5%	3.6%	8.1%	0.9%	72.9%	100%

Table 7: Summary of Cluster Densities.

CLUSTER	STAGE 1	STAGE 2	STAGE 3	STAGE 4	TOTAL	STATUS
Cluster	28	13	25	2	68	Multi-Event
1	41.2%	19.1%	36.8%	2.9%	100%	>3.75 Sq.m
Cluster	24	7	14	1	46	Single-Event
2	52.2%	15.2%	30.4%	2.2%	100%	3.00 Sq.m
Cluster	20	9	4	1	34	Partial-Event
3	58.8%	26.5%	11.8%	2.9%	100%	2.25 Sq.m
Cluster	4	1	2	0	7	Incomplete
4	57.1%	14.3%	28.6%	0.0%	100%	<1.0 Sq. m
Test Unit	52.3%	18.8%	26.9%	2.0%	100%	Mean Ratios

Table 8. Tabulation of Debitage: Cluster 1.

UNIT	STAGE 1	STAGE 2	STAGE 3	STAGE 4	SH	TOTAL
S1/E0-C		1	1		9	11
S1/E0-D		1	2		9	12
N0/E0-C	3		2		12	17
N0/E0-D	1	1	3		12	17
S1/E1-A	4				30	34
S1/E1-B	4	3	6		40	53
S1/E1-C	2		1	1	27	31
S1/E1-D	4	2	3	1	33	43
N0/E1-A	4	2	2		49	57
N0/E1-D	6	3	5		72	86
N0/E2-A					16	16
TOTALS	28	13	25	2	309	377
CLUSTER %	7.4%	3.5%	6.6%	0.5%	82.0%	100%
TEST UNIT %	12.5%	4.5%	6.9%	0.6%	75.5%	100%
STAGES %	41.2%	19.1%	36.8%	2.9%	N=68	100%

