CERAMICS, CHRONOLOGY, AND COMMUNITY
PATTERNS AT MOUNDVILLE,
A LATE PREHISTORIC SITE IN ALABAMA

Volume I

by
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For Laurie

PREFACE

The present endeavor is actually part of a larger project that was organized by Professor Christopher Peebles in 1977. The overall aim of the project was to attain a better understanding of the Moundville phase, particularly with regard to questions concerning the development and decline of the complex Mississippian society that the phase appeared to represent. At its inception, the project was planned as a cooperative venture among four researchers: Margaret Scarry was to reconstruct subsistence using excavated food remains; Margaret Schoeninger was to be concerned with the biocultural aspects of nutrition, using osteological data from human burials; Peebles was to conduct a surface reconnaissance in order to gather detailed information on settlement patterns; and I was to construct a ceramic chronology, so that fine-grained temporal control in all areas of investigation could be achieved. Although each of these lines of inquiry was to be pursued somewhat independently, the hope was that ultimately the various lines would converge in attaining the project's overall aims. The project was funded by a National Science Foundation grant to the University of Michigan (BNS78-07133). Field work began in June 1978, and was carried on intermittently until August 1979. A tremendous amount of information was gathered during this interval by all the investigators, and much of this information is, at

this writing, still in the process of being analyzed.

For my own part of the project, "field" work was mostly carried out indoors, recording data on whole vessels from Moundville in extant museum collections. I was accompanied on this task by Laurie Cameron Steponaitis, who photographed the vessels and helped in innumerable other ways. It is safe to say that without her talents, the project would have foundered from the start. Other people who, at various times, helped us sift through these collections are John Blitz, Gail Cameron, Mary Meyer, Masao Nishimura, Jeffrey Parsons, John Scarry, Margaret Scarry, Letitia Shapiro, Deborah Walker, and Paul Welch. Their willingness to put up with the tedium and dust while looking through countless boxes is gratefully acknowledged.

Our obsessive search for Moundville collections eventually took us to five museums in four different states. Although not all of the collections were found to contain whole vessels, the work was invariably made more comfortable and productive by the staffs of the institutions we visited. Among those to be thanked are Joseph Vogel, John Hall, and Dorothy Beckham of the Alabama Museum of Natural History; Richard Krause, Kenneth Turner, and Amelia Mitchell of the Department of Anthropology, University of Alabama; David Fawcett, James Smith, and Anna Roosevelt of the Museum of the American Indian, Heye Foundation; Vincent Wilcox, Joseph Brown, and Marguerite Brigida of the Department of Anthropology, National Museum of Natural History, Smithsonian Insititution; Barbara Conklin of the American Museum of Natural History; and Richard MacNeish of the R.S. Peabody Foundation, Andover.

Once the data had been collected, the bulk of the analysis was carried out at the Smithsonian Institution, where I was appointed as a Predoctoral Fellow. Bruce Smith, my advisor while on fellowship, was truly a stimulating colleague to work with. Not only did he share freely his ideas on Mississippian culture, but also he provided logistic, bureaucratic and moral support in more ways than I can possibly enumerate. A number of other people at the Smithsonian contributed substantially to effort as well. David Bridge was instrumental in helping me grasp the complexities of SELGEM, the data-banking program with which I managed to keep track of all the vessels. Jane Norman helped by reconstructing beautifully some vessels which seemed to be fragmented beyond hope. Also to be acknowledged is Florence Jones, who, as a Smithsonian Institution volunteer, ably drew most of the rim profiles that appear in this report.

The technological studies of ceramics were all done at the National Bureau of Standards in Gaithersburg, Maryland. I arrived at the Bureau as a complete novice in materials science, mindful of issues that needed to be studied, but with no inkling of how to actually go about doing it. I was most fortunate, therefore, to fall in with a group of experience colleagues who never seemed to tire of my endless questions, and who taught me enough so that I could get by. Carl Robbins, for one, spent countless hours showing me how to use a petrographic microscope, and helping me with mineralogical indentifications. He also produced all of the x-ray diffraction patterns on which many of my conclusions are based. When it came to matters concerning physical properties (or, as the division title quaintly put it, "Fracture and Deformation"), Alan Franklin, C.K. Chiang, Ed Fuller, and Steve Freiman were the experts. Together, they introduced me to some rather unaccustomed definitions of "stress" and "strain", and showed me how to make the measurements that were critical to the successful outcome of my research. All of this work was made possible by my appointment as a Guest Worker at the Bureau, under the sponsorship of Carl Robbins. I am also particularly grateful to Alan Franklin and Jacqueline Olin (Conservation Analytical Laboratory, Smithsonian Institution), who were both instrumental in bringing this arrangement about. Ceramic thin-sections were obtained through the courtesy of Daniel Appleman, chairman of the Department of Geology, Smithsonian Institution.

Most of the actual writing was done while I was on the faculty at the State University of New York at Binghamton. Several people at this instituion helped a great deal in edging the (sometimes reluctant) manuscript toward its completion. The figures were capably prepared by Laurie Steponaitis and Stan Kauffman. David Tuttle handled the

copy-work involved in reducing the camera-ready figures to final size. Robert Stuckart of the Computer Center helped by showing me how to get SUNY-Binghamton's oversized abacus to do what it was supposed to.

As noted earlier, the project was, from the very start, a multifaceted affair, designed to make the most out of a collaboration between researchers working on different aspects of a common goal. To my colleauges on this project -- Christopher Peebles, Margaret Scarry, Paul Welch, Tandy Bozeman, Margaret Hardin, and Margaret Schoeninger -- I owe a great deal for their stimulating thoughts, for their willingness to share information, and in general for making the atmosphere of collaboration a pleasant one.

Other people who offered valuable help and suggestions are William Autry, Jeffrey Brain, Ian Brown, David DeJarnette, Richard Ford, James B. Griffin, David Kelley, Keith Kintigh, William Macdonald, Dan Morse, J. Mills Thornton, Sander van der Leeuw, Stephen Williams, and Henry Wright. It was van der Leeuw, who first opened my eyes to the need for a detailed understanding of ceramic technology. Brain, Brown, Ford, Griffin, Kintigh, and Williams were particulary generous with comments on the manuscript, all of which were appreciated although not all accepted. Finally, it was Morse who spared me untold embarrassment by gently pointing out that the the wierdest "Mississippian" jar I had ever seen was actually a Formative Period Mexican type which had mistakenly been catalogued as coming from Moundville.

With all the help that I have received from these people and others, it should be clear that any and all faults that remain in the manuscript are entirely my own reponsibility.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

In the 10th-11th centuries A.D., there developed along the interior river valleys of southeastern North America a number of societies that are now called Mississippian. It is well known that the Mississippian people were sedentary farmers who grew maize and other crops. It is also generally accepted that these people possessed a relatively complex social organization, with evidence of internal social ranking and political hierarchies that extended beyond the range of the local community. Societies of this type are often categorized in general evolutionary terms as "chiefdoms," and questions relating to the organization of such societies and how they developed continue to be matters of wide interest and considerable debate.

This study deals with the Moundville culture of west-central Alabama, a Mississippian society which existed from about A.D. 1050 to 1550. Sites of this culture are located in the valley of the Black Warrior River, south of the fall line at Tuscaloosa. By far the largest of these sites is Moundville, after which the culture was named. In its time, Moundville was a political and religious center of major proportions. Indeed, it was the second largest

Mississippian community in all of eastern North America, second only to the great Cahokia site in the American Bottoms near present-day St. Louis.

During the past decade, a tremendous amount of research has been devoted to reconstructing the social, political, and economic organization of Moundville's former inhabitants. Mortuary data have been analyzed for evidence of social differentiation (Peebles 1971; 1974), settlement patterns have been examined for evidence of political organization (Peebles 1978; Steponaitis 1978), and environmental data have been brought to bear in explaining certain aspects of community size and location (Peebles 1978). Although these studies have contributed greatly to our understanding of Moundville, considerably more remains to be learned. One limitation of prior studies is that they were all essentially synchronic in outlook. A number of social, political, and economic patterns were identified, yet questions relating to how these patterns developed through time were never adequately addressed. This shortcoming was not at all due to lack of interest, but rather it was imposed by the state of knowledge at the time. The Moundville phase, as it was then defined, encompassed a 500 year span within which no temporal distinctions could be perceived. As long as this block of time remained undivided, evolutionary studies could not proceed.

This, then, was the context in which the present study was conceived. Long years of excavation at Moundville had produced large collections of ceramics, including many whole vessels from grave contexts, which had never been analyzed but which were still being curated at various museums. These collections were an ideal source of data with which a ceramic chronology could be constructed, a chronology which could be used to partition the archaeological record into finer temporal units and thereby reveal the trajectory by which the socio-political complexity at Moundville developed, and later declined.

The chapters which follow will not answer all the questions related to the processes of development at Moundville, nor will they attempt to. The goal instead is to provide a sound diachronic framework which will allow certain previous interpretations to be refined, and which will also provide the first glimpse of how the size and configuration of the Moundville site changed through time. Achieving these goals requires a detailed understanding of the formal variation in Moundville ceramics, a subject to which the greater part of this volume is devoted.

