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Part I

SURFACE PATTERNING AT THE TWIN MOUNDS SITE (15Ba2)
Introduction

The material culture surface distributions from two Mississippian sites in western Kentucky suggest that although sites apparently may have filled different roles in the Mississippian system, internally they may have had similar domestic organization. Twin Mounds and Adams, a secondary and primary Mississippian center respectively, are compared with respect to village cluster arrangement and composition using controlled surface collection data.

The method used here for grouping Mississippian sites follows Kreisa (1988) and relies on the Mississippian peoples manner of organizing their populace across the landscape. The settlement patterns are grouped into four different hierarchical types of communities, the criteria for which are primarily the presence of public architecture and total area of settlement coverage. The "town" is the largest of the settlement types, having more than two mounds, at least one public gathering area, and usually covering more than 3 ha (Kreisa 1988). A "village" consists of one to two mounds and a plaza surrounded by housing, altogether covering approximately 2 to 3 ha. Occasionally towns and villages are surrounded by palisades, moats, or both. The "hamlet" comprises a small group of clustered houses, possibly with a plaza area, but lacking mounds. A "farmstead" is a small cluster of homesteads without any public architecture.

Each community type is thought to have played a different role in the Mississippian system. The focal point of the energy and/or power collectively produced by the Mississippian community accumulated in the Mississippian town. A town had the responsibility of providing defense and important religious activities to the surrounding villages, hamlets and farmsteads as well being the hub of major decision making at the
community level (Kreisa 1988). In situations of increased distances between towns, as is the case in the Twin Mounds area, villages seem to take on certain town-like roles, such as providing defense and certain religious activities to surrounding hamlets and farmsteads. Finally, hamlets and farmsteads housed the bulk of the Mississippian society and consisted of groups of essentially autonomous homesteads that relied on farming for subsistence and contributed portions of their surplus and time, for the building of public works, to the towns (Service 1962; Smith 1978).

Muller (1978;1986) has suggested a similar patterning of site hierarchy and population for the sites of the Black Bottoms on the Ohio river, c. 80 kilometers upstream from Twin Mounds. He states that the sites of the Black Bottoms can be arranged into three groups or site types: farmsteads (0.1-0.3 ha), hamlets (0.9-1.0 ha), and towns (0.9-1.0 ha). Each progressively larger site includes the characteristics of the preceding site type and a collection of its own distinguishing characteristics. Thus, according to Muller, farmsteads are simply collections of autonomous homesteads located, usually on a well-drained rise, in the hinterlands of a town. Hamlets, are a collection of farmsteads with the possible nodal qualities of one family performing, part-time, religious activities for the small community and supporting themselves through farming. Finally, the town represents a collection of hamlets and farmsteads or simply a large aggregation of autonomous homesteads with public architecture such as temple and burial mounds all within a defensive stockade.

One item of note is a lack, or non-recognition, of the village site type in the Black Bottoms (Muller 1986), a type that is recognized in the Barlow Bottoms as in Twin Mounds. The missing site type of the village in the Black Bottom area may stem from this area's not needing the services that a village provides for the community. The close
proximity of the towns of Kincaid downstream and Angel upstream might have eliminated the need for Black Bottom secondary sites to have been bigger than a hamlet to perform any of the services that the towns could not because of distance. On the other hand, in the Twin Mounds vicinity, towns are somewhat more distant from each other and the greater traffic in the immediate proximity of the confluence of two major rivers probably increased the need for defense, necessitating the rise of village sites like Twin Mounds.

One concept that is similar across both Kreisa's and Muller's settlement hierarchies, or better put by Kreisa (1990 dissertation) as heterarchies, is that regardless of the site type, homesteads are similar upon comparison. This logically makes the Mississippian homestead a basic unit of site organization in this region.

Household archaeology has within the past decades become an important focus of attention (Fletcher 1981; Mehrer 1988; Oetelaar 1993). Studies of inter and intrahousehold patterning can provide information about current and changing social and economic situations within and between households. Because of their density of settlement, the placement of structures within communities such as Adams and Twin Mounds would seem to be based on social rather than environmental constraints, and therefore reflect social policies for intrasite arrangement. The social processes responsible for intrasite development can be explored surficially, such as with studies at Adams (Stout 1989) and Twin Mounds in western Kentucky and Beckwith's Fort in southeastern Missouri (Healan 1972), or through subsurface testing, such as Mehrer's (1988) work in the American Bottoms and work at the Mouse Creek site in central Tennessee (Sullivan 1987). Intrahousehold studies also provide the archaeologist the chance to view social processes responsible for the presence and spatial patterning of artifacts, however, because the Adams and Twin Mounds studies utilize surface collections as sources of data, the study of
intrahousehold spatial patterning of artifacts is not possible. On the other hand, the presence of certain artifacts in association with tentatively recognized household artifact clusters is used to talk about gross intrahousehold activities. This preliminary study proposes that there exists a commonality between the Adams and Twin Mounds sites based on artifact surface patterning.

This paper buttresses that idea in a comparison of the distribution patterns at Twin Mounds and Adams. The following sections of Part I briefly place Twin Mounds and Adams into cultural and chronological context, present the material culture from Twin Mounds and its spatial distribution, and finally discuss the relevance of the findings.

A Late Prehistoric Chronology of Western Kentucky

The Ohio and Mississippi Rivers confluence region (Figure 1) includes the areas of western Kentucky, southeastern Missouri, and southern Illinois. The chronology used here is one introduced by Lewis (1983) and entails the division of the Mississippi period into four arbitrarily established phases of two hundred year durations (Figure 2). The Late Woodland period, immediately preceding the Mississippi period, has also been divided into arbitrarily established phases: one phase of three hundred years, the Cane Hills phase (A.D.600-900), and the other of two hundred years, the Berkley phase (A.D.400-600) (Kreisa and Stout 1991; Susenbach and Lewis 1987). In this project however, phases are too fine a time unit to be used when referring to the earlier component at the site, so Late Woodland period will be used when referring to this component or any of its corresponding cultural materials.
Late Woodland Period, A.D.400-900

This period brought about the development of hierarchical settlement patterns and the advent of extensive mound building. The rise of maize (Zea mays) agriculture fueled social, political, and economic changes, but was not adopted as a major mode of subsistence until the Mississippi period. Hunting and gathering were very important during the Late Woodland period, but communities may have begun to increase in size as a surplus was created through developing plant domestication practices, coupled with advancement in hunting techniques brought about by the introduction of the bow and arrow (Kreisa and Stout 1991). Sites of this period were generally located on the well-drained natural levees of river valleys and near agriculturally productive soils (Kreisa 1987). Further community development depended on site location and subsistence patterns; the larger communities of the Mississippi period relied on the easy access to diverse biotic environments, which were areas initially inhabited by Late Woodland groups. Natural resources were mostly extracted locally, although a slight increase in nonlocal lithic materials existed compared with the early Late Woodland. Cordmarked and grog-tempered ceramics, such as Mulberry Creek Cordmarked and Baytown Plain, became the most popular ceramic wares. Single set post structures were the norm.

Mississippi Period, A.D.900-1700

By the James Bayou phase (A.D. 900-1100), maize agriculture was in full swing, shell-tempered pottery types such as Mississippi Plain and Bell Plain, had become very common, and a new domestic construction technique that used trenches in the construction
of house walls was developed. Late Woodland traditions such as grog-tempered pottery and single set post structures were declining and eventually phased out by A.D. 1100. Along with shell-tempered wares, red film pottery gained in popularity during the early Mississippi period in most of western Kentucky and southeastern Missouri (Kreisa and Stout 1991). Also, locally available cherts were being replaced by regionally available materials, such as Mill Creek from Union and Alexander counties in Illinois, for use mainly in the production of hoes. Social differentiation between sites seems to have been on the rise compared with that of the previous period; non-local and specialized ceramics and objects of personal adornment are found in greater proportion in the towns and large villages than in hamlets and farmsteads (Kreisa and Stout 1991).

In the Dorena phase (A.D. 1100-1300) maize continued to be an integral part of Mississippian life with other plant foods being gathered as a supplement. Animals, such as white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*) were hunted as well (Lewis 1990). These subsistence patterns lasted 400 years or more, into the Medley Phase (A.D. 1300-1700). Plain, shell-tempered ceramics such as Bell Plain and Mississippi Plain predominated over the red film type Old Town Red, which was at its peak in popularity during the Dorena phase, and although plain types continued to dominate for another 200 years, decorated types including Matthews Incised and O'Byam Incised increased in popularity during the Medley phase. Compared with previous phases, the percentage of hoes, adzes and the residue of their production increases reflecting an increase of their use and an intensification of agricultural practices in this phase (Edging 1990).