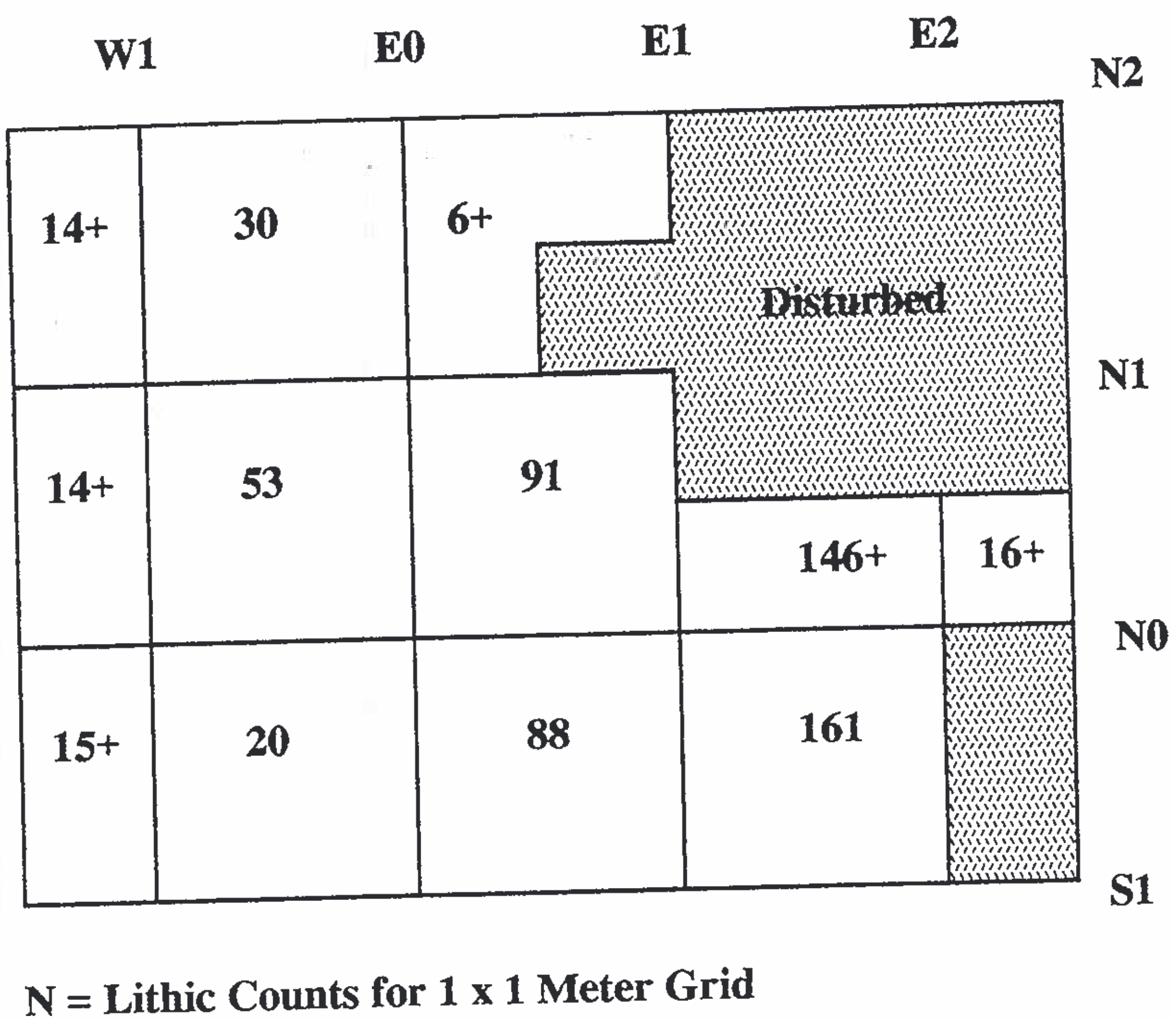

Figure 5. Test Unit 1 Distribution Map - 1 x 1 Meter Units.