The present study addresses itself to four major areas of concern. First, the materials and technology of pottery manufacture at Moundville are examined. This discussion not only lays the groundwork for describing the ceramic assemblage, but it also demonstrates how certain pottery attributes, often thought to be purely conventional, are directly related to vessel function.

Second, a new classification of Moundville ceramics is presented. This classification consists of six analytically separate dimensions of design, ware and shape, which together constitute the formal categories on which the chronology is based.

Third is a presentation of the chronology itself. This chronology was formulated using two kinds of evidence: (1) a seriation based on whole vessels excavated in the years between 1905 and 1941, and (2) stratigraphic analysis of sherds obtained from test excavations conducted at Moundville in 1978 and 1979. These lines of evidence have allowed the 500 year block of time, formerly known as a single "Moundville phase", to be broken up into three shorter phases -- Moundville I, Moundville II, and Moundville III. Adding these three new units to the two previously-defined phases which come before and after, the entire late prehistoric sequence now consists of five phases spanning the period from A.D. 900 to 1700.

Fourth and finally, the spatial distribution of burials and ceramic vessels, dated according to this chronology, is examined at Moundville for each phase in turn. In so doing, the site's evolution from a small village, to a minor center, to a large regional center is traced, and certain implications of this sequence are discussed.

As a prelude to these chapters, let us begin by describing the Moundville site and its setting in more detail, reviewing the history of investigations there, and describing the particulars of the ceramic sample on which the study depends.

The Site and Its Setting

> I do not think in the Southern States there is a group of Mounds to compare to Moundville, in the arrangement and state of preservation of the mounds (C.B. Moore, quoted in Owen 1910:44).

The Moundville site, so highly acclaimed by Moore, is located in west-central Alabama astride the Hale-Tuscaloosa county line, about 25 km south of the city of Tuscaloosa (Fig. 1). It sits on a low terrace overlooking the east bank of the Black Warrior River, nestled in an alluvial valley which cuts through the gently rolling Fall Line Hills.

During the time of prehistoric occupation, this region was characterized by a high diversity of physiographic zones and forest biomes. As Peebles has aptly described:

> The forests that were above the floodplain of the Black Warrior River were a mixture of oak-hickory and pine facies that mirrored the physiographic complexity of the area. As Figure [1] illustrates, four major physigraphic provinces lie within 20 miles of Moundville. To the north of the fall line, in the Ridge and Valley Province and the Cumberland Plateau, the oak-hickory forest is the climax biome. South of the Black Belt, the pine barrens of the Coastal Plain was the dominant forest type. Between these two forests, in the Fall Line Hills, the interfingering of these two forests plus the floodplain vegetation produced a broad ecotone forest. Both the oak-hickory forest supported high densities of deer and turkey, the faunal mainstays of the Southeastern Indians [Peebles, in press:43; see also Peebles 1978:388-393].

Within the Valley proper, the floodplain soils constituted

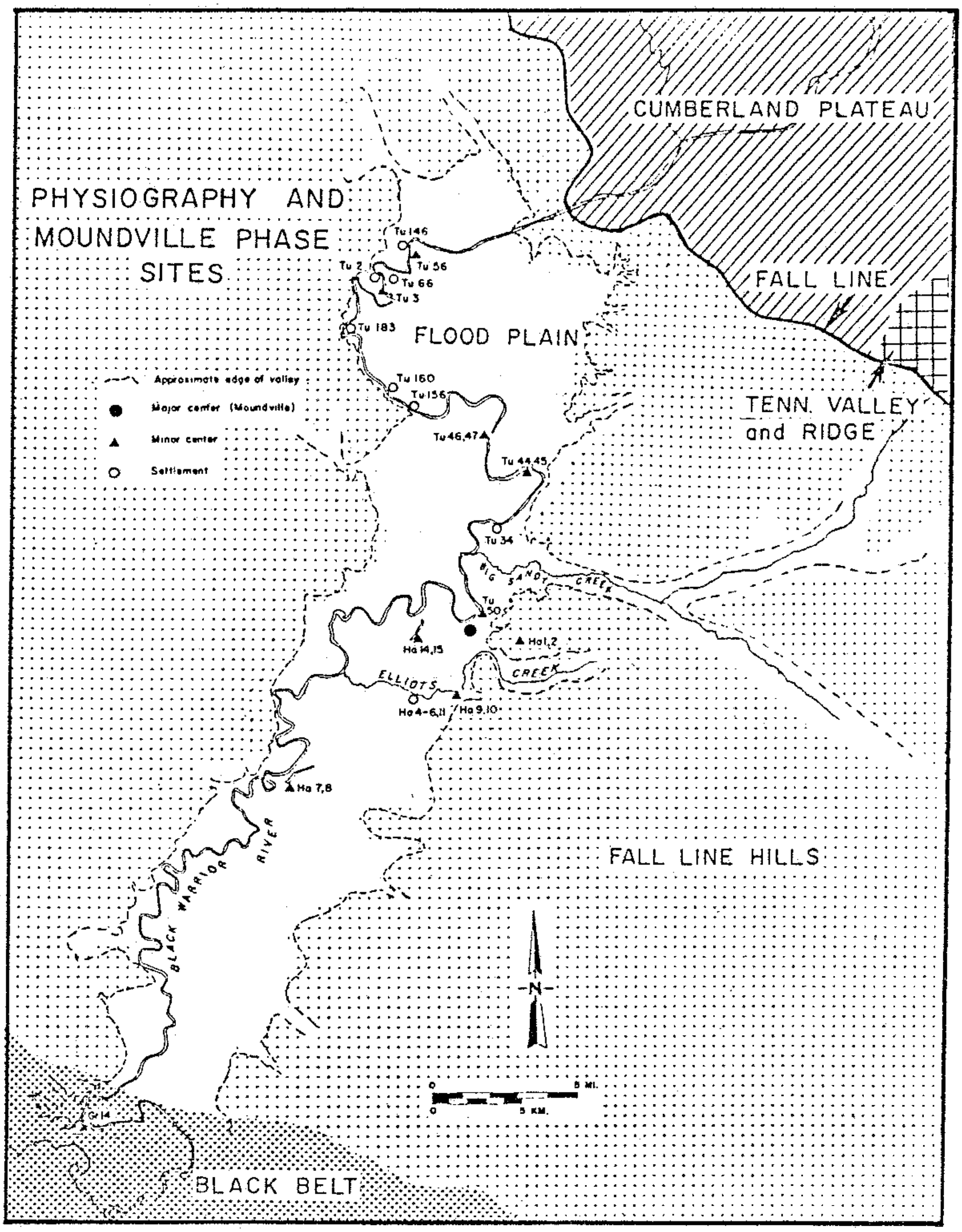


Figure 1. Location of Moundville and other Moundville phase sites in the Black Warrior River Valley (after Peebles 1978:Fig. 13.10).

another resource of great importance to the prehistoric inhabitants, for these soils are known to have had a high fertility and were eminently suited to the growing of maize, the principal Mississippian crop (Peebles 1978:400-412).

The site itself contains at least 20 artifical mounds, neatly arranged around a rectangular plaza (Fig. 2). The largest of these mounds, Mound B, is about 17 m high, and about 100 m square at the base; the other mounds range from about 8 m to about 1 m in height (Moore 1905:128; McKenzie 1966:Table 5). Many, if not all, of these mounds were used as platforms for structures, either for public buildings ("temples") or for the dwellings of important individuals. The plaza alone covers some 32 ha, and if one includes the various areas which were occupied around the periphery of the plaza, the total extent of the site comes to about 100 ha. At one time, the three sides of the site away from the river were surrounded by a bastioned palisade, traces of which show up in air photographs, and the existence of which has been confirmed by archaeological excavation (Peebles 1979:Fig I-1, passim). In terms of both its size and architectural complexity, Moundville is certainly one of the most impressive late prehistoric sites north of Mexico.