The Jackson phase (A.D. 1500-1700) marks the depopulation of the Mississippi and Ohio rivers confluence region, which could have been the result of European diseases.
penetrating the Southeast as suggested by Ramenofsky (1982) and highlighted by Lewis (1986) for western Kentucky.

Twin Mounds and the Surrounding Environment

Twin Mounds (15Ba2) is a secondary Mississippian site, or village, in western Kentucky (Figure 3). The site is located 7 km north of the confluence of the Ohio and Mississippi rivers (Funkhouser and Webb 1932; Kreisa 1988:45). Situated on a natural levee in the Barlow Bottoms less than 1 km east of the present channel of the Ohio River, the Mississippian component of Twin Mounds consists of two mounds, a plaza, and village areas covering about 4 ha. Late Woodland deposits are primarily located on a ridge to the southwest of the Mississippian mound and plaza complex. Densities of Woodland pottery found within the village area suggest that Woodland deposits underlie portions of the Mississippian village. Mississippian and Woodland components together bring total site coverage to over 14 ha (Kreisa 1988:45).

The mound and plaza complex is situated on the highest natural site elevation (Kreisa 1988:45) within several kilometers. The plaza lies south of mound A and east of mound B, and is surrounded by village deposits to the north, south, and east (Kreisa 1988:45). A shallow swale, perhaps a slough that has been filled by silt and plowing, appears to surround a large portion of the Mississippian village. Mounds A and B are tree covered and have been unnaturally flattened and looted since the late nineteenth century.

The Barlow Bottoms span 8 kilometers at their widest (Kreisa 1988) and are annually inundated. Stands of willow and cottonwood flourish along the active channel of the river, while cottonwood, elm, sweet gum, and sycamore forests with cane undergrowth
can be found following former and present levees (Kreisa 1988). Seasonally inundated swamps and low portions of old backslope remnant are covered by sweetgum, elm, and cypress, while water tupelo and bald cypress grow in the sloughs and swamps. The river valley is bordered by Pleistocene loess bluffs that range from unnoticeable up to 50 m in height and sustain a beech-tulip forest and dense cane undergrowth. The uplands are dissected and covered with an oak-hickory forest with secondary species of maple, poplar, beech, and sweet gum (Davis 1923).

Previous Research

Twin Mounds was first described in 1882 by Collins, who mistakenly identified a levee remnant as a third mound associated with the site (Kreisa 1988). Six years later, Loughridge (1888) briefly described the mounds and artifacts from the site. This was followed by a brief mention of the site by Thomas (1894). In 1916, Moore (1916) also described the mounds and the contents of his excavations as "two ridges and humps" in a village area, including an extended burial. Funkhouser and Webb (1932) repeated much of Moore's description in their archaeological survey, and described additional burials exposed in their "superficial" excavations of the mounds. It is rumored among local residents that the Kings, who excavated the Wickliffe site in the 1930s and 1940s and developed it into an open museum, had at one time uncovered a log-lined burial deep within one of the mounds, but there is no record of such an excavation or finding.

Generally known to residents and archaeologists alike, this site had its first major professional investigation in the late 1980s by Kreisa (1988), who made a detailed topographic map of the site and clarified the boundaries of the Mississippian and Late
Woodland occupations. His excavations demonstrated a pre-A.D. 900 occupation of the general site area, and exposed the remnants of a house basin, a single-set post structure, and a wall trench structure, each dating to the early part of the Mississippi period. He also identified a later Mississippian occupation, probably A.D. 1250-1350, represented by midden deposits and another house basin.

The Study

A spatially controlled surfhoe collection was made at Twin Mounds to examine the surface patterning of material culture for comparison to the surface patterning of material culture at the Adams site (15Fu4), a Mississippian town located about 100 km south, near the town of Hickman (Stout 1989). Situated on an alluvial terrace remnant where the Bayou de Chien enters the Mississippi flood plain, the Adams site (Figure 4) covers 7.3 ha and is surrounded by a seasonally-inundated cypress swamp. Six mounds (A-F) delineate a centrally-located plaza, which is flanked by two village areas with 1-1.5 m thick midden deposits (Edging 1986). Together the village areas account for 4 ha of the site. A seventh mound (G) lies along the north edge of the southwestern portion of the site, delineating the northern edge of a secondary plaza. The Adams site mounds and perimeter are currently tree covered; the remainder of the site is under row crop cultivation.

Comparison between Adams and Twin Mounds offered the opportunity to view differences in social organization that may be explained by their undoubtedly different site functions. Issues that were approached in this analysis center on community structure including what kinds of activity areas existed at the site, and how they related to each
other. This project was also intended to further test and refine spatial analysis methods introduced by Stout (1989) at the Adams site.

Stout’s (1989) spatial analysis of the Adams site used data obtained through a nearly 100% controlled surface collection that required 1400 person-hours in the field and over three years in the lab. The work at Twin Mounds is based on the controlled surface collection of a 50 m by 50 m area and required 120 person-hours to assemble.

METHODS

The surface investigation performed at Twin Mounds was developed from a methodology used by Stout (1989) at Adams, which involved the gridded subdivision of a portion of the site into individually numbered units. Artifacts at Twin Mounds were collected from a 50 m by 50 m grid in 5 m by 5 m collection units. The grid at Twin Mounds was intentionally placed near the south edge of the plaza to extend into the most centrally located village midden at the site, which might have delineable patterns comparable to those found by Stout at Adams. Collecting conditions were fair, but not optimum, since the site had been plowed but not disked, and it had only rained trace amounts on the three consecutive days prior to our arrival. The Adams site on the other hand had been disked before the surface collection, and it also received 3 cm of rainfall. For consistency in collecting from unit to unit, collecting was time controlled with crew members recollecting each other’s units. In order to impart the greatest visual information, I have scaled most of my maps into a few logarithmic levels of density following Stout (1989).
The statistical analysis of surface collection counts follows Stout's G-K analysis (Goodall-Kershaw analysis) for daub and Mississippian ceramics along the north-south and east-west axis at Adams. The G-K analysis provides a descriptive presentation of variance estimates delimiting clusters along one “vector” or another (Figure 16); this is not confirmatory but a descriptive exploratory data analysis method (Stout 1989). This method for spatial analysis is a modification of methods developed by Goodall (1974) and Kershaw (1957) and entails calculating the sum of the squares of the difference between specific artifact counts of units along a specific vector. Stout's G-K analysis takes the Goodall and Kershaw methods and melds them into one method that locates clustering in a known direction. Stout applied this method to vectors no less than 16 units in length at the Adams site. For further description and discussion of the G-K method consult Stout (1994). This study will test this methods' viability for use in situations where vectors are less than 16 units long.

Material Culture

Before the distribution patterns of the material culture are discussed, the classes used to house the artifacts are presented and important characteristics among them are briefly noted.

Nine hundred forty five pieces of burned clay, or daub, were collected, representing decomposed structures.

The controlled surface collection also produced 9,318 pottery sherds, of which 437 are rims. Because of the small size of the rim sherds, vessel form and size could not be
determined for the vast majority of the ceramic assemblage. Sherd size also limited the
calculation of vessel diameters.

Pottery types and their distinctive characteristics from the surface collection
assemblage are presented below. As is discussed in relation to lithics in Part II of this
paper, pottery is imbued with decorative and morphological style, is relatively fragile and
easily broken, which insures that the archaeological record will not be without, and, unless
it has been eroded away, is nearly ubiquitous at Mississippian sites. All classifications
Selected rim profiles are presented in Figure 5 and Table 1 shows the counts and
percentages of all ceramic types collected in the surface collection. Additional
descriptions are presented in Burks, Stout, and French (1994).

Mississippi Plain is the most common pottery type found at the Twin Mounds site,
and is characteristic of Mississippi period sites in the Middle Mississippi River Valley. It
comprises 73.5% of the total ceramic count from the surface collected materials. The
paste contains a coarse shell temper that varies in density, ranging from the use of low
proportions of shell temper to densely packed shell temper.

Bell Plain, a burnished, fine shell-tempered pottery is the second most common
 ceramic type at Twin Mounds, and accounts for 15% of the surface collected ceramics.
Occasionally, the paste had grog inclusions along with the fine shell temper. This type is
the default type in analysis of many decorated types with Bell paste, since decoration often
lies on necks and rims, but not on the body of a vessel.