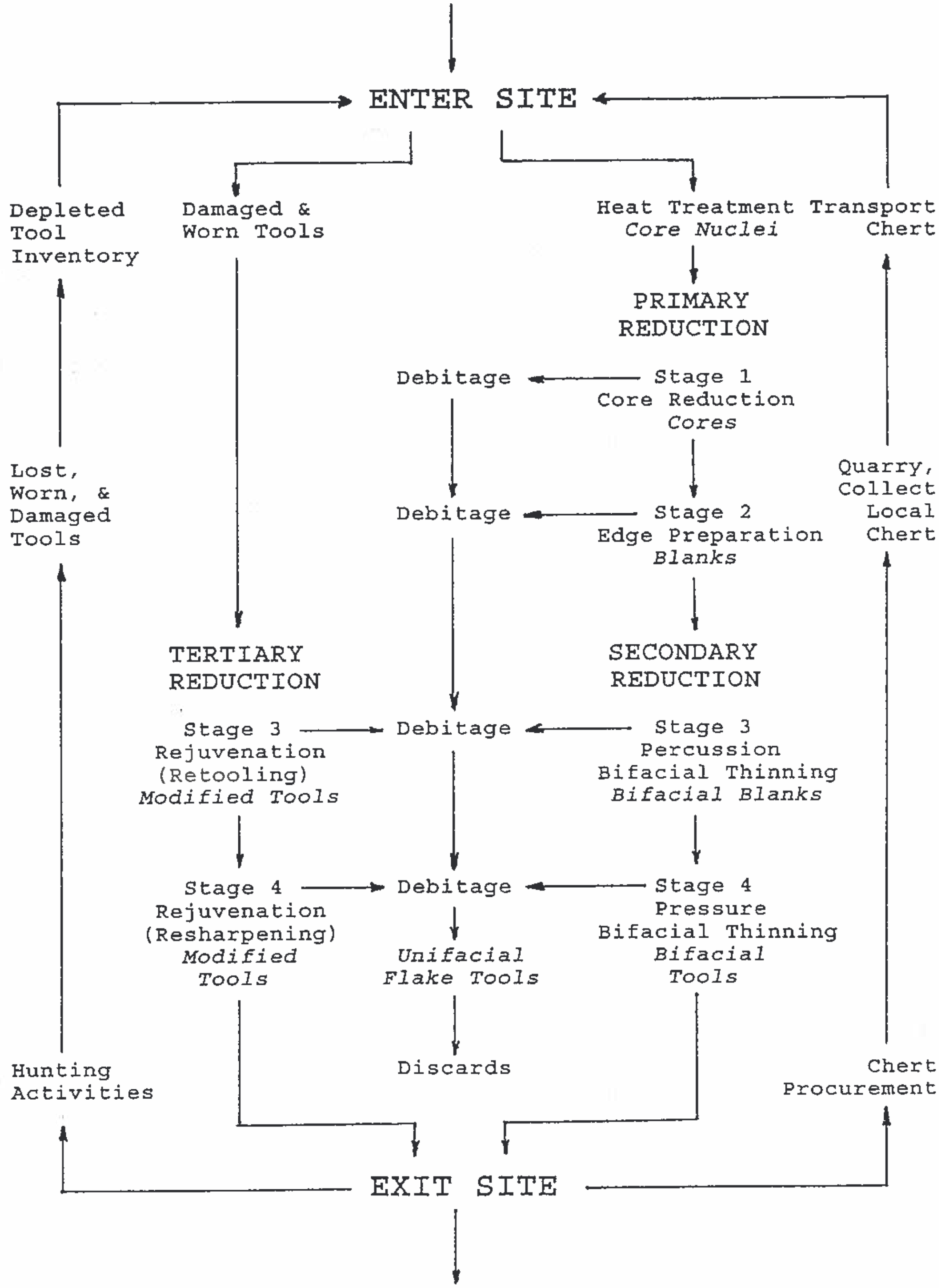

Figure 6. 15Cr92 Chert Utilization Model.

this region yield nodular and bedded forms available by collecting and quarrying. Based on a very low representation (N=1) of Primary Decortication (100.PP) debitage at the Fontana Site, this Stage 1 reduction category probably occurred at the chert procurement site to test and select raw materials.

Following transport to the site, certain raw materials may have been subjected to thermal treatment to improve knapping characteristics. Fully one-half (50.9%) of all diagnostic flakes are represented by debitage from Stage 1 Secondary Decortication (110.SP) and Interior Flake category 120.IP. Primary Reduction was continued during Stage 2 Edge Preparation with the removal of Alternate Flakes (20X.A) and Edge Preparation Flakes (20X.E) to produce a rough blank. An emphasis on Primary Reduction, represented by Stage 1 Core Reduction (50.9%) and Stage 2 Edge Preparation (18.9%), clearly illustrates that lithic manufacturing at 15Cr92 was tied directly to the chert procurement strategy rather than importing blanks for final reduction.

Debitage produced by Stages 3 and 4 could be the result of either Secondary Reduction (tool production) or Tertiary Reduction (tool rejuvenation). This study was not able to make such distinctions, in part because the assemblage is probably a mixture of both reduction processes. Stage 3 reduction activities, which concentrate on percussion bifacial thinning to produce bifacial blanks, yielded 27.7% of all diagnostic debitage. A substantial increase is observed when compared to Stage 2 (18.9%). This indicates that Stage 3 percussion bifacial thinning is a significant factor in the lithic manufacturing process to produce bifacial blanks and/or rejuvenate tools.

Stage 4 reduction, which focuses on pressure bifacial thinning, is represented by only 2.5% of all diagnostic debitage. The use of a smaller mesh screen could have recovered a more significant sample, as seen in the results of a sample unit using a 0.85 mm mesh screen. The recovery of four (4) Stage 4 pressure flakes in a single excavation unit suggests that the manufacture and/or rejuvenation of lithic tools had a significant role at 15Cr92. This conclusion is enhanced by the occurrence of expedient unifacial flake tools that were probably manufactured at the site, used possibly for hafting, and then discarded.

INTRA-SITE PATTERNS

Based on the premise that an individual knapping locus would be characterized by a dense concentration of lithics encompassed by a reduced lithic count, an analysis of lithic distribution identified four concentrations termed clusters (Figure 7). Results of the analysis are summarized in Table 7. Each cluster is composed of a cluster center (one or more 50 cm x 50 cm high density units) and adjoining lower density units. Units with lower lithic counts separate clusters. Counts were assigned proportionally for shared units between cluster centers. With the exception of a reduced count for Stage 3 debitage in Cluster 3, the relationship of debitage counts observed in all cluster analyses occur in the same sequence as the overall site, i.e. Stage 1, Stage 3, Stage 2, and Stage 4 in decreasing density.