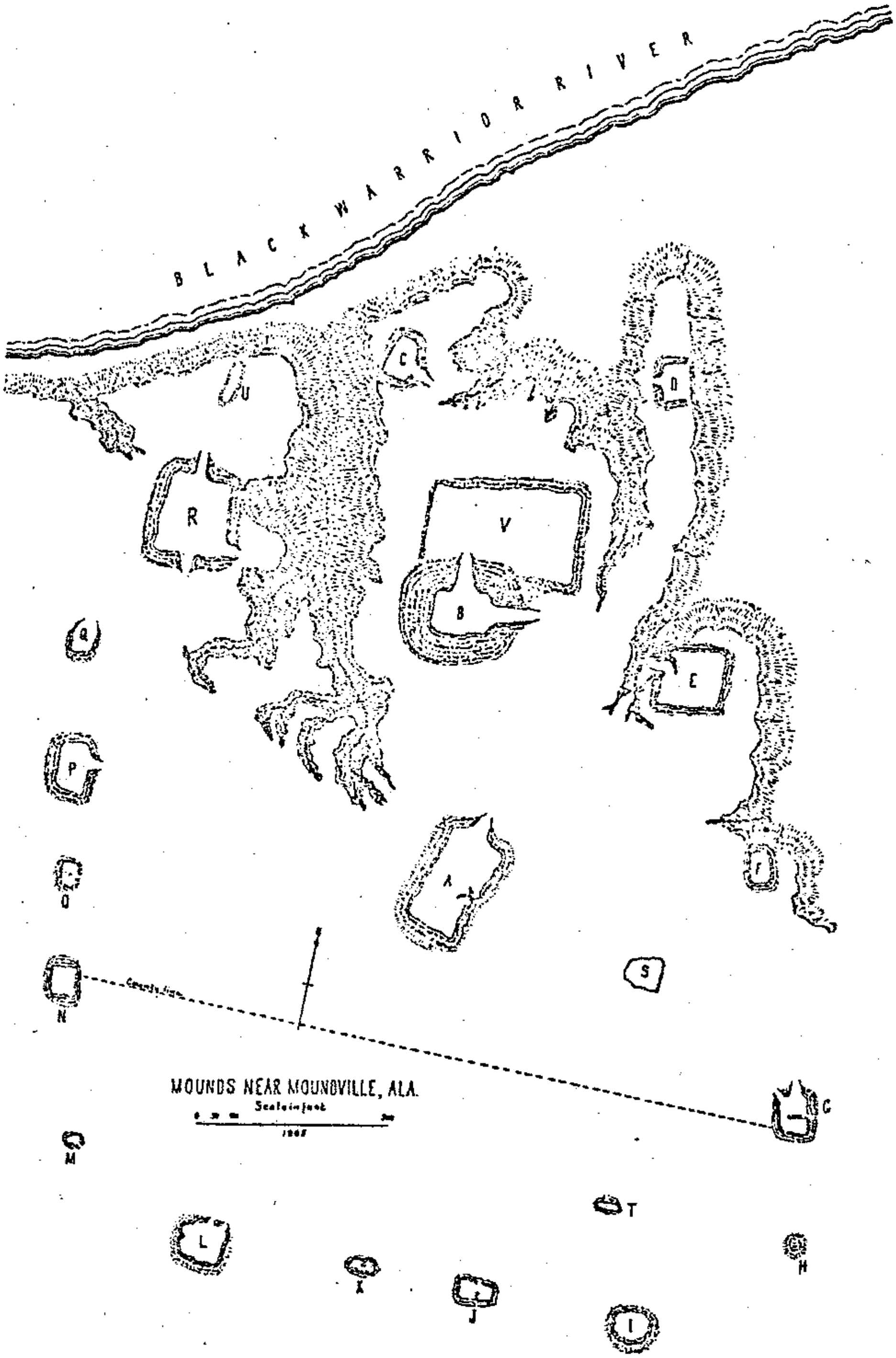


Figure 2. The Moundville site (after Moore 1905:129).

Investigations at Moundville Prior to 1978

> ... near Carthage ... there are many mounds of various sizes, some of which are large [Pickett 1900:168; orig. 1851].

No doubt because of its tremendous size, Moundville has attracted the attention of antiquarians for quite some time. Descriptions of the site appeared in print as least as early as 1851 (see above), and continued to crop up in the literature thoughout the second half of the nineteenth century (e.g., Brewer 1872:271; Thruston 1890:Fig. 84; Thomas 1891:13). Variously referred to as the "Carthage group" (after a nearby town) or the "Prince mounds" (after the landowner), these earthworks owed at least some of their early notoriety to the work of the fledgling Smithsonian Institution, which twice sent its agents to investigate. The first of these recorded visits was made in 1869 by N.T. Lupton, a local scholar of some repute, who mapped the site, briefly described it, and placed an excavation in Mound O (accession records, U.S. National Museum). Some years later, in 1882, a second visit was made by James D. Middleton, who brought back a modest surface collection and another description (National Anthropological Archives: #2400-Box 1). Although neither investigator's observations were ever published in full, many of the unusual artifacts they found were illustrated in the works of Charles Rau (1879:Figs. 49,150,151) and William Henry Holmes (1883:Pl. 56-Figs.1-4, Pl. 66-Fig.6; 1903:Pl. 58f).

It was not until the early years of the twentieth century that Moundville saw its first large-scale excavations, undertaken by the indefatigable Clarence Bloomfield Moore. Moore and his crew of shovel-hands came to Moundville on two occasions: once in 1905 and again in 1906, staying about a month each time. During these two forays they managed to put "trial holes" into practically every one of the mounds, and into many off-mound areas as well. All in all they turned up over 800 graves, many accompanied by pottery vessels and other artifacts of shell, copper, and stone. Moore's excavation techniques were crude by today's standards, but, fortunately for us, he was much more competent than a good many of his contemporaries. He consistently maintained an accurate set of fieldnotes, in which he recorded individual gravelots and their contents, and kept track of the general localities in which his various finds were made. Even more importantly, much of this information soon found its way into two, profusely illustrated volumes (Moore 1905; 1907). These volumes contained the first accurate map and extensive description of the site to appear in print, and, to this day, they remain virtually the only source of information on what was inside the mounds.

The second major episode of excavation at Moundville began in 1929, and lasted until 1941. This work was begun by the Alabama Museum of Natural History, but, with the onset of the Great Depression, it soon came under the sponsorship of various federally-funded relief agencies -- the W.P.A., the C.C.C., and the T.V.A. At first, the excavation techniques were no better than those of C.B. Moore: graves were the only class of feature recognized, and the field records kept were rather spotty. As time went on, however, the techniques greatly improved, so that by the mid-1930s, the excavators had learned to consistently record post holes, wall trenches, hearths, and other structural features that had previously been ignored. Paralleling these improvements in feature recognition was also a greater effectiveness in artifact recovery, as sherds and other small artifacts began to be retained, and their proveniences recorded with greater horizontal and vertical control. Most of the improvements were brought about by David L. DeJarnette, who had been trained at the University of Chicago field school in Fulton County, Illinois, and who effectively directed most of the work at Moundville from 1932 on. By the time the depression-era excavations ended, some 4.5 ha of the site's surface had been opened, yielding over 2000 burials, about 75 structure patterns, and innumerable other finds (Peebles 1979; in press:10-13).

The mass of data produced by the 1905-1941 excavations obviously required synthesis and interpretation, and these concerns were not lost on the investigators at the time. Archaeologists in the 1930's had developed an overriding concern with space-time systematics -- the process of defining cultural units and their relationships to other units in space and time -- and this was the issue that dominated interpretive statements on Moundville until well into the 1960s. Reference to the existence of a "Moundville culture", characterized by a distinctive set of material traits, appeared in print as early as 1932 (Jones 1932). This concept then underwent a gradual process of elaboration and descriptive refinement (Jones and DeJarnette n.d.; DeJarnette and Wimberly 1941; DeJarnette 1952; Wimberly 1956), a process which eventually culminated in McKenzie's (1966) synthesis of what he called the "Moundville phase". The phase's principal hallmarks included pyramidal platform mounds, square or rectangular wall-trench dwellings, extended burials with grave goods, corn agriculture, and a number of distinctive shell-tempered pottery types, many of which had a "black filmed" surface and were sometimes engraved with elaborate zoomorphic motifs. Geographically, the phase included sites in the Warrior drainage, and some as far north as the Pickwick Basin on the middle Tennessee River. Based on stylistic cross-ties with other regions, McKenzie estimated that the phase lasted from A.D. 1200 to 1500 -- a range which, as we now know, did not begin sufficiently early, but was otherwise nearly correct.

Thus, by the late 1960s the broad outlines of a cultural-historical unit called the Moundville phase had been delineated. And with this accomplished, the focus of research on Moundville began to change. Issues of unit definition were emphasized less, as archaeologists became more and more interested in understanding the sociological meaning of variability within the unit itself. It was with such concerns that Christopher Peebles began working with the Moundville material, and the studies he eventually carried out underlie most of our present notions of how the prehistoric society at Moundville was organized.

Using the data on burials recovered in the 1905-1941 excavations, Peebles performed a set of numerical analyses, by means of which he isolated several distinct segments within the burial population (Peebles 1974; Peebles and Kus 1977; see also Peebles 1971). He argued that one segment, representing the "superordinate dimension," consisted of individuals who belonged to the social and political elite. These individuals were always buried in or near mounds, with an elaborate mortuary ritual, and were consistently accompanied by certain distinctive artifacts which probably served as symbols of their political office or social rank. The remaining segments of the burial population, constituting the "subordinate dimension", apparently contained individuals of lower standing, as evidenced by both mortuary ritual and the poorer nature of their grave offerings. A consideration of the age/sex composition within each segment further suggested that access to elite statuses was principally determined by birth, rather than by life history or achievement. Thus, Peebles' evidence indicated the existence of a marked social hierarchy, in which nobility was largely based on descent.