In the Twin Mounds assemblage, Matthews Incised, var. Unspecified generally
has a coarse shell temper like that of Mississippi Plain, but the thickness of the sherdstends to be comparable to the thinner Mississippi Plain sherd. Fifty-four body sherds and
two rim sherds indicate the presence of this type in the assemblage. Distinguishing characteristics are coarse shell temper accompanied by exterior curvilinear to rectilinear incised lines. Kimmswick Fabric Impressed is represented by five pan rim sherds and 50 body sherds. A very dense, coarse shell-tempered paste, which allows pots to expand without breaking when heated, suggests that these Kimmswick Fabric Impressed vessels were repeatedly heated (Phillips 1970). Forty-six cordmarked, shell-tempered sherds are Crosno Cordmarked and account for 0.5% of the ceramic assemblage. Old Town Red is one of three red slipped types usually containing coarse shell temper found in the 1992 surface collection, and is represented by 40 body sherds and one rim sherd. Twenty-eight body sherds of Wickliffe Thick were present, accounting for 0.3% of the ceramic assemblage—low compared with the surrounding region. Three rim sherds and 22 body sherds of O'Byam Incised were collected. These sherds have a fine shell temper similar to that of Bell Plain and distinctive, fine rectilinear incised lines on the top side of flared rims. One rim is decorated with exterior notches while another has parallel incisions oriented obliquely on its lip. The paste of Matthews Incised, var. Manly is the same as that of Matthews Incised, var. Unspecified. Punctations on the shoulders of Manly vessels however, segregate this variety from other Matthews varieties. Thirteen punctated body sherds were gathered in the surface collection. Six coarse shell-tempered sherds, three of which are rims, represent Mound Place Incised. Distinctive incised lines can be found on the exterior of the rim sherds. The samples from this collection each have three parallel incised lines below the lip. Two of the rims have been identified as vertical one having a flat lip, while the third rim has a round lip. These rims have been interpreted as belonging to cylindrical and standard bowl forms. Nashville Negative Painted is represented by three body sherds. Negative painting of a red color on a buff background was applied in a
curvilinear pattern. The three negative painted sherds of this assemblage are too small to identify the patterning as anything more than curvilinear. The paste contains a fine to medium shell temper. Fourteen shell-tempered, incised sherds were placed in a Shell-Tempered Incised category. These sherds and those from the Grog-Tempered Incised category (Shell-Tempered Incised sherds and Grog-Tempered Incised sherds comprise the type Unknown Incised in Table 1) are too small to determine any patterning in their incisions and thus are nearly impossible to accurately type. Possible types include O'Byam Incised and Matthews Incised.

Eight undecorated and untempered body sherds have been included in an Untempered Plain category.

Baytown Plain, Mulberry Creek Cordmarked, and Larto Red represent a Late Woodland component that potentially underlies portions of the Mississippi period component(s). Baytown Plain is a grog-tempered ware that represents about 5% of the total ceramic count. Some of these sherds include sand temper along with grog. Mulberry Creek Cordmarked is represented by two rim sherds and 143 body sherds, which is 1.6% of the total ceramic assemblage. Distinguishing characteristics of this type are vertical cordmarking and grog temper. One rim sherd has a rounded lip and the other is vertical with a flat lip. Both are decorated with exterior notches. A red slipped surface distinguishes the grog-tempered Larto Red from other grog-tempered types. Only 2 body sherds were found during the surface collection. Several incised sherds have grog tempering, indicating that they might be Kersey Incised (Kreisa 1988), but due to
weathering and small size are not accurately typeable and thus have been placed into the
category Grog-Tempered Incised.

Any plainware sherd that was untypeable was placed into the Unidentifiable
Ceramics category. One hundred and thirty five (1.4%) sherds were unrecognizable for
any number of reasons, but predominately because they were either too small or had
exfoliated. Most of these were shell-tempered.

Lithics consist of chipped (Table 2) and ground stone implements and debitage.
The counts on ground stone implements were so few that a table was not drawn up for
them. Debitage includes four subclasses: primary, secondary, and tertiary flakes, and
shatter. Each type of flake represents a particular phase in the fashioning of lithic tools.
The primary flake is the first to be removed from the piece of raw material being worked.
In this study, a flake's surface had to be at least 25% cortex to be considered primary,
following Stout (1989). Secondary flakes are produced further along in the processing of a
tool, and have cortex covering no more than 25% of their surface (Stout 1989). The final
stage of tool manufacture is represented by tertiary flakes, which exhibit no cortex and are
almost always smaller than the preceding classes of flakes. Another by-product of lithic
tool fabrication is the blocky chunks of the raw material that can not be classified as
flakes, which Stout (1989) calls shatter.

Ground stone includes items such as celts and abraders that were ground into
characteristic forms in their manufacture or use, and are recognized in their whole and
partial forms.

The lithic materials presented below are described following Binford (1963) and
White (1963). The counts and percentages of lithic types are presented in Table 2. A
more detailed lithic analysis is presented in Part II of this paper.
Hoe fragment (Figure 6 a): One fragment of Mill Creek chert exhibiting a highly polished surface was recovered. Flake scars on this fragment have been nearly polished away by use.

Celt fragment (Figure 6 b): One celt fragment is made of Dover chert that has been ground and polished.

Drills (Figure 6 c, d): One drill made from Mounds chert has an expanding base and a biconvex transverse section. Its bifacial flaking is highly irregular and non-symmetrical with alternate bilateral step fractures caused by use in a clockwise boring or drilling fashion. The other, of Mill Creek chert, has similar step fractures, but is smaller, has step fractures indicative of counter clockwise use, and may be a resharpened projectile point. The tips of both are broken (broken areas are indicated by an arrow in Figure 6).

Unifacially retouched flakes (Figure 6 e, f): Two flakes exhibited the regular notching associated with serration. Both appear to be secondary flakes, one of which exhibits less than 25% of its cortex. This flake appears to have been heat-treated and its notching is extremely uniform. The second flake, of Mounds chert, did not have cortex and had a less uniform serration. The flakes removed to create the serration of the Mounds chert flake came off the ventral side, while the flakes removed from the heat treated flake came from the dorsal side.

Bipolar tool (Figure 6 g): One bifacially flaked tool of Mill Creek chert appears to be a cutting tool recycled into a wedge. A small percentage of cortex remains near the top of this tool, where the hammerstone would have struck. Secondary chipping at the very bottom of the wedge, where the tool contacted the material being split, has step fractures, possibly indicating use.
Retouched secondary flake (Figure 6 h): This Mill Creek chert flake tool or early stage preform is bifacially retouched with semi-invasive retouch scars and oblique flake-blank orientation. This tool grossly resembles a projectile point blank, but flaking was never finished. When this modified flake is positioned so that the dorsal side is up and the platform is in the lower left corner, as in Figure 6 h, the bottom and the right edges of the flake are modified. The bottom has relatively short wide step fractures on the dorsal surface, while the right side has deep short step fractures on the dorsal and ventral sides, making a sinuous edge. The left side is also minimally modified on the dorsal surface.

Projectile point like tool (Figure 6 i): This tool is made of a translucent chert of an unknown type. Its basic shape and chipping are reminiscent of a projectile point, but when viewed from the dorsal or ventral side it is asymmetrical, rendering it impractical for use as one. The flaking is bilateral and bifacial, indicating that it was double edged. Secondary retouch is marginal. A small portion of cortex or an impurity remains on the point.

Biface (Figure 6 j): This heat-treated tool may have been a projectile point but its base has been broken off, so its original form is uncertain. It was made from Mill Creek chert and has expanding primary flake scars and small scalariform secondary scars. Its transverse section is biconvex and longitudinal section is ovate or triangular.

Projectile points (Figure 6 k-o): There are five projectile point fragments, all but one have their tips broken off and none are tanged. Collectively their axial lengths range between 1.5 and 2.5 cm with widths ranging between 0.8 and 1.3 cm. They exhibit a wide variety of manufacture and function evidenced by the following descriptions. Point K, made of Dover chert, is broken unevenly, making it difficult to determine its original blade shape. Its transverse section is biconvex and its longitudinal section is asymmetrical.
biconvex. Blade margins exhibit bifacial-bilateral highly irregular secondary flake scars. Point L is made of an unknown translucent chert type. Its blade shape is contracting ovate with biconvex transverse and longitudinal sections. Primary flake scars are semi-invasive and secondary are marginal. This point may have had a secondary use as a drill. Point M is a heat treated triangular shaped specimen of an unknown chert type and both the tip and the base are broken. It has a biconvex transverse section and an asymmetrically plano-convex longitudinal section with expanding scars and step fractures. Point N, a specimen of unknown chert, is triangular in shape and lenticular in both transverse and longitudinal sections. Its flaking is highly irregular with many step fractures. It has no evident primary flaking and irregular secondary retouch. Point O is the only complete point. It has a plano-convex transverse section and a convex longitudinal section. On the bottom side it has expanding scars, while the top side, as shown in Figure 6 o, has no primary retouch whatsoever. Expanding scars are notable on the lateral edges with evidence of retouching and step fracturing. There is a possible notch on the left side of the point as illustrated in the figure.