The implication here is that individual cluster activities largely reflect site function. This observation is enhanced by the finding that each cluster has a radius equal to or slightly greater than an arm's length, i.e., a space equal to that of an individual. The intra-site activity area is seen as representing one or more events. Use of the term "event" refers to the manufacture or rejuvenation of a single tool in the case of a "single-event". A multi-event knapping locus could represent the manufacture or rejuvenation of several tools by an individual during a single span of time, or several individuals over an extended period of time. Each of the four clusters will be discussed separately to assess behavioral patterns and site function.

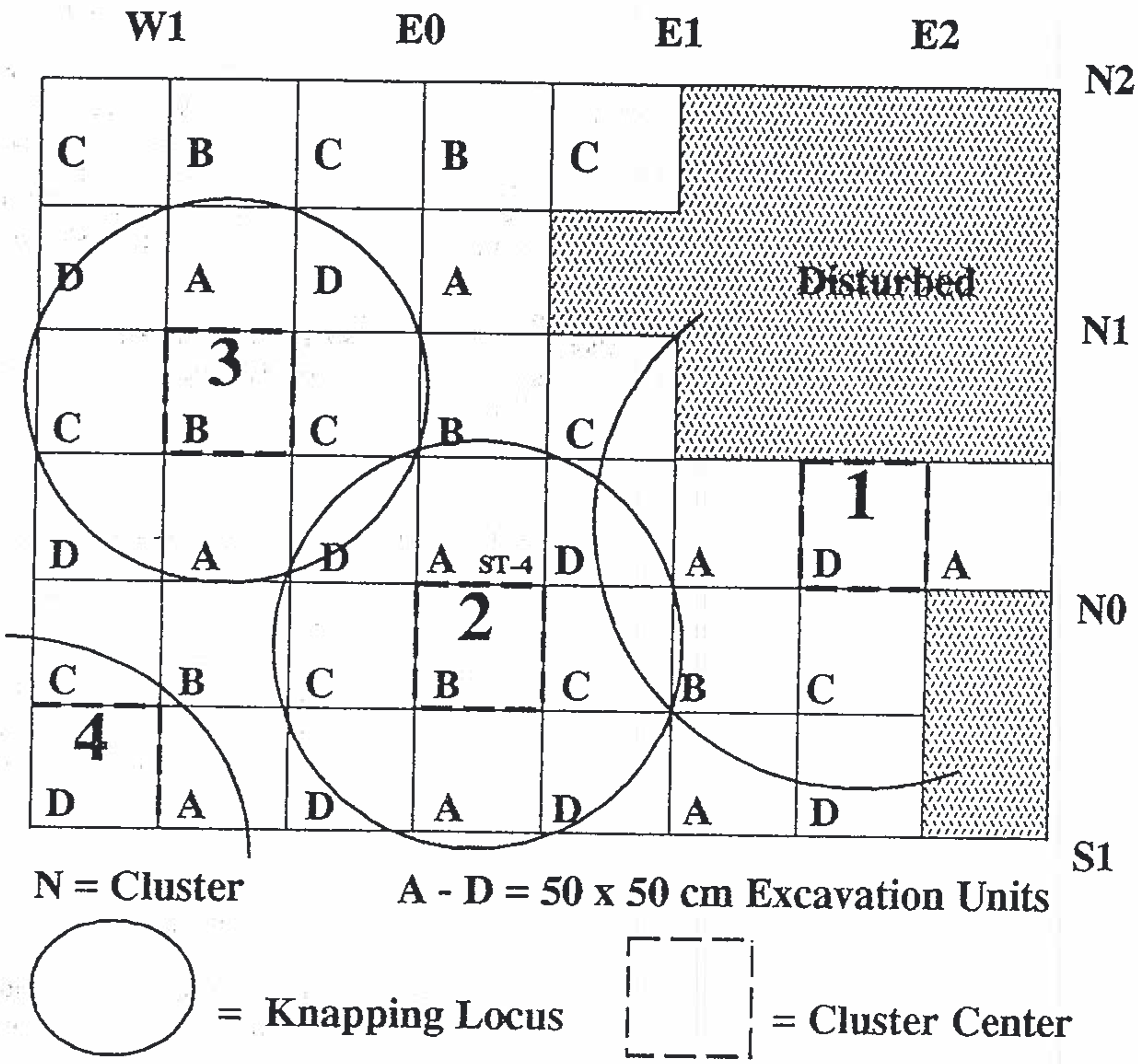

Figure 7. Test Unit 1 Distribution Map of Lithic Clusters.