Not only could ranking be seen in the burials, but a hierarchy could also be discerned among the Moundville phase sites themselves (Peebles 1978). Moundville, with its 20 mounds and its vast extent, was by far the largest and most complex site in the Warrior Valley. Nearby were 10 smaller centers, each with only one mound, as well as numerous villages and hamlets with no mounds at all. Comparision between the sizes of these sites and the agricultural potential of the surrounding soils suggested that the outlying settlements were self-sufficient in their food supply, but that the inhabitants of Moundville were at least partly provisioned by tribute brought in from other sites (ibid.:400-410). Thus, the settlement data indicated a political hierarchy of 3 levels -- major center, smaller center, village/hamlet -- with Moundville clearly at the apex.

Further analysis showed that the spatial distribution of Moundville phase settlements corresponded closely to an ideal configuration, which tended to minimize the costs of moving tribute and administrative information between centers and the populations they controlled (Steponaitis 1978:417-444). In comparing the relative sizes of mounds at minor centers, evidence was also found to suggest that Moundville exacted more tribute-labor from the centers in its immediate vicinity than it did from those slightly farther away (ibid.:444-448).

Such, briefly recounted, was the state of our knowledge in 1978, the year in which this study began. A great many analyses had been carried out, and a great many conclusions had been reached; but all this work shared the one affliction mentioned earlier -- the lack of fine chronological control. Data gathered in the years after McKenzie's (1966) first chronological estimates had exacerbated the problem even further, by showing these estimates to be too short. Preceding Moundville, the West Jefferson phase had been isolated with a good terminal date of A.D. 1050 (Jenkins and Nielsen 1974); following Moundville, the Alabama River phase had been defined as beginning no later than 1550 (Sheldon 1974). Thus, by 1978 it was clear that the Moundville phase itself spanned some 500 years -- quite a bit of time even by archaeological standards. A great deal of cultural change could well have taken place during that amount of time, yet there was never any choice but to regard all burials and sites that dated anywhere within this span as being contemporary. Neither the prior West Jefferson phase nor the sequent Alabama River phase showed any evidence of moundbuilding or hierarchical organization. Thus, Moundville's social and political complexity must have evolved and declined entirely within that undivided 500 year span. Obviously, there was no way this process of development could be studied until a finer chronology was achieved -- and achieving that chronology became this study's first concern.

Aspects of the Ceramic Sample

The ceramic sample on which this study is based consists of two parts. One part, in many ways the most important, subsumes the complete or nearly complete vessels excavated by C.B. Moore and the depression-era archaeologists prior to 1941. These specimens were mostly found with burials, and they will be referred to collectively as "whole vessels", despite the fact that not all of them are entirely whole. The second part consists of pottery fragments found during the recent University of Michigan test excavations north of Mound R. These ceramics were mostly associated with house floors and refuse deposits, and collectively will be called our "sherd" sample. A more extended discussion follows, treating each of the two parts in turn.

The Whole Vessel Sample

The whole vessels included in the sample reside in three museums: (1) the Alabama Museum of Natural History (AMNH) in Tuscaloosa; (2) the National Museum of Natural History (NMNH) in Washington, D.C.; and (3) the Museum of the American Indian (MAI) in New York. The first houses most of the artifactual materials from the depression-era excavations, along with all of the surviving fieldnotes. The second has in its collections a small number of vessels also from the depression-era excavations, given to it by the AMNH in the 1930s. The third museum maintains most of C.B. Moore's excavated material, and also his fieldnotes.

Although there are small numbers of Moundville pots in other museums (e.g., R.S. Peabody Foundation - Andover, Birmingham Museum of Fine Arts, Alabama Department of Archives and History, etc.), the three collections which were examined together contain the vast majority of all the extant material.

Dimensions of the Sample. It was known at the outset of this project that the number of vessels excavated at Moundville was large; but it was not known exactly how many of these vessels could still be located and studied. As the museum work progressed, each collection posed its own peculiar problems, and these problems sometimes imposed constraints that allowed only certain vessels to be studied at the expense of others. The resulting selectivity may well have introduced some biases to the sample, and it is important that these be made clear.

The major problem we encountered at the Alabama Museum of Natural History was lack of time. During the early stages of the work, every vessel that was located was recorded in detail, and thereby included in the sample. Gradually, however, it became apparent that the collection was so large that there was no hope of recording it all in the amount of time available. From this point on, only vessels with secure burial provenience were recorded, and the rest were left out. It should also be noted that a number of vessels were left out because they could not be located in the first place. Most of the Moundville material, though well-curated, was boxed in storage with no key to finding individual cataloged specimens. Thus, securing our sample involved searching through hundreds of boxes one by one, looking for vessels packed in among many other kinds of artifacts, including sherds. Whole vessels that were unbroken, or broken and reconstructed, were easy to pick out. Whole vessels which were stored in fragmentary condition, on the other hand, could easily be mistaken for sherds, and undoubtedly in some instances were missed. Museum files indicate that the depression-era excavations produced from 1350-1400 vessels, most of which were at one time in the AMNH collection. During our three months with this collection, we managed to locate about 1100 of these vessels, the rest having been dispersed to other museums or inadvertently missed. Of the vessels that were located, 932 were included in the sample -- 713 with secure burial provenience and 223 without.

The second major collection was that of C.B. Moore at the Museum of the American Indian, and here the factors governing selectivity were different. The problem was not that the collection was too large, but rather that it was, in a sense, too small. All the vessels in the collection were located and recorded, but this number represented less than half the total C.B. Moore had originally excavated. Although a few of the missing vessels may yet turn up at other museums, I strongly suspect that most of them are no longer available for study. The vessels now in the MAI are conspicuously the nicer ones that Moore found; the missing vessels, on the other hand, tend to be those which Moore described in his notes as being "roughly made", "crude", or otherwise unsavory. In other words, it seems most likely that Moore's collection was deliberately high-graded between the time of excavation and the time of accession at MAI -- whether by Moore himself or by someone else is unknown. Of the 342 pots that Moore unearthed, we recorded 162 (including 9 not in the MAI but illustrated in Moore's reports). Of these 162 vessels, 110 could be assigned to burials or other closed features.

Finally, the small collection of Moundville vessels at the National Museum of Natural History was recorded in its entirety: 22 specimens in all, 10 from gravelots.

Adding all these figures together, we find that our whole vessel sample totals 1120, or about 70% of the estimated 1600 vessels excavated at Moundville between 1905 and 1941. Within this sample, 837 vessels (ca. 75%) can be assigned to specific gravelots or features.

Methods of Recording Data. Each vessel included in the sample was photographed from at least one side, and a set of descriptive characteristics were recorded on a standard form (which form, incidentally, underwent quite a bit of revision and simplification as the project wore on). The kinds of characteristics noted were generally qualitative in nature, such as the presence or absence of secondary shape features, features of design, and obvious indications of wear on the base or on the lip. Early in the fieldwork, each vessel was measured in detail with calipers, and surface colors were recorded with a Munsell chart, but these practices were eventually dropped for lack of time. In a number of instances, vessels which could not themselves be found in the collections were recorded on the basis of photographs in the Alabama Museum of Natural History files and in C.B. Moore's published reports.

For the purposes of reconstructing burial proveniences, I relied as much as possible on the original depression-era burial forms on file at the Alabama Museum of Natural History, and on C.B. Moore's original fieldnotes kept at the Museum of the American Indian. Considerable use was also made of the three Moundville site reports (Moore 1905; 1907; Peebles 1979), not only as sources of supplementary information, but also as keys to deciphering the original field records.

Vessel Numbers. Each vessel in the sample has a catalog number which may consist of three parts: an alphabetic prefix, a serial number, and (sometimes) a suffix. The prefix and serial number are usually equivalent to the original field specimen (F.S.) designation assigned by the excavator. The suffix serves to define the particular episode of fieldwork during which a vessel was recovered -- a necessary piece of information since the same field specimen designations were often re-used by excavators working at different times.

The prefix generally refers to the locality within the site where the vessel was found. Often such a prefix consists of a compass direction combined with a lettered mound designation. Thus, for example, the prefix "SD" represents "south of mound D", and "SWM" represents "southwest of mound M". If the compass direction is left off, then the locality referred to is the mound itself. There are also some locality prefixes which do not follow these conventions, but are simply ad hoc abbreviations for particular named areas of excavation. Examples of such prefixes are "Rho" for the Rhodes excavation, and "Rw" for the Roadway excavation. Finally, there is also a prefix which does not refer to a specific locality at all: "Mi" stands for "miscellaneous", a designation that was sometimes used by the Alabama Museum of Natural History for vessels whose within-site provenience was unknown. The various prefixes are summarized in Table 1, arranged in the conventional order of precedence used when vessels are listed by catalog number (as in Appendix A).