Hoe Flakes: These flakes are generally considered to be the product of resharpening activities. The one distinctive characteristic that a hoe flake must exhibit to be included in this class is a soil sheen, which can be described as a glossy polish produced from use. Mill Creek, a coarse grained chert from Union County, Illinois (Fowke 1928), is the typical raw material used in the Ohio-Mississippi Rivers confluence region for the production of hoes.
Distributions

Mounds and midden surround the plaza area at Twin Mounds. The midden surface is characterized by artifact clusters, inferred on the basis of visual inspection and statistical results. There are three observable clusters interpreted as the debris from domestic architecture. Although these clusters were delineated on the basis of daub (representing structures) and pot sherds (undoubtedly utilitarian and representing primarily cooking and eating activities), the distributions of most other artifacts are similarly clustered. Figure 7 presents a composite distribution of all classes of artifact distributions at the site, including ceramics; daub; fauna; lithic tools; debitage; grinding stones; hoe flakes; charcoal; burnt bone; etc. This figure reveals the clustering of all materials, first, below the plaza and second, in the northwest corner of the grid, in the center, and in the southwest corner.

A similar pattern of distribution is found for daub (Figure 8). Typical Mississippian structures had walls constructed of cane and daub that was sometimes as much as a foot thick. When this kind of structure was burnt or otherwise destroyed, it left dense concentrations of daub that are recognizable on the site surface despite a century of row crop cultivation. In my sample, daub appears to be concentrated into three clusters identified in this figure. Given their distance of 25-30 m from each other, center to center, which is consistent with Stout's (1989) findings at the Adams site, and the presence of other domestically associated artifacts, these clusters are interpreted here as representing households. The following distribution patterns support this interpretation.

Within these domestic clusters are similarly clustered utilitarian ceramics (Figure 9), predominantly Mississippi Plain, a coarse shell tempered lower Mississippi Valley type
referred to by Phillips (1970) as the "utilitarian ware of the middle class." This type's efficient production and rigidity make it ideal for everyday use.

The Bell Plain distribution differs from those of Mississippi Plain and daub: this type is scantily represented in daub Cluster 3, in the southwestern corner of the grid, and is more evenly scattered over the site than either daub or Mississippi Plain.

It appears from the distribution of Baytown Plain and Mulberry Creek Cordmarked pottery (Figure 10) that Mississippian deposits are underlain by Late Woodland deposits. Results of a general reconnaissance (Kreisa 1988) suggest that the entire 14-15 ha area of the site includes one or more Late Woodland sites, and that even though most Late Woodland materials actually appear on a ridge southwest of the Mississippian mound-plaza center, concentrations probably lie below the Mississippian midden as well. This is reinforced by the modest but consistent correlation between Mississippian clusters and Late Woodland clusters, which are probably the result of posthole, footing, or house floor burial excavation by Mississippian occupants of the site, bringing Late Woodland materials to the surface. It is also likely that post-depositional activities such as plowing caused some of the mixture.

Lithic tools—including projectile points, celts, axes, scrapers, hoe fragments, and hammerstones—are scanty and widely distributed in my sample, but cluster in patterns similar to those of daub and ceramics: in the northwest corner, in the center, and in the southwest corner of the grid (Figure 11). Although Kreisa's excavation provided some evidence of intrasite task specific areas, the clustering of artifact classes in the surface collection is a similar pattern to that found by Stout (1989) at Adams. In fact, nearly all of Stout's artifact classes had highly correlated distribution patterns, which led him to conclude that, at least at Adams, Mississippian production of goods used by individual
households were also produced by those individual households rather than by specialists. This runs contrary to some other interpretations of Mississippian culture in which specialists are supported by surplus crops (Sears 1971). This is important because of Twin Mounds' location relative to the Kincaid system in southern Illinois, where this interpretation persists (Cole 1951).

The assemblage of lithic tools collected within the 2500 square meter grid is only a fraction of what the total site would have yielded if it had been collected. Within this relatively small site sample, scraper-like tools dominate. Over three quarters of these scrapers are retouched primary and secondary flakes. Nearly all bifacial and more extensively worked tools were broken. Parts of celts and axes were also found.

Hoe flake and tertiary waste flake distributions, both of which are interpreted as representing sharpening or finishing of tools, are presented in Figure 12 together. They have an even distribution across the village area unlike that at Adams, where there was a much stronger association with household clusters. This may be a reflection of tool-sharpening activities, but more likely the result of too small an assemblage of these flakes due to their small size and the site's mediocre visibility at the time the collection was made.

Debitage—a composite category containing irregular pieces of shatter as well as primary, secondary, and tertiary lithic flakes—appears to be associated with domestic structures, although less strongly than ceramics (Figure 13). The intermediate category of debitage, secondary waste flakes, is the largest class of debitage material, and also has the most clearly visible clustering characteristics.

Domestic areas are likely places for tools to have been sharpened at the end or beginning of the work day or finished from roughed out blanks obtained through long
distance trade—sharpening and finishing being represented by tertiary flakes. However, at Twin Mounds, tool manufacture from beginning to end seems to have been carried out in or near households. The distribution of debitage and hammerstones tends to concentrate around the domestic clusters, especially between the northernmost and easternmost clusters for debitage and more around the southern cluster for hammerstones.

Rough rock is a class that has three main constituents: quartzitic stones, small calcareous stones, and water-smoothed stones of many different shapes and sizes. The distribution vaguely correlates with the domestic clusters (Figure 14). Most pieces of rough rock are not identifiable as artifacts, or even fire-cracked rock, but appear to at least be manuports for as yet undetermined purposes.

Preliminary sorting of the Twin Mounds fauna has yielded results typical of Mississippian middens. General types of fauna present were turtles, waterfowl, deer, and fish. Parts of deer long bone, turtle shells, and waterfowl long bones were the most common types of bone present. For this preliminary distribution map, all fauna were taken together. The distribution pattern of the fauna (Figure 15) roughly follows the location of the three domestic clusters, with a predominance in the central and northwest clusters. The third cluster, in the southwest corner of the grid, did contain fauna but at a much lower concentration.

The G-K analysis, when applied to the Twin Mounds data, produced results comparable to those achieved by Stout at Adams. Artifact clusters tended to be 25-30 meters apart along north-south and east-west vectors, which is consistent with the clustering of artifacts shown on the distribution maps (Figures 7-15).
Summary

In the spring of 1992 a group of University of Illinois student archaeologists and their supervisor performed a controlled surface collection at the Twin Mounds site (15Ba2) in western Kentucky, which yielded 15,096 artifacts. Part I is the end product of a study of the surface patterning of the 100 m² collection. Artifacts were divided into categories, for example, the ceramics were divided into types following Phillips, Ford, and Griffin (1951); Phillips (1970); Kreisa (1988); and Stout (1989) and lithics into generally recognized reduction stages for debitage, formal tool types, and other relevant categories. A more in-depth study of the lithic assemblage is presented in Part II of this study. As artifacts were being divided by type, frequencies per unit were tabulated, the final product of which are the spatial distribution maps.

Two methods were used to study the artifact distributions, (1) a visual inspection of artifact distribution maps and (2) a G-K analysis of artifact distribution. Visual inspection of the distribution maps revealed three areas of high artifact density for most artifact classes and an area devoid of material. The G-K analysis revealed a clustering of artifacts along north-south and east-west vectors every 15-25 meters. These results are similar to those found at the Adams site (15Fu4), a Mississippian town 50 km downstream along the east banks of the Mississippi river and may represent a socially bound habitation density limit for these two sites (Fletcher 1981). Thus suggesting a similarity between the domestic areas of two sites of different sizes that played different roles in the Mississippian society.
Conclusions

This is a preliminary analysis, so it must be emphasized that Twin Mounds' patterning is consistent with Adams', and in the absence of the previous work at the Adams site the Twin Mounds would not provide enough data for even this general interpretation. Also, even though the Twin Mounds distributions were consistent with Adams, the domestic clusters were not completely matched one to another. This may reflect actual differences in living patterns or some undetermined bias. One serious collection bias that likely exists is against small objects, such as tertiary flakes, small pieces of pottery, and bone fragments. These small pieces might shed more light on the observed patterning.