Cluster 1

Cluster 1 is a large concentration with the greatest density of debitage (58%; N=377) and formed artifacts (67%; N=8). The full extent of this cluster was not exposed because excavation was hampered by road and tree root disturbances. The minimum area for Cluster 1 is greater than 3.75 square meters. Debitage totals more than the other three clusters combined, accounted for by a large shatter count, with only a small increase in total diagnostic debitage. Table 8 tabulates debitage densities for each stage in relation to total cluster debitage, total test unit debitage, and total for stages 1 - 4. In terms of decreasing densities, each stage follows the general pattern of Stage 1, Stage 3, Stage 2, and Stage 4. Formed artifacts associated with Cluster 1 included two cores, two biface fragments, and four unifacial flake tools. Both cores were located peripheral to high density units, suggesting that rejected core nuclei were tossed aside rather than dropped into the central knapping debris. The cores are failed attempts to reduce the parent material adequately for tool production. The failure rate at lithic reduction sites is evidently substantial (e.g. Sanders 1983). The undiagnostic biface fragments could represent manufacturing failures or damaged tools discarded during the rejuvenation process. All four unifacial flake tools were found in high density excavation units within the cluster. Cluster 1 appears to be a multi-event loci for the production of finished bifacial tools from raw materials, including expedient unifacial flake tools, and the rejuvenation of damaged tools.

Cluster 2

Cluster 2 is smaller than Cluster 1 with a lower density of debitage (21%; N=140) and formed artifacts (16.7%; N=2). This cluster has been excavated completely, covering an estimated 3m^2 with an average diameter of 1.75 m. It is overlapped on the east side by Cluster 1 and at the northwest corner by Cluster 3. Table 9 shows a very close correlation between Cluster 2 and Test Unit 1 density ratios, as well as a density sequence of S1/S3/S2/S4. A single core was found peripheral to the cluster center, similar to Cluster 1. One unifacial flake tool was recovered from the high density cluster center. Cluster 2 appears to represent a single-event for the production of a finished bifacial tool from raw material, and also an expedient unifacial flake tool. Cluster function may therefore be characterized as the completion of a continuum from core nucleus to final assembly by hafting.

Cluster 3

Cluster 3, also completely excavated (2.25 square meters), is represented by debitage (13.4%; N=87) and a single formed artifact fragment (8.3%; N=1). This fragment is the only tool remnant recovered at Test Unit 1 that could be considered temporally diagnostic. The artifact is the stem portion of a projectile point. The parallel sided stem best fits a category of straight stemmed projectile points characteristic of Late Archaic. Evidence of an impact fracture suggests the implement was removed from its shaft and discarded for the purpose of replacement. Debitage ratios for Stage 1 through Stage 4 are consistent with the other clusters, except for a reduced count in Stage 3 (Table 10). This variance, and the absence of a unifacial tool, may indicate a partial-event, i. e., an incomplete manufacturing or rejuvenation process.

Cluster 4

Cluster 4, located in the southwest corner of Test Unit 1, appears to represent the partial excavation (1 m^2) of a cluster periphery composed of only debitage (3.9%; N=25). Table 11 reveals expected ratios and sequence priority of Stages 1, 3, 2, but an absence of Stage 4. The low debitage

Table 9. Tabulation of Debitage: Cluster 2.

UNIT	STAGE 1	STAGE 2	STAGE 3	STAGE 4	SH	TOTAL
N0/W1-C	2	1	2		4	9
N0/E0-D	1	1	2		8	12
S1/E0-C		1	1		7	9
S1/E0-D			1		7	8
N0/E0-A	4	1	3		27	35
S1/E0-B	13	2	4		29	48
S1/E0-A	1		1	1		3
N0/W1-D	2	1			3	6
S1/W1-C					5	5
S1/W1-D	1				4	5
TOTALS	24	7	14	1	94	140
CLUSTER %	17.2%	5.0%	10.0%	0.7%	67.1%	100%
TEST UNIT %	12.5%	4.5%	6.9%	0.6%	75.5%	100%
STAGES 1-4%	52.2%	15.2%	30.4%	2.2%	N=46	100%

Table 10. Tabulation of Debitage: Cluster 3.