Following the prefix is usually a serial number. Excavators assigned these serial numbers sequentially to the vessels from each locality; however, the numbers were not always consecutive from year to year. An independent numbering sequence was used, and therefore the same serial numbers were re-used, in each of three periods of excavation: (1) Moore's 1905 season, (2) Moore's 1906 season, and (3) the depression era work between 1929 and

TABLE 1
Locality Prefixes and Special Symbols, Listed in the Conventional Order of Precedence*

Prefix	Locality	Prefix	Locality
AdB	Administration Bldg.	H	Mound H
MPA	Museum Parking Area	EH	East of Mound H
Rho	Rhodes Site	SEH	Southeast of Mound H
RPB	Picnic Bldg. W. of R	EI	East of Mound I
Rw	Roadway Excavation	K	Mound K
B	Mound B	L	Mound L
NB	North of Mound B	SL	South of Mound L**
WB	West of Mound B	SM	South of Mound M
C	Mound C	SWM	Southwest of Mound M
NC	North of Mound C	NN'	North of Md. N (prime)
NEC	Northeast of Mound C	WN	West of Mound N
D	Mound D	O	Mound O
ND	North of Mound D	EO	East of Mound O
NED	Northeast of Mound D	WP	West of Mound P
ED	East of Mound D	WP'	West of Md. P (prime)
SED	Southeast of Mound D	NQ	North of Mound Q
SD	South of Mound D	NR	North of Mound R
NE	North of Mound E	WR	West of Mound R
EE	East of Mound E	W	Mound W***
SE	South of Mound E	NW	North of Mound W
F	Mound F	SW	South of Mound W
EF	East of Mound F	NWW	Northwest of Mound W
NG	North of Mound G	Mi	Miscellaneous
SG	South of Mound G	<I>	Incorrect provenience
SWG	Southwest of Mound G	<M>	Provenience missing

* For futher information on the location of these areas, see Peebles 1979.

** All the artifacts from this excavation were originally cataloged with the prefix SK.

*** This refers to an elevated area west of Mounds O and P, which was not actually an artifically constructed mound.

1941. Thus, although the original field specimen designations for vessels are unique within these periods, they are not necessarily unique across all periods. The most practical way to deal with this problem was to add suffixes to the original numbers assigned by Moore. Vessels excavated in 1905 and published in Moore's first report (1905) are suffixed with "/M5". Vessels excavated in 1906 and published in Moore's second report (1907) are suffixed with "/M7". Numbers pertaining to vessels excavated after 1929 are left unsuffixed. So, to give an example, there are three vessels in our sample which were originally designated SD1; the one excavated in 1905 is here cataloged as SD1/M5, the one excavated in 1906 is cataloged as SD1/M7, and the one found after 1929 is simply cataloged SD1.

As inevitably happens when dealing with large museum collections, we occasionally met with vessels whose original field specimen designations were either incorrectly marked or missing entirely. When the proper designations could be reconstructed from photographs or other museum records, the vessels are here cataloged as described above. Otherwise, the vessels are listed with one of two special symbols. The symbol <I>, followed by a field specimen designation, indicates that the latter number is written on the vessel but is incorrect. The symbol <M>, followed by an arbitrary number or a museum catalog number, indicates that no field specimen designation appears on the vessel at all. Whichever of these symbols is used, their practical import is the same: the within-site provenience on such vessels has been lost.

<u>Burial Numbers</u>. Burial proveniences are here usually designated by the burial or skeleton numbers assigned by the

excavator, except that, as with vessel catalog numbers, it was sometimes necessary to add suffixes to avoid redundancy.

C.B. Moore numbered his burials sequentially within each locality, starting a new sequence each time he visited the site. Thus, it is necessary to suffix all of Moore's burial numbers with the locality and season in which they were found, using the same abbreviations as in the vessel catalog numbers described above. For example, 1/SD/M5 refers to the first burial found south of Mound D in 1905, and 2/WR/M7 refers to the second burial found west of Mound R in 1906.

Moore also described in his notes finding features which contained whole vessels but no visible skeletal remains. It is possible that these features were indeed burials in which the skeletal material had decayed away, or they may have been former graves from which the buried individual had been removed as part of an extended mortuary ritual. In some repects the question is academic, since these features are "closed-finds" which for chronological purposes can be treated just the same as actual gravelots. Moore did not number these features, but I have done so for him: They are designated here by the symbol "F.", followed by an arbitrary numeral and a suffix analogous to those appended to burial numbers -- for example, F.2/O/M5.

The depression-era excavators used two slightly different systems for numbering burials, changing from one to the other in 1932. The earlier excavators, like Moore, maintained a separate sequence of skeleton numbers for each locality within the site. The later excavators, however, instituted a master numbering system which applied a single sequence to the site as a whole. Thus, for present purposes, skeleton numbers below 800 are always suffixed by the locality in which they were found -- for example, 42/EI (note that the absence of "/M5" or "/M7" in the suffix implies that the burial was excavated after 1929). Skeleton numbers above 800 are unique within the master numbering system, but for the sake of consistency these have been given locality suffixes as well.

Finally, it should be noted that multiple burials -- that is, burial features which contain more than one individual -- are for chronological purposes treated as single gravelots. In other words, all the vessels found in such a feature are regarded as being contemporary, even if they are listed in the notes as being associated with different individuals. Multiple burials are denoted by concatenating a series of individual skeleton numbers, separated either by commas (when the numbers are not consecutive) or by hyphens (when the numbers are consecutive), and followed by the usual suffix. Thus 1181-83/EE denotes a multiple burial found east of Mound E, containing individual skeletons 1181, 1182, and 1183.

The Sherd Sample

The excavations which produced our sherd sample were carried out in the summers of 1978 and 1979, under the capable direction of Margaret Scarry (University of Michigan Museum of Anthropology). Two 2x2 m squares, designated 6N2W and 8N2E respectively, were opened in the locality north of Mound R. These squares were positioned about 2 m apart, and were excavated to subsoil through cultural deposits more than 2 m thick. The units were taken down with extreme care, using trowels only; features were meticulously isolated and the deposits were taken out in natural levels whenever possible (Scarry 1980). These efforts resulted in very fine control, especially in the lower levels where stratigraphic mixture was virtually nonexistent. Complete description of the excavations will have to await a future report; for present purposes, a synopsis of the stratigraphic levels is presented in Appendix C.

Dimensions of the Sample. Virtually all the pottery from these excavations was studied, except for the few sherds that might still be hiding in the unprocessed flotation samples from 1979. If and when these sherds do appear, some of the counts given here may change a bit, but it is unlikely that any conclusions based on present evidence will have to be altered. All told, the excavations yielded 8212 sherds that could be used in the stratigraphic analysis (Chapter IV). This total excludes the pottery found in postmolds, pits and other features which intruded into earlier midden and thus were stratigraphically mixed.

Methods of Recording Data. When brought into the laboratory, all sherds were tested with a 1/2" mesh screen. Those small enough to pass through were bagged by provenience and placed in storage with nothing more than a cursory glance. Sherds in the larger fraction, which did not pass through, were weighed by provenience and counted according to the classification presented in Chapter III. The resulting sherd counts and weights by level are tabulated in Appendix D.

Level Designations. Throughout the text, stratigraphic levels will be indicated by the abbreviation "L.", followed by number, and suffixed with the designation of the excavated unit. Thus, for example, L.6/8N2E refers to Level 6 in unit 8N2E.

CHAPTER II

CERAMIC TECHNOLOGY

Despite the many obligatory references to Anna Shepard in the Southeastern literature, detailed technological studies of Mississippian pottery have been few and far between. Two people have been mainly responsible for what little recent work on this subject there is. James Porter, for one, has published a number of thin-section descriptions of Mississippian pottery from southern Illinois and elsewhere (Porter 1964a; 1964b; 1966; 1971; 1974; Bareis and Porter 1965; Porter and Szuter 1978). Also, Michael Million has been quite active in doing replication experiments and mineralogical studies, particularly with reference to Mississippian pottery from northeast Arkansas (Million 1975a; 1975b; 1976; 1978).

What follows is by no means a comprehensive treatment of the Mississippian ceramic technology at Moundville. More coverage has been given to some aspects than others, usually reflecting the relative abundance (or lack) of systematic work that has been done. At the very least, the information presented is intended to clarify some of the observed variability in the Moundville assemblage, and also to serve as the basis for future technological comparisons with culturally related assemblages, both across space and through time. Ultimately, such comparisons will not only be fruitful in elucidating patterns of inter-regional exchange, but also, I suspect, will reveal that a good many of the ceramic changes and distinctions which we have long taken for granted as being stylistic, are fundamentally technological in nature.

Clays

Numerous clay outcrops exist in the vicinity of Moundville. Geologically, most of these outcrops belong to the Tuscaloosa Group, an extensive sedimentary deposit of late Cretaceous age (Clarke 1964; 1966; 1970).