What opening up this surface collection window does provide, however, is the opportunity to compare this small Ohio River Mississippian village with a large Mississippi River Mississippian town where surface distribution patterns have been studied extensively.

Three clusters of artifacts have been identified that seem to indicate "self-sufficient" households near the Twin Mounds plaza. These clusters follow a habitation and production pattern similar to that of a larger Mississippian town located 50 km south of the Ohio-Mississippi confluence. A similar distribution of most debitage and pottery sherd types within the domestic clusters shows that these three "houses" were somewhat similar in the production of certain types of tools, e.g., cooking vessels and hide processing tools such as scrapers and knives. This pattern of self-sufficiency is similar to what Stout found at the Adams site in that the ceramics and lithics are evenly distributed among the domestic clusters and no one cluster contains any specialized tools for the mass production of lithic, such as an unusually high concentration of cores and hammerstones, or ceramic items, such as wasters and pottery trowels, or the by-products thereof. However, the
surveying of another 50m x 50m area at Twin Mounds could reveal a pottery or lithic specialists' production area.

An equidistance between domestic structures, lack of specialty areas, and a similar clustering of artifacts like daub, ceramics, and lithic debitage all lend to the idea that two sites of differing size and function are organized similarly at the domestic level. Spatial investigations based on this restricted collection obviously do not have the same potential as that done at the Adams site, but what is hoped for is that opening this window at Twin Mounds and comparing what is seen with the full view at Adams will shed more light on Mississippian intersite patterning in the Ohio-Mississippi Confluence Region. Future comparisons between Twin Mounds and other Mississippian sites will be of equal importance, but given comparability of methodology, the Adams site is an appropriate first step.
Part II

A LITHIC ANALYSIS OF SURFACE COLLECTED MATERIALS FROM TWIN MOUNDS
Introduction

In the realm of North American archaeology, there is a disproportionate number of ceramic studies compared to lithic studies. The ceramic assemblage of a site can relinquish an incredible amount of information about those responsible for its making. Pottery is a vehicle for decorative and morphological style, and therefore can be used by archaeologists to monitor style changes over time (Braun 1983; Rice 1983; Shepard 1956). It also reflects the idiosyncrasies of the artist as well as demonstrates connections between distant groups that shared styles or trade. Above everything else, it fulfilled specific technological roles as cooking, eating, serving, and storage vessels (Braun 1983) and for this reason can be found in vast quantities at most post-Archaic archaeological sites throughout the United States. Because pottery can be successfully used as a time marker, is encoded with social meaning, and can be found in large quantities, it has been an important focus of archaeological research. However, one of its greatest drawbacks is that it is an easy victim to erosion; many Mississippian ceramics are even more so affected by erosion (i.e. leaching) because they are tempered with ground-up clam shells, which can be dissolved by water relatively easily (Koldehoff and Kearns 1993).

Stone tools have style, fulfilled important technological and social roles, can be used as time markers, are ubiquitous in the archaeological record, and are very resistant to erosion. Furthermore, use wears on lithic tools can be studied in order to determine the materials that were being worked and the motions used to work them (Keeley 1980). Considering the information potential and resistance to erosion of lithics, it is surprising how minimally the lithic assemblage is used. The succeeding discussion concentrates on a sample of the lithic assemblage of Twin Mounds recovered in the 1992 Surface Collection.
A well documented example of the importance placed on lithic tools in prehistoric times is that characterized by the Hopewell from the Midwest and Eastern Woodlands within the Middle Woodland period (200 B.C.-A.D. 600) (Moorehead 1892; Converse 1973). Extraregional lithic raw material played an important part in expressing the Hopewell way of life and involvement in the Hopewelian Interaction Sphere (Moorehead 1922; Caldwell 1977), with some raw materials (e.g., obsidian) traveling great distances from western Wyoming. Economic worth of lithic materials seemed to be a factor of distance, or exoticness, for many Middle Woodland people, as evidenced by the quality of the material and its curation. The further the source, the more valuable and desirable the material. Larger amounts of obsidian and nonlocal chert disks are more often found in caches or in burial mounds compared with materials from less exotic origins (Moorehead 1922), which demonstrates how important and socially sought after nonlocal materials were. A correlation between procurement distance, or minimally local vs. nonlocal, and value is indicated in the use of nonlocal cherts and debitage by the occupants of Twin Mounds and other western Kentucky sites, and is demonstrated below.

Kreisa's 1988 excavation results from the Twin Mounds site are crucial to this study because his data are very similar to the surface collected data used here. For this reason Kreisa's excavation results can be used as backing for the surface collected Twin Mounds data when making comparisons with other regional data obtained by excavation. Chert type and debitage frequencies demonstrated below for surface collected material follow very closely the patterns found by Kreisa in the excavations. The present study examines surface collected debitage and tools associated with activity areas and every day life of Mississippian households adjacent to the plaza at Twin Mounds. Results are
presented in the same general format as other western Kentucky lithic studies, which allows for more concise regional comparisons.

The Lithic Assemblage

The lithic artifacts in this study were gathered in a 1992 spatially controlled surface collection at the Twin Mounds site. The 50m by 50m collection area is situated in the village area of a multi-phase Mississippian village (Figure 3). The collection area was chosen to include a plaza-village interface area. The edge of a plaza and three domestic structures were tentatively recognized in Part I from the preliminary spatial analysis of all artifact class assemblages (Burks 1992, 1994).

The lithic assemblage consists of 1761 artifacts (debitage, tools, cores, etc.) sorted out of a total artifact collection of c. 15,000 artifacts. Lithics were divided according to preconceived type categories and the chert types were ascertained, the parameters of both are discussed below. Most type distinctions follow White (1963) and Binford (1963). The following paragraphs explain and discuss the different type categories used. A graphic representation of a small sample of surface collected lithic tools is shown in Figure 6.

Many categories are subsumed under the heading of debitage and represent lithic reduction activities, beginning with the core, which is any piece of lithic raw material that is approximately cobble sized or bigger (< 64 mm) exhibiting multiple, nonrandom negative flake scars on at least two sides. Two kinds of cores are generally recognized by archaeologists, those worked into a single tool (e.g., a hoe), and those used to produce flakes that are then utilized or further reduced into tools. The latter type is essentially a source of raw material for the production of flakes. Both types produce comparable lithic
debitage with their reduction, as do other flaking activities. However, only the latter core type is classed as a core per se, because the only remnants of the former, a core-tool, left after reduction are waste flakes and the tool itself. Incidentally, the flakes from a core-tool can also be utilized or further reduced.

Flakes are grouped into three broad categories: primary, secondary, and tertiary. Primary flakes represent the first stages of reduction and are recognized as having a size generally larger than either secondary or tertiary and a dorsal surface covered by more than 25% cortex. Flakes were not individually measured for lack of time, so size limits are based on the judgment of the observer. Secondary flakes have less than 25% cortex, are relatively large in relation to tertiary flakes and of similar to smaller size compared to primary flakes, and have multiple negative flake scars dorsally, which are representative of reduction activities associated with intermediate stages of the production. The finishing of a tool is represented by tertiary flakes, which generally have no cortex, are smaller than either primary or secondary flakes, and have dorsal flake scars. Similar flake types representing the reduction stages of lithic raw materials were demonstrated by Mauldin and Amick (1989) experimentally, indicating that although all three types of flakes are produced during each stage of reduction, they generally follow a reduction pattern of primary flakes representing the first stages of reduction, secondary representing an intermediate stage, and tertiary the finishing of the piece. Shatter is a fourth category of chert debitage produced during the reduction process. It is characterized by usually small, blocky pieces of raw material that do not have a bulb of percussion but do have at least one other morphological trait similar to those of flakes, such as ripple marks. Higher percentages of shatter have been shown in experiments by Magne (1985: 104-106) and
Magne and Pokotylo (1981: 37) to be more indicative of core reduction as opposed to tool production/preform retouch.