UNIT	STAGE 1	STAGE 2	STAGE 3	STAGE 4	SH	TOTAL
N0/W2-C	1	5			5	11
N0/W2-D		3				3
N1/W2-D	4				6	10
N1/W1-A	3	1			8	12
N1/W1-D	3			1	9	13
N0/W1-A	1		2		5	8
N0/W1-B	7		1		16	24
N0/W1-C	1		1		3	5
N0/W1-D					1	1
TOTALS	20	9	4	1	53	87
CLUSTER %	23.0%	9.3%	4.6%	1.2%	60.9%	100%
TEST UNIT %	12.5%	4.5%	6.9%	0.6%	75.5%	100%
STAGES 1-4%	58.8%	26.5%	11.8%	2.9%	N=34	100%

Table 11. Tabulation of Debitage: Cluster 4.

UNIT	STAGE 1	STAGE 2	STAGE 3	STAGE 4	SH	TOTAL
S1/W2-D	1	1			7	9
S1/W2-C					6	6
S1/W1-A	2		2		2	6
S1/W1-B	1				3	4
TOTALS	4	1	2		18	25
CLUSTER %	16.0%	4.0%	8.0%		72.0%	100%
TEST UNIT %	12.5%	4.5%	6.9%	0.6%	75.5%	100%
STAGES 1-4%	57.1%	14.3%	28.6%	0.0%	N=7	100%

count and an incomplete sequence of stages attest to the conclusion that the cluster center is outside the limits of Test Unit 1. Limited excavation of Cluster 4 precludes an assessment of size or intensity. However, density relationships for the cluster are generally consistent with the pattern for Test Unit 1. The significant aspect of this cluster analysis is the potential to predict the presence of a knapping locus from minimal data using a small-unit excavation methodology and the Replicative Systems Analysis model.

RESULTS OF FUNCTIONAL ANALYSIS

Behavioral Patterns

Behavioral patterns revealed by this investigation can be viewed in terms of chert procurement, site selection, intra-site activity areas, tool maintenance, and subsistence/settlement. Paoli chert was collected and/or quarried from Newman Formation outcrops in the valley floors. After minor decortication, core nuclei were selected for transport to nearby sites for bifacial reduction. Maynard's research in Carter County also indicates that raw materials were transported to reduction sites (Ledbetter and O'Steen 1991). Site selection was apparently dependent upon the location of chert sources. Preferred reduction sites were nearly level ridgetop environments overlooking one or more drainages with chert sources.

Intra-site activity areas defined by clusters of dense debitage were recognized as knapping loci. A range of bifacial reduction debitage expected for tool production was identified within each loci, as well as the overall site. Knapping loci were geared toward the production and rejuvenation of finished tools for tool maintenance. Analyses demonstrated that tool production began with decortication of core nuclei and percussion flaking into a rough blank. In some cases, core nuclei may have been thermally treated to improve knapping qualities. Bifacial blanks were produced by additional percussion flaking. Finished tools or preforms were then produced by pressure flaking, as well as unifacial tools. The occurrence of expedient unifacial flake tools may be a diagnostic trait to indicate final hafting. Rejuvenation, i.e. retooling or resharpening, served to maintain worn and damaged tools. Subsistence/settlement patterns consist of chert procurement and tool maintenance, probably combined with a hunting strategy. The manufacture of tools from raw materials, and the rejuvenation of damaged tools, may indicate resource exploitation by local or regional populations.

Site Function

Site 15Cr92 represents a resource exploitation site tied to a chert procurement strategy and the production/rejuvenation of finished tools related to tool maintenance. Proximity to Paoli chert sources appears to be a key factor in site selection. The site most likely represents repeated, short term encampments during the Late Archaic period (3000 - 1000 B.C.). The analysis of debitage exhibiting the full spectrum of lithic reduction stages emphasizes the manufacture of finished tools from raw materials, rather than bifacial blanks. Knapping loci analyses further suggest that bifacial reduction processes were geared toward the production and rejuvenation of finished tools for tool maintenance, rather than stockpiling. Although no evidence of hunting/butchering activities was found, a hunting strategy is probably related to the maintenance function.

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