In order to see what sorts of clays would have been most readily available to the Moundville potters, ten samples were collected from various outcrops within a kilometer of the site (Table 2). The mineralogical composition of these samples was determined by means of x-ray diffraction, the results of which analysis are summarized in Table 3. Despite evident differences in color and sometimes in texture, the clays are remarkably uniform in the minerals they contain. Consistently present are the clay minerals kaolinite and illite, along with the non-clay minerals quartz, muscovite, feldspar, and hematite. Maghemite, a form of iron oxide closely related to hematite, is detectable only in the iron-rich red clays, but not in the grey. The heavy minerals zircon and garnet, when observed at all, are present in very small concentration,

TABLE 2
Clay Samples from Outcrops in the Vicinity of Moundville

Sample Number	Unfired Color	Fired Color*	Location of Outcrop**
C-1	grey (N5.5)	pinkish white (7.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-2	light grey (N5.5)	light red (7.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-3	grey (5Y6/1)	reddish white (2.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-4	red (10R5/6)	red (10R5/6)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-5	grey (N4.5)	pinkish white (7.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-6	light brownish grey (2.5Y6/2)	pinkish white (7.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-7	white (2.5Y8/1)	pinkish white (7.5YR8/2)	NW1/4 SE1/4 Sec.36,T24N,R4E
C-8	weak red mottled with yellow (7.5R5/2;2.5Y6/4)	pale red (7.5R6/4)	SE1/4 NE1/4 Sec.36,T24N,R4E
C-9	red (10R4/6)	red (10R4/8)	SE1/4 NE1/4 Sec.36,T24N,R4E
C-10	greyish brown (2.5Y5/1)	light reddish brown (5YR6/4)	NW1/4 NW1/4 Sec.31,T24N,R5E

* The samples were fired in air at 650°C for 45 minutes.

** All samples were collected from the east bank of the Black Warrior River, no more than 2m above water level (23 August 1978). Geologically, these deposits belong to the upper portion of the Tuscaloosa Group (see Clarke 1970:10-11).

TABLE 3
Mineralogical Composition of Clay Samples

Mineral Phase	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10
Quartz	X	X	X	X	X	X	X	X	X	X
Muscovite/Illite	X	X	X	X	X	X	X	X	X	X
Feldspar*	X	X	X	X	X	X	X	X	-	X
Kaolinite	X	X	X	X	X	X	X	X	X	X
Hematite	X	X	X	X	X	?	?	X	X	?
Maghemite	-	-	-	X	-	-	-	X	X	-
Zircon	-	?	-	-	?	-	-	?	-	-
Garnet**	-	X	-	-	-	-	-	-	-	-
Unknown (6.6A)***	X	X	X	-	-	X	X	X	X	X

Key: X = definitely present; ? = probably present; - = absent or not detected.

* Mostly Microcline.

** Grossularite.

*** This phase is represented by a low, very broad peak at about 6.6 Angstroms. Our best (tenuous) guess is that it may be a clay mineral of the attapulgite-palygorskite group (Grim 1968:Table 5-16).

and so their apparent absence in many of the samples could simply be due to insufficient sensitivity in the detection technique. All in all, the range of minerals corresponds closely to what one finds in Moundville sherds (to be discussed in a subsequent section), indicating that clays of this sort were indeed used by the Moundville potters.

Apart from these kaolinite/illite clays, deposits of montmorillonite clay also occur in the Black Warrior River valley. Geologically, these clays come from the lower portions of the Tuscaloosa Group, and they tend to outcrop most frequently to the north and east of Moundville (Clarke

1966, 1970). The closest reported outcrop is in the vicinity of Snows Bend, about 36 km upstream along the Warrior (Clarke 1966:75). Although these outcrops could conceivably have been exploited, we have no evidence from our mineralogical studies of sherds that they were. In fact, this apparent lack of exploitation makes perfect sense from a potter's viewpoint, since montmorillonite-rich clays typically have very high shrinkage rates and are usually considered inferior as raw materials for making pottery (Shepard 1956:376-377).

It should also be noted that various geologically recent alluvial clays would presumably have been available in the floodplain of the Warrior River. However, none of these clays was sampled in the field, and, to my knowledge, no published descriptions of their mineralogical composition exist.

Tempering Materials

The vast majority of Moundville pottery is tempered with crushed shell. This shell was probably obtained from locally available mussels, a presumption which is strengthened by the fact that temper particles, when viewed microscopically in thin-sections, commonly exhibit the kinds of internal shell structures that are typical of the family Unionacea -- a taxon which includes a large portion of the bivalves native to the interior rivers of the Southeast (see Taylor et al. 1969:109-115).

Although direct archaeological evidence of the practice is still lacking in our region, it is quite likely that shells were deliberatly heated before being added to the paste as temper (Porter 1964:3-4; Million 1975a:218-219). Such heating would have offered the potter two practical advantages. The first and most obvious benefit is that heating whole shells makes them extremely friable, and greatly reduces the effort required to crush them to the appropriate size. The second benefit has to do with certain changes in shell mineralology which takes place at elevated temperatures. Unionid shells in their natural state consist mainly of the mineral aragonite (Taylor et al. 1969:109; Porter 1964:2), which, when heated to about 500°C, alters irreversibly to calcite (Hutchinson 1974:454). Although both these minerals are crystalline forms of calcium carbonate, the shift from one to the other entails an expansion in volume which could cause some damage if it were to occur inside the vessel wall during firing. Pre-heating the shell reduces the risk of such damage, by allowing the expansion to take place before the shell is even added to the paste. Million (1975a:219; 1975b:202) has found conclusive evidence that Mississippian potters in northeast Arkansas used burned shell as temper, and given the cultural similarities between the two regions there is no reason to believe that the Moundville potters would have done otherwise.

Estimates derived from examining thin-sections of Moundville pottery indicate that shell temper comprised from at least 20 to at least 50 percent of the fired ware by volume (Table 7). One should realize that these percentages are probably underestimates, because our microscopic technique was capable of counting only the particles large enough to be resolved at 125 magnifications, leaving out the fine silt- and clay-sized carbonate "dust" which is reportedly produced when burned shell is crushed (Million 1975a:219).

Another tempering material which sometimes appears in Moundville pottery is grog, consisting of crushed sherds. Grog occurs as the sole tempering agent only in the very early and (possibly) in the very latest part of the occupation at Moundville; during most of the "Middle Mississippi" occupation (Moundville I-Moundville III), grog was used only in combination with crushed shell, never by itself. The one grog and shell tempered sherd examined in thin-section was estimated by point-counting to contain about 23% grog by volume (S-2 in Table 5).

It should also be noted that a small, but consistent proportion of the pottery found in Mississippian contexts at Moundville appears to be untempered. I say "appears to be" because I have not looked at any of those specimens in thin-section, and the slim possibility exists that they once contained very fine shell, now leached out. These vessels tend to be relatively small, and usually are made in rather simple shapes. They also consistently exhibit a distinctive grey color, both in surface and in core, which is unlike the reddish tones seen in most tempered pottery, but is very similar to the color of certain local, unfired clays (e.g., C-1, C-2, and C-3 in Table 2). This may well indicate that such vessels were fired neither high enough nor long enough to oxidize the clay of which they were made -- perhaps a technological necessity in the absence of temper.

Vessel Forming, Finishing, and Decoration

No complete or very detailed study has yet been undertaken of the forming techniques used by Moundville potters. We are fortunate, however, in that Sander van der Leeuw and Margaret Hardin -- both ceramic technologists with much more experience in such matters than I -- have had the opportunity to spend some time looking at a sample of whole vessels, and have arrived at some preliminary conclusions in regard to how these vessels were constructed. The descriptions to be presented below rest largely on their unpublished reports (van der Leeuw 1979; Hardin 1979), supplemented to some extent by my own observations.

At least four generalized vessel building methods or "traditions" can be recognized in the Moundville assemblage. Two of these methods make use of the technique usually referred to as coiling, in which the vessel wall is built up by successively adding horizontal strips or rings of clay, one above the other (Shepard 1956:57-59). The other two methods make use of slab construction and hand modeling, respectively.

1. <u>Coiling with a Support</u>. This method was frequently employed in making bottles, cylindrical bowls, pedestaled bowls, and simple bowls. Its distinguishing feature was the use of a flat or basin-shaped support on which the vessel's base could rest. Minimally, the support acted as a pivot on which the vessel could be turned as coils were added to the walls; in some cases the support also served as a mold in which the base was formed by squeezing out of a lump of clay (van der Leeuw 1979:2-5). It is difficult to say exactly what the support itself consisted of, but a large sherd or shallow bowl would have served the purpose well.

Also worthy of note are two building procedures which appear less frequently than the "standard" method described above, but are probably just extreme variants within the same technological tradition. The first is simple coiling without the use of a support; a minority of bottles and bowls seem to have been constructed in this way. The second is a highly efficient technique whereby the base and shoulder of a bottle were molded separately in hemispherical supports, and the two halves were joined to form a subglobular body, in which an orifice was subsequently cut out and a neck added. Noting that the latter variant only seems to occur relatively late in the ceramic sequence (i.e., Moundville III), Hardin (1979:2-3) has suggested that the function of the support in vessel building may have undergone a gradual development through time: Early on, the support may only have been used to rotate the pot; later it began being used to mold the shape of the vessel's base, and later still to mold the shape of the entire body -- an intriguing hypothesis which deserves further attention.