Two additional flake categories are also recognized, which segregate and highlight important characteristics that are not treated in the preceding paragraphs: biface thinning flakes and hoe flakes. The biface thinning or sharpening flake is the product of sharpening a bifacial tool, and is therefore recognizable by its distinct morphology. It is essentially a tertiary flake, but has distinct morphological traits that segregate it from other tertiary flakes. Biface thinning flakes are produced when a bifacial tool is struck near its edge with the assumed intent of sharpening. The resultant platform is faceted due to pre-existing negative flake scars near the edge of the biface. The edge of the biface thinning flake created by its platform and dorsal surface is part of the former edge of the tool from which the flake was struck. The biface thinning flakes from this assemblage are morphologically similar to flakes Hayden and Hutchings (1989) describe as billet flakes, or flakes removed by soft hammers such as antler, wood, or bone billets. By using a soft hammer, rather than a hard hammer, the flint knapper can conserve material and overall tool form. This is important in the sense that it enables the flint knapper or tool user to stretch the use life of a tool.

Hoe flakes are recognizable by the presence of an extremely lustrous surface, or "corn gloss", which is produced by the abrasive, polishing affect of repeated digging in the soil. Any artifact displaying this kind of gloss was considered to have at one time been a hoe or a part of one.

There are two all-inclusive categories of tools found at Twin Mounds, utilized flake tools and retouched tools. Care must be taken when considering the flakes of this assemblage as utilized or retouched because of the disturbed environment from which they
were taken. Farm machinery and animal trampling can produce flake edges that seem to have been prehistorically modified, however, certain clues, for example, the freshness of the flake scars, the presence of plow marks, and the random location of flake scars and edge damage, can be used to differentiate between human and accidental modifications. A flake is considered utilized when its edges are marked with very small, intersecting negative flake scars within a restricted location on the artifact. Different use activities produce unique patterns in the location of edge modification, and each use produces characteristic micro and/or sometimes macrowear on the edge of the tool. The type of use wear recognized here is gross in contrast to the microscopic use wears identified in studies such as Keeley (1980) and Tringham et al. (1974). This study does not try to define different types of use wear, only to recognize some use as evidenced by macroscopic edge damage. This assemblage also does not meet basic criteria established by Keeley (1980) for microwear analysis of European Lower Paleolithic assemblages, which require that the artifacts come from a primary context (i.e. not from the plowzone) and that they have been curated properly, both in order to insure that the microwear does not have a postdepositional origin.

Retouched flakes required an extra effort in production relative to utilized flakes and therefore are less expedient, with the degree of expediency varying negatively with the amount of intentional retouch. The least expedient, or more formalized tools, are represented at Twin Mounds by projectile points, bifaces, drills, gravers, and retouched flakes.

A projectile point is a bifacially or unifacially retouched artifact that displays distinct form and style, and can be associated with a time and cultural group. Objects that have flakes removed from both sides, are not a known type of projectile point, and/or
cannot be demonstrated to be retouched flakes are classified here as bifaces or biface fragments. The flaking on a biface should be, at least, semi-invasive.

A tool with only marginal retouch and flake morphology (e.g., platform, bulb and point of percussion, lip, erraillure scar, ripples, etc.) is considered a retouched flake and can be unifacial or bifacial. Flake scars on retouched flakes must be parallel to one another and intersecting; these parameters help exclude fortuitously altered or casually retouched flakes.

The remaining two tool types, gravers and drills, have similar morphology and uses, the graver being the more versatile or less specialized of the two. Use wear and marginal retouch together give gravers a beaked appearance. These tools are used in a scraping and drilling fashion, whereas drills are used to perform only the latter function. Drills have concentrated stepped flake scars on alternate sides of their bits. They can be primary drills, made specifically for drilling or can be secondary, transformed by resharpening other tools such as projectile points. Each type of drill is represented in this assemblage.

The final two categories are not directly related to the others but their presence is significant nonetheless. The first includes tools that on one edge have very concentrated bifacial or unifacial step fractures and on an opposite edge exhibit, depending on the presence of cortex, either small impact cones of percussion or step fractures similar to their opposite edge. These tools are interpreted as having been involved in some sort of bipolar activity and in North America they are commonly called "wedges", which reflects the North American interpretation of the function of these tools. However, wedges can also be produced through the bipolar reduction of a core (Hayden 1980). Nevertheless, these tools do not seem to have any formalized style besides being bipolar. In fact, the
wedges of this collection have at least two different histories. One is the medial portion of a broken biface, while the rest are simply cobbles, or cores, with bipolar morphology, demonstrating that there are both tool wedges and core reduction wedges present. The final category of this classification, amorphous chert cobbles, is significant in that it contains unaltered cobbles of chert that do not naturally occur at the site and thus must be manuports. One potential use for these cobbles is as a lithic raw material source, while another might be as a hammerstone, of which there is one in this assemblage.

Chert Use Patterns Reflected in the Surface Collection

There are two broad, widely used methods for typing chert, one is subjective and the other is objective. The least expensive of the two, the one used in this study, is subjective and relies on visual inspection of the chert using characteristics such as color, luster, texture (Ives 1984), and fossil inclusions. An objective approach to typing chert involves petrography and analytical procedures, such as neutron activation analysis, that identify the elements present in the sample and have the potential to source cherts to the particular outcrop from which they were procured (Luedtke 1979). Unfortunately, these objective methods are very expensive and beyond the nonexistent budget of this study. On the other hand, subjective typing produces quick, inexpensive results and, in a study like this where the chert types have distinct visual differences, is relatively reliable and accurate. The chert types identified within the lithic assemblage from the 1992 surface collection at Twin Mounds are described below.

The major local chert used by the prehistoric inhabitants at Twin Mounds, which can be found in many of the stream beds of the western Kentucky area, is Purchase gravel,
also referred to as Mounds chert. This chert has a fine to medium texture and is generally light to dark caramel with a darker brown weathered cortex. The cortex can, however, range in color from a dirty white to dark crimson red. Distinguishing thermal alteration can be very tricky because many pieces have a natural appearance similar to what would be expected of a thermally altered piece, so color by itself is not a good indicator. Color coupled with marked luster changes proved to be reliable in determining if the Purchase Gravel artifacts had been thermally altered in order to facilitate better flaking properties.

As a very specialized chert, Mill Creek makes its way to western Kentucky archaeological sites in the form of hoes and hoe blanks (Kreisa 1988; Sussenbach and Lewis 1987). This chert was obtained from quarry sites in Union County, Illinois (Fowke 1928). It occurs in raw form as large tabular nodules, which make it attractive to groups such as the Mississippians that produce large tools (e.g., hoes and adzes). Its most distinctive traits are its coarse, granular texture and buff color, which can range from medium to coarse texture and from white or dirty white to dark buff. When heated this chert becomes pinkish, but generally only the finer textures become visually more lustrous.

Dover chert, most of which has its origins in the famous quarry sites of Stewart County, Tennessee, is an important raw material at Twin Mounds and within the Southeastern complex as a whole (Faulkner and McColough 1973). It can be found in the lower boundary region between the St. Louis and Warsaw/Salem formations. It is fine to medium grained, has a resinous luster, and has brown to black lenticular mottling in brown to gray matrix. Other sources of a "visually indistinguishable" Dover-like chert from the lower St. Louis formation have been reported by Nance (1984) to occur in stream beds from the Ohio river in Livingston County, Kentucky southwards towards Stewart County, Tennessee.
Burlington chert is Mississippian (Osagean) in age, and outcrops extensively in the Burlington limestone of southern Illinois (Rubey 1952). In general, it is white or pale gray with a range to yellow or even black, and when heated may become orange or pink (Luedtke and Meyers 1984). The texture ranges widely from fine-grained and lustrous to coarse, dull, and chalky. One of the prime distinguishing characteristics of this type is the presence of fossils, especially crinoids (Rubey 1952), which range in size and density from large and densely packed to small and sparse, and are sometimes filled in or replaced by other minerals.

A chert that outcrops extensively as a part of the St. Louis formation in southern Illinois is the St. Louis chert. Rubey (1952) describes it as gray and brown dense chert in nodular and bedded nodular forms that "occur sparingly in nearly every exposure." It has a waxy luster and is fine-grained.

Ft. Payne chert is visually similar to Dover with its brown to black mottling in a gray matrix, however, Ft. Payne also has pink mottling. This follows Stout's (1989) interpretation for Ft. Payne, which is contrary to Stelle's (1986), who states that Ft. Payne is what is here referred to as Dover. Nonetheless, it outcrops in western Tennessee and Kentucky but due to thorough fracturing is of poor quality for flaking (Gatus 1979: 40). Because it is represented by so few artifacts (3) in the surface collection, it is not included into any of the frequencies.

Some pieces within the assemblage were of an unknown or indistinguishable chert type. These were grouped into an unknown category. Most pieces, especially shatter, were indistinguishable because of their small size, others because of in situ weathering caused by being in close proximity to their cortex.
The following sections will discuss the percentage distributions of the chert types within the assemblage (Table 2). First the distribution of chert types for the debitage is discussed. The debitage grouping includes the primary, secondary, and tertiary flake classes, as well as primary and secondary utilized flakes, primary and secondary unifacially and bifacially retouched flakes, and biface thinning flakes. The distribution of chert types within the assemblage is then used to make conclusions about resource procurement activities and relative values placed on the chert types by their users.

The most obvious pattern within the chert type distribution is the high percentage of Purchase Gravel, 43.3% of the assemblage (Table 2). This can likely be attributed to the ubiquity of the source within the Twin Mounds region. Mill Creek is a close second, accounting for 36.8% of the assemblage. The reason for which is not quite so easily explained.

Mississippian subsistence relied heavily on the products produced through horticulture and agriculture. Maize (Zea mays) was the primary domesticated plant and required a considerable amount of field preparation. The principle tool used to work the soil was the hoe. Mill Creek chert was the preferred raw material for hoes at this site and other Mississippian sites in this area (Edging 1990; Kreisa 1988). Nonetheless hoes were not the only thing for which Mill Creek was used for at Twin Mounds. Points and a drill were also made from Mill Creek chert. About 90% of the hoe flakes and fragments at Twin Mounds are Mill Creek chert.

The remaining four cherts (Ft. Payne, Dover, Burlington, and St. Louis) and the unknown cherts account for only 19.5% of the assemblage, but the latter three provide supporting evidence for chert trade and usage patterns. Use patterns are most easily seen in the debitage of the assemblage, the by-products of tool manufacture.
Purchase Gravel, the most abundantly used and easily procured chert within the assemblage, consists of 257 (41.1%) primary flakes, 229 (36.6%) secondary flakes, 2 (<1%) tertiary flakes, 137 (21.9%) shatter, and 1 (<1%) biface thinning flake. It also represents 77.4% of the primary flakes from the entire assemblage. Purchase Gravel then appears to have been brought into Twin Mounds from the surrounding area in cobble form, producing a corresponding number of primary flakes when worked. This is also supported by the percentages of Purchase Gravel cores (64.3%) and amorphous cobbles (89.9%) within the assemblage. The Purchase Gravel secondary flake percentage is also high at 36.6% of the total Purchase Gravel lithics and 38.8% of the assemblages' secondary flakes. However, this reduction represented by the high percentages of primary and secondary flakes does not seem to be producing many formal tools. Purchase Gravel only accounts for 5 (11.9%) biface fragments, 1 (33.3%) graver, and 2 (40%) drills within the assemblage, and only <1% (2 flakes) of the debitage is tertiary. What is, then, the end-product of the reduction of Purchase Gravel at this site? Utilized and retouched flakes only account for 13.6% of the debitage, so flakes do not seem to be the desired end-product of reduction. One explanation could be that the formal end-products of the reduction have been removed from the site prehistorically or recently by collectors. Another possibility is they were being used in a different part of the site not sampled by this surface collection. However, formal tools made on Purchase Gravel are also rare at other Mississippian sites in the area (Edging 1990; Kreisa 1991) and may indicate that the quality of this chert was viewed by the Mississippian people as substandard for the production of formal tools and was better put to use as expedient flake tools.

The Mill Creek debitage tells a much different story. It consists of 51 (11.3%) primary, 258 (57%) secondary, and 22 (4.9%) tertiary flakes, 110 (24.3%) shatter, and 12
(2.6%) bifase thinning flakes, which is a pattern very similar to the remaining cherts: Dover, Burlington, St. Louis, and the Unknowns. Mill Creek chert came into the site predominantly in the form of hoes or hoe blanks. This accounts for the low percentage of primary flakes relative to secondary and tertiary because most of the primary flakes were removed somewhere other than this site or out of the range of the 100 m² surface collection area. However, a small percentage of Mill Creek primary flakes were produced on site or within the collection area. Many of the flakes and hoe fragments in this assemblage exhibiting "corn gloss" still retain a part of their cortex, demonstrating that not all of the cortex was removed from finished pieces before they were used. Thus, some of the primary flakes in the collection, which by definition have 25% or more cortex on their dorsal surface, could actually be secondary reduction flakes that have been removed from hoe blanks produced elsewhere, either by the Twin Mounds people or by another group that traded them to the Twin Mounds people. The high incidence of hoe maintenance debitage ubiquitously distributed within the area of the surface collection identified as village indicates that agricultural tools were transported between domestic and hinterland areas on a regular basis and were maintained by each household rather than by specialists.

Above, a positive but not necessarily linear relationship was found between the value of a chert or lithic raw material and the distance to its source. Mill Creek, Dover, Burlington, and St. Louis are all nonlocal cherts with similar debitage frequency patterns, and based on the increase in energy needed for their procurement, by trade or direct procurement, are considered more valuable. This value is seen in the use of the debitage of these cherts for tools. Only 13.6% of the primary and secondary debitage from the local chert was utilized or retouched, whereas the percentages for the nonlocal cherts is noticeably higher: Mill Creek 26.9%, Dover 28.6%, Burlington 18%, and St. Louis 16.7%.
A second figure that backs up the idea that nonlocal cherts were more valuable than local cherts is the percentage of formal tools made from each. The group formal tools includes bifaces and biface fragments, projectile points, gravers, and drills. 14.3% of the formal tools were made from local cherts, while the remaining 85.7% of the tools were made from nonlocal materials, 64.3% of those being Mill Creek, and of the 7 projectile points, 4 were made from nonlocal Burlington chert and all are small triangular Madison points, which are representative of the Mississippian cultural expression (Justice 1987).

Regional Perspectives

The results representing the lithic artifacts from Kreisa's excavation work (1988) are very similar to those found in this study. Similar ratios of primary to secondary reduction flakes were found in the excavations with the local chert, Purchase Gravel, having a ratio much closer to 1:1 than the extralocal cherts, which have an average ratio of 0.39:1. Purchase Gravel accounted for 38% of the excavated lithic assemblage and 43.5% of the 1992 surface collected lithic assemblage. One major difference does exist, however, between the two collections. Kreisa's excavations yielded a relatively large amount of tertiary flakes compared with the number found in the surface collection. His excavation methods included the screening of sub-plowzone material through 6mm by 6mm hardware cloth, which would easily collect most tertiary flakes. In the 1992 work, two surface collectors had 5 minutes to collect everything they could pick up, relying solely on the visibility of the artifacts. A small tertiary flake is one of the least visible artifacts in a plowed field, so this discrepancy between surface and excavated assemblages is undoubtedly due to differences in sampling methods.
Other Mississippian sites in western Kentucky not only exploit similar lithic raw materials, but also have similar lithic assemblages to Twin Mounds, which indicates similar activities among sites. Kreisa (1991), however, notes an eastern progressing trend within the lithic assemblages of sites in western Kentucky along the Ohio river. He found that southern Illinois, Missouri, and western Tennessee cherts (Mill Creek, St. Louis, Burlington, Illinois Novaculite, and Dover) as well as Purchase Gravel, decreased in abundance towards the east and were being replaced by cherts found to the east such as Flint Ridge, Wyandot, Upper Mercer, and other unidentifiables. Sites to the south along the Mississippi river, at least as far as the Adams site 50 km south of Twin Mounds, have similar chert type frequencies, suggesting that they were a part of the same lithic raw material interaction sphere. Thus lithic raw material activities as demonstrated by those cherts present may be helpful in demonstrating which interaction spheres Twin Mounds was active in. If the data obtainable from lithic raw material is a true reflection of intergroup interaction, then Twin Mounds is more closely associated with Mississippian sites along the Mississippi river, such as Adams and Marshall, rather than sites further to the east along the Ohio river such as Kincaid, which is about 80 km upstream from Twin Mounds and is not on Figure 1.

**Summary**

The analysis of the lithic material from a controlled surface collection at Twin Mounds revealed patterns in chert procurement and usage. The most ubiquitous chert at this site and in western Kentucky in general is Purchase Gravel. Despite its ubiquity, Purchase Gravel comprises only a small percentage of the formal tools. Instead, nonlocal
cherts such as Mill Creek, Dover, Burlington, and St. Louis are used in the production of formal tools. The low frequency of nonlocal chert primary flakes suggests (1) that the formal tools were finished elsewhere and transported to the site or (2) that nonlocal cherts were being brought to the site in a previously reduced form that could not, upon further reduction, produce debitage characteristic of primary flakes, only secondary and tertiary. A deficiency of tertiary flakes, however, would seem to support the first hypothesis, "it is not the presence of small flakes that distinguishes most tool manufacture from core reduction, but the absence of larger debitage," (e.g., primary flakes) (Baulmer and Downum 1989).