2. Coiling with Paddle-and-Anvil Finishing. This method was employed in building most unburnished jars, as well as some flaring rim bowls. Van der Leeuw reconstructs the procedure as follows:

> All through the period covered by the Moundville materials these vessels seem to have been made in one and the same basic manner, i.e., by coiling without the use of any support or rest. After thus shaping the pot roughly, the potter would "iron out" most irregularities by beating it with a paddle, supporting the inside with an anvil. The paddle was flat and smooth, not covered with string or any other substance [1979:5].

Evidence that the paddle and anvil technique was used "comes basically from the surface treatment of all the vessels concerned: faceted surfaces which, after smoothing or polishing, have a 'hammered' appearance" (ibid.). One might add that the pottery "trowels" (Fig. 3a) which are found on the site probably served as the anvils in such a procedure, an interpretation first proposed by Thruston (1890:161-162) and Holmes (1903:35-36) a good many years ago.

3. Slab Building. This rather distinctive method was used in making rectanguloid vessels, including some of the step-sided bowls, which, though generally rare, seem to turn up more often at Moundville than anywhere else. As inferred

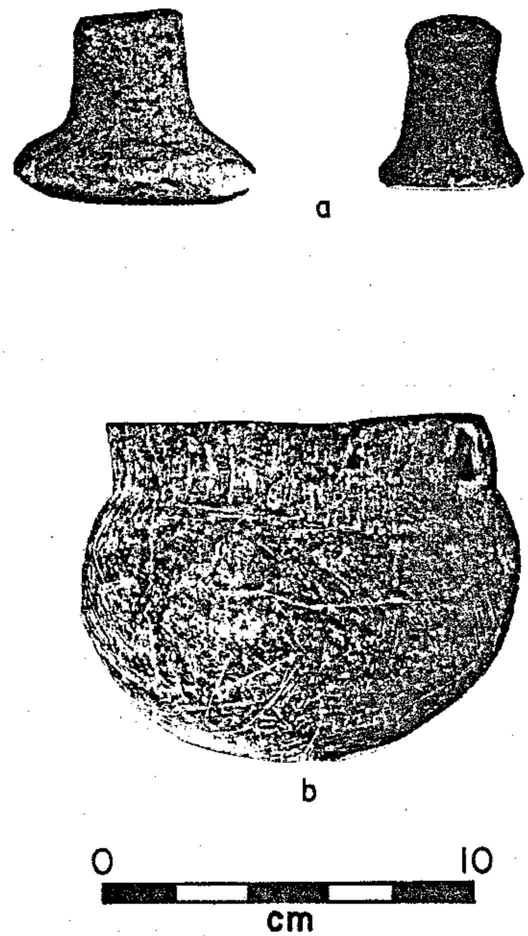


Figure 3. Ceramic artifacts from Moundville: a, pottery "trowels" (MAI-17/2795); b, unburnished jar showing evidence of scraping on exterior (WR69).

by van der Leeuw,

> The technique is one of rolling out slabs of paste, cutting those into the desired shape, and joining them at the edges, then assembling the whole vessel. In some cases, more than one surface may be constructed out of one and the same slab by bending at right angles, if and only if the clay is coherent enough to support such an action [1979:5].

4. Hand Modeling. This method simply involved starting with a lump of clay, and manipulating this lump directly into the desired vessel shape using one's hands. Vessels made in this way were usually simple bowls and miniatures of various forms. Apparently, the simple nature of the technique precluded its use in the building of large and or intricate pieces.

After a vessel was completely built up by one of the methods described above (but especially the coiling methods), the vessel's walls were often scraped to thin them and make them lighter. Of course, the striations left by the scraping tool only remain visible in those places where they were not obliterated by subsequent finishing. Thus, the marks are seen most frequently on the relatively inconspicuous interior surfaces of constricted-orifice vessels such as bottles; they do, however, occasionally turn up on exterior surfaces as well (Fig. 3b).

The two most common surface finishing techniques used by Moundville potters can be referred to as smoothing and burnishing. The former involved evening out the surface of the vessel while the clay was still fairly wet, probably by wiping the surface with something relatively soft and pliant (Shepard 1956:187-191). The finish that results from this treatment is fairly smooth, but not compacted or lustrous. Burnishing, on the other hand, was accomplished while the clay was in a somewhat drier state, by rubbing the previously smoothed surface with a hard, blunt instrument -- possibly a waterworn pebble (Shepard 1956:191). This treatment produces a compacted surface which is often lustrous or "polished" in appearance. There are numerous instances in our sample where the potter was perhaps not meticulous enough in rubbing, and the striations left by the burnishing tool are still plainly visible. A burnished finish is usually found on bowls and bottles; a smooth unburnished finish is usually found on jars.

A number of Moundville vessels show clear evidence of having been slipped. Often a slip was used in cases where the temper in the paste was fairly coarse but the potter wished to produce a burnished finish. Since it is difficult to satisfactorily burnish a coarsely tempered vessel -- the larger temper particles tend to drag in the clay as the tool is moved across the surface -- a slip of untempered clay was applied over the coarse paste and the slip itself was burnished. Slips also were employed to achieve particular surface colors in firing. For example, a white color could be produced by firing under oxidizing conditions a clay containing little or no hematite. Moundville potters sometimes used such white-firing slips on vessels otherwise constructed of pink-firing clays. A case in point is provided by one of the thin-sectioned sherds (Table 4): Mineralogically, the slip in this sherd is quite different from the vessel wall, in that the slip contains relatively abundant quartz, mica and feldspar, but completely lacks hematite.

TABLE 4
Mineralogical Composition of the Slip and Vessel Wall in Specimen S-1*

Mineral Phase	Slip	Wall
Calcite (shell)	-	49.7%
Quartz	21.3%	4.0%
Hematite	-	1.8%
Muscovite (mica)	5.3%	-
Feldspar	2.1%	-
Zircon	1.1%	-
Undifferentiated Matrix	69.1%	39.6%
Void	1.1%	4.8%
Fired Color	white (7.5YR6/3)	pale yellow-red (7.5YR7/4)

*The mineral percentages were derived by point-counting at a magnification of 125x. The number of points sampled was 94 for the slip, and 767 for the wall.

A number of red filmed vessels also occur in the Moundville assemblage. It is clear that the bright red color was achieved by applying hematite to the surface and firing under oxidizing conditions. In many cases, the hematite seems to have been applied in the form of an iron-rich clay slip, but I am not sure that this method was the only one used.

This brings us to a consideration of the "black film" so common on the Moundville bowls and bottles, and the evidence for how this color was produced. It has traditionally been maintained that the black film results from an organic paint applied directly to the surface by the potter. This idea was first proposed by C.B. Moore (1905:140) more than seventy years ago, based on both visual and chemical evidence:

> ... the Moundville ware, except in the case of cooking vessels, is almost invariably covered with a coating of black, more or less highly polished on the outer surface. This coating was not produced by the heat in firing the clay, but was a mixture intentionally put on by the potters. Scrapings from the surface of a number of vessels were furnished to us by Harry F. Keller, Ph.D., who, by analysis, arrived at the conclusion that the black coating on the earthenware is carbonaceous matter. ... From its appearance and chemical behavior, Dr. Keller concludes that it must have been applied in the form of a tarry or bituminous matter, which upon heating out of contact with air, was converted into a dense variety of carbon. Doctor Keller is of the opinion that a mixture of soot and fat or oil might produce the effect, though the numerous lustrous particles resembling graphite rather suggest the carbonization of a tar-like substance.

Considerably later, F.R. Matson did a series of experiments on black filmed sherds from the Guntersville Basin that led him to a similar conclusion:

> An examination of a group of Moundville Black Filmed sherds showed that several of them had an oxidized core buff to salmon in color, while other pieces with gray cores had an oxidized area at one or both surfaces. Upon the surfaces themselves, covering the light area, appeared the black film.

> That this film could not have been produced while the vessels were being fired was indicated by the oxidized region just beneath it ...
>
> It would be possible to obtain such a black surfacing either by using a slip containing iron which when fired under reducing conditions would produce a black iron oxide coating, or by applying an organic paint that a reducing atmosphere would carbonize [quoted in Heimlich 1952:29].

Matson's experiments adequately demonstrated that the dark surface color was not the result of an iron oxide paint or slip; therefore, by process of elimination, he concluded that the color had to be due to an organic paint (ibid.:30-31). Furthermore, he argued that the paint had to be applied with a second firing, because the initial firing which produced the oxidized core in these sherds would at the same time have oxidized (i.e., burned off) any organic paint on the surface.