The lithic assemblage also lends credence to the idea that nonlocal cherts have an inherent value over local raw materials. For example, the local chert, Purchase Gravel, is of a better flaking quality but only occurs as large gravels or small cobbles, not nearly large enough to produce a Mississippian hoe. For this reason Mill Creek chert was procured from southern Illinois quarries some distance away. Mill Creek may not be the most lustrous or fine textured chert, but in raw form, it is large enough and already the shaped for the production of hoes. The value of Mill Creek chert as a nonlocal raw material is not so much that it is one of few sources of large sized raw material, but more that its debitage at Twin Mounds is reused as informal tools more often than the local chert. The use of a lesser quality, harder to obtain chert for informal tools, such as utilized flakes or retouched flakes, over an abundant, better quality chert, which was not being used for formal tools, suggests that the lesser quality chert might be of a higher value. Distance of procurement, or exoticness of material, raw material form, and durability are about the only factors that make Mill Creek debitage more valuable than Purchase Gravel.
Regional comparisons with other sites in western Kentucky suggest that Twin Mounds follows chert procurement strategies more similar to Mississippian sites along the Mississippi river, than equivalent sites to the east on the Ohio river. Hence, Twin Mounds is more attuned to the lithic procurement interaction sphere, which involves the exploitation of lower Illinois cherts, used by groups along the Mississippi river and provides contact between these groups. Plentiful fine quality raw material sources further up the Ohio river limits the need for groups in that area to venture elsewhere.

Conclusions

These preliminary findings indicate that the Mississippian people of Twin Mounds were using mostly nonlocal cherts as raw materials for their formal tools instead of the locally available chert. Nonlocal cherts were of better quality and could be found in a larger raw form. Most of the projectile points from the excavation and the surface collection, which range in size from 20-30 mm, are well within the capacity of the local raw material, but are made from nonlocal cherts. This demonstrates that the prehistoric inhabitants of the Twin Mounds site had a preference for better quality, nonlocal raw materials for the production of formal tools. The presence of finished tools made on nonlocal cherts indicates that they had an interaction area, from which they directly and/or indirectly procured lithic raw materials, that was quite large and encompassed southern Illinois, western Kentucky, and northwestern Tennessee and undoubtedly the ranges of other contemporary groups. Kreisa (1988) concluded that the "regional contacts increased in size and scope" in the latest Mississippian component at the site. This area simply represents where the lithic raw materials for everyday tools were being procured from. If
regions from which influences on ceramic styles are factored in, the area of interaction grows. As demonstrated above, formal tools at Twin Mounds were made from relatively more valuable nonlocal materials, a pattern that is consistent with other Mississippian sites in Western Kentucky (Edging 1990; Kreisa 1991; Sussenbach and Lewis 1987).

These results are the end-product of a study performed on surface collected material from a plowed field and thus are not considered to accurately represent what was deposited at the site 700-1000 years ago. Two categories that are undoubtedly under-represented, especially when compared to excavation data from the site, are tertiary flakes and formal tools. Because the site is in an annually plowed field and plowing is always exposing previously undisturbed artifacts, it is subject to the yearly assault by collectors who pick up all of the formal tools they can find, especially projectile points. The tertiary flake counts are probably biased because of a lack of collection due to a poor visibility because of their small size.

Considering the relatively small scale of the test excavations and surface collections at Twin Mounds thus far, further excavations and/or surface collections are needed to solidify the tentative conclusions presented here based on the surface collected material from 1992.
Site Summary

Twin Mounds first made it into the annals of midwestern archaeological prehistory when Collins identified it in an 1882 publication. The first published excavation results came in 1916 from Moore, who described the site as "two ridges and humps" in a village area, from which he excavated an extended burial. The 1930s and 1940s brought professional archaeological research by Funkhouser and Webb (1932) and then by the Kings, who as local rumor has it, allegedly uncovered a log-lined burial deep within one of the mounds. Unfortunately, there are no records of such findings. In the late 1980s, the University of Illinois' Western Kentucky Project (Kreisa 1988, 1991) conducted mapping and test excavations, which clarified component boundaries and permitted regional comparisons with other western Kentucky Mississippian sites.

This study on the spatial patterning and lithic assemblage of surface collected material is the latest research from a site with an archaeological history of over 100 years. The past decade of work here has turned a bright light on very small portions of the site, a house basin here or an artifact cluster there, but many questions remain to be answered about the site and its inhabitants. For instance: A swale circumscribes the village and, potentially, mound areas of the site. Is it the remainder of a prehistoric fortification or a trench dug within the past 75 years to drain an agricultural field? What were the functions of the two mounds? Were they burial or sub-structure mounds? How has plowing affected the distribution of artifacts on the surface of the site? Can tentatively recognized domestic clusters from this study be associated with sub-plowzone house features? This list could go on and on, but the research at this site to date has laid a framework from which future
projects can be deployed. Already, much information about the prehistoric inhabitants of the Twin Mounds site has been retrieved from the archaeological record. It is still, however, only a small portion of the potential information that lays on top of and below the soil, awaiting the shovel and trowel of an eager archaeologist so that it can be saved from the destruction caused by the yearly ravages of the Ohio river and the steel teeth of the farmer's plow.
Figure 1. Ohio-Mississippi Confluence Region (Sussenguth and Lewis 1987: Figure 1)
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Figure 2. Regional Chronology.
Figure 3. Topographic map of the Twin Mounds site (15Ba2) in Ballard County, Kentucky (after Funkhouser and Webb 1932: 14; Kreisa 1988: Figure 13).
Figure 4. Topographic map of the Adams site (from Stout 1989).
Figure 5. Selected rim profiles from the Twin Mounds surface collection (selected from Burks, French, and Stotz 1993).
Figure 6. Lithic tools from the Twin Mounds surface collection: a hoe fragment, b celot fragment, c-d drills, e-f unifacially retouched flakes, g bipolar tool, h retouched secondary flake, i projectile point like tool, j biface, k-o projectile points (from Burks, French, and Stout 1994).
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Figure 7. Distribution of combined artifact classes (Burks 1992)
Figure 8. Daub distribution (Burks 1992).
Mississippian pottery distributions

Mississippi Plain

Counts

0 1-27

Bell Plain

Counts

17-34 8-16 1-7 0

Figure 9. Mississippian pottery distributions (Burks 1992).
Late Woodland pottery distributions

Baytown Plain

Mulberry Creek
Cordmarked

Counts

14-27
7-13
1-6
0

Counts

present

0

Figure 10. Late Woodland pottery distributions (Burks 1992).
lithic tool/
utilized flake
distribution

Counts

- 6-12
- 1-5
- 0

Figure 11. Tool and utilized flake distributions (Burks 1992)
Figure 12. Hoe flake and tertiary waste flake distribution (Burks 1992).
Figure 13. Secondary waste flake distribution (Burks 1992).
Figure 14. Rough rock distribution (Burks 1992).
Figure 15: Fauna distribution (Burks 1992)
Figure 16. Twin Mounds surface collection G-K variance estimates at inter-collection unit distances for all Mississippian pottery types and daub (following Stout 1989).
Ceramic Types from the Surface Collection

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* Less than 1%

OT=Old Town Red; MP=Mississippi Plain; KF=Kimmswick Fabric Impressed; BP=Bell Plain; CC=Crosno Cordmarked; WT=Wickliffe Thick; BT=Baytown Plain; MI=Matthews Incised; OI=O'Byam Incised; LR=Larto Red; MC=Mulberry Creek Cordmarked; UKI=Unknown Incised; UC=Unidentifiable Ceramic; UP=Untempered Plain; MM=Matthews Incised, var. Manly; NP=Nashville Negative Painted; MDI=Mounds Place Incised.

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<td>0</td>
<td>10</td>
<td>109</td>
</tr>
</tbody>
</table>

| Total # | 766 | 648 | 4   | 170 | 64 | 56 | 53 | 1761 |
| %Total  | 43.5 | 36.8 | * 9.7 | 3.6 | 3.2 | 3 | **99.8 |
| # Heat Altered | 9 | 54 | 0 | 0 | 2 | 0 | 0 | 65 |

* Less than 1%    ** Difference due to rounding error
P.G.- Purchase Gravel; M.C.- Mill Creek; Pt. P.- Pt. Payne; D.- Dover;
B.- Burlington; St. L.- St. Louis; U.- Unknown

Table 2. Lithic frequencies according to chart and tool types.
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