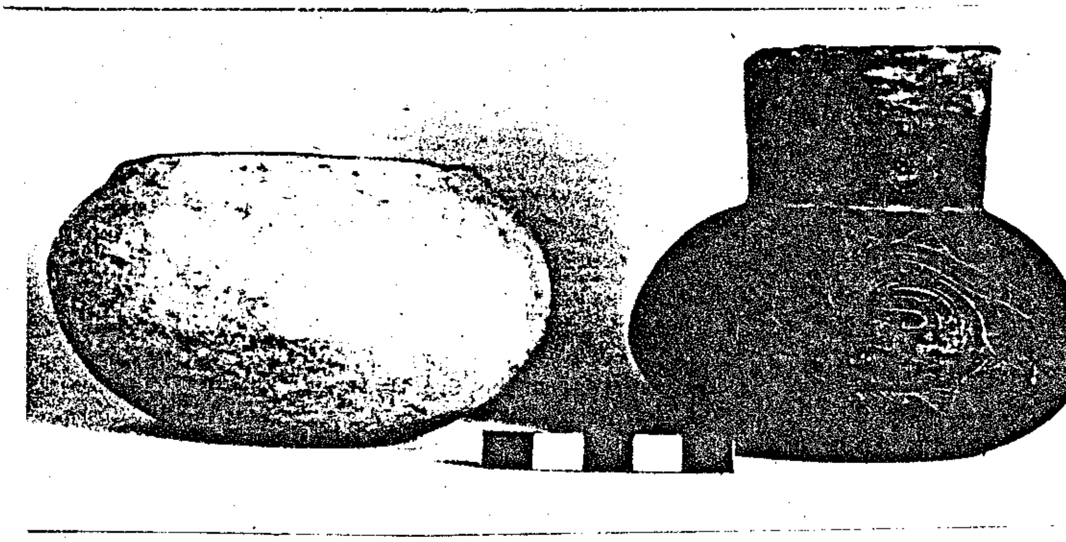
Although these arguments have gained some acceptance over the years, they are not as convincing as they would appear to be at first glance. The conclusions of both Keller and Matson rested in the dubious premise that the carbonaceous matter on the surface could only have been the residue of an organic paint applied before firing. Only by taking this premise for granted could Matson have argued reasonably for the necessity of a second firing in order to obtain a dark surface over an oxidized core.

It should be noted that there does exist a simple method of producing a black film apart from direct painting. This process is referred to as "smudging", which is described by Shepard (1956:88) as a "means of blackening pottery by causing carbon and tarry products of combustion to be deposited on it." A vessel can be smudged after firing, or smudging can take place during the process of firing itself. All it requires is a smoldering fire that burns with a sooty smoke, and a certain amount of care to ensure that the soot deposited on the vessel's surface is not burned away by direct contact with the flames.

A key point that Matson did not consider is that the firing atmosphere need not remain constant during the course of a single firing. The burning of charcoal in an open firing tends to produce a neutral or oxidizing atmosphere; the burning of fresh fuel tends to produce a reducing atmosphere (Shepard 1956:217). Thus, it is quite possible to vary the atmosphere during open firing by manipulating the fuel supply and to some extent by controlling the draft.

These considerations raise the possibility that the black filmed wares owe their surface color not to an organic paint, but rather to a process of deliberate smudging and reduction in firing. The observed characteristics of these wares could well have been produced in a single firing and without the use of paint, if the following procedure were used: First the vessels could have been placed in a "clean" fire, which would oxidize both the surface and the core. Then, in the very last stages of firing, fresh fuel that burned with a sooty smoke could have been added; this fuel would have produced a reducing atmosphere and inevitably have brought about some degree of smudging. Both the reduction and the smudging would contribute to blackening the vessel, because reduction darkens the color of iron oxides in the clay, and smudging deposits carbon. As long as the reduction and smudging were of relatively short duration, their effects would be confined to the surface, and the core of the vessel wall would still remain oxidized. Exactly this kind of technique for producing blackwares has been documented among traditional Catawba potters (Fewkes 1944:91).

It is difficult to conclusively demonstrate that the above procedure was actually the one used in making the black filmed wares at Moundville. We can, however, show that it was indeed possible to produce the dark color in this way using locally available clays. As noted previously, a number of apparently local vessels at Moundville exhibit zones of red paint on a whitish surface, colors that could only have been achieved by deliberate firing under oxidizing conditions. Such vessels invariably have a few irregular patches on their surface where the whitish color has turned black (Fig. 4b, left). These patches of black are obviously not the result of painting; rather they can only be interpreted as places where the surface was accidentally reduced and/or smudged in firing. Conversely, black filmed vessels sometimes exhibit patches of whitish color that have resulted from accidental oxidation (Fig. 4b, right). These observations clearly suggest that differences in surface color -- from white to



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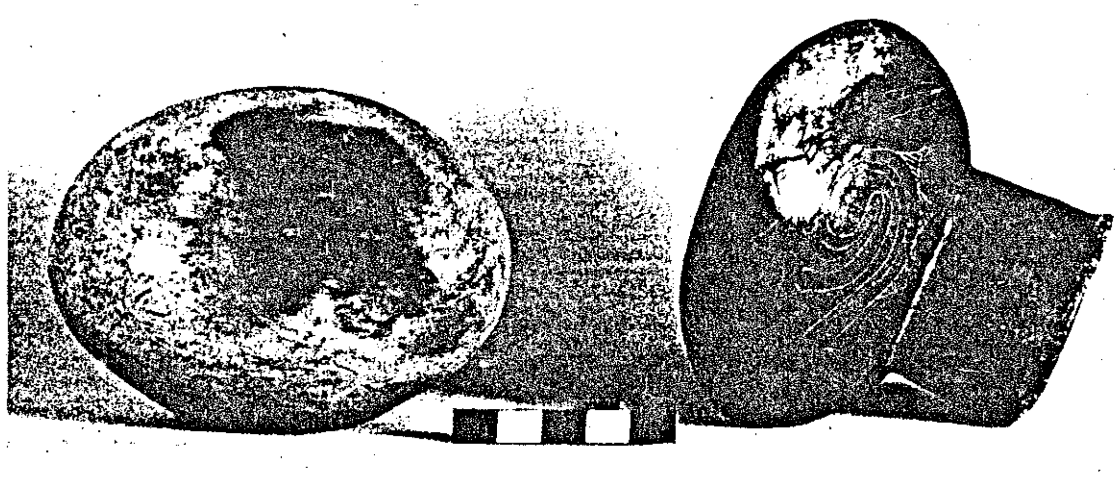

b

Figure 4. Fire-clouding on white- and black-surfaced vessels: a, the vessels are in upright position; b, the vessels are turned to reveal fire-clouding. Note that the accidentally reduced areas on the white-surfaced vessel are black, and oxidized areas on the black surfaced vessel are white (left - Rho302, right - Rho304).

black -- can be produced simply by varying the conditions under which the clay is fired. Additional confirming evidence has come from a series of replication experiments conducted by Robert Lafferty and Ned Jenkins of the University of Alabama (personal communication). Using clay from a single local source, they were able to produce both white and black-surfaced wares without paint just by changing the nature of the firing atmosphere.

Moundville potters usually applied no more than one surface color to any given vessel, yet there are cases where two or even three colors were combined. Among the combinations used were red and white, black and red, black on white, and (in one case only) black-and-red on white.

The red and white effect usually was achieved by first slipping the vessel with a white-firing (iron-deficient) clay, and then covering certain areas of the slip with red-firing (iron-rich) clay. Sometimes the two kinds of clay were applied to separate parts of the vessel, rather than one over the other. With either method, simply firing the vessel under oxidizing conditions would bring out the desired colors.

Considerably trickier was the red and black effect, since black can only be produced by reduction in firing, and red can only be produced by oxidation. Judging from the evidence on the vessels themselves, this technological dilemma was circumvented as follows: After the vessel had been built and burnished, the areas to be colored red were covered with a noticeably thick layer of hematite-rich clay. The vessel was then fired in the usual way to produce a black film -- initially oxidized, then smudged/reduced at the very end to leave a thin layer of black on the surface. As long as the smudging did not penetrate too deeply, the desired color contrast could be achieved by mechanically abrading away the darkened surface only in those places where the hematite-rich clay had been applied, exposing the oxidized, bright red color below. Supporting this reconstruction of the technique are two observations: 1) the red areas often have a matte, slightly rough texture, which contrasts with the burnished appearance of the surrounding black areas; and 2) in some patches where it was not fully abraded off, the original darkened surface can still be seen covering the red.

The black on white effect was apparently produced by means of a negative painting technique. First, the vessel was white slipped and fired under oxidizing conditons. Next, after the vessel had cooled, the design was executed on the surface with a "resist" material, and the surface was coated with carbon black -- perhaps by exposure to sooty smoke, or possibly by applying an organic paint and briefly re-heating (see Shepard 1956:210). When the resist material was removed, the areas which had been covered would still retain their original color, and stand out as white against a dark background. The black and red on white effect was produced in essentially the same way, except that the additional step was taken of applying hematite-rich clays over portions of the white slip before firing. The nature of the resist material used by Mississippian potters is still unknown, and it is not likely to be known until replication experiments are undertaken.

Turning now to a different subject, let us briefly consider the two predominant forms of tooled decoration used on Moundville pottery: incising and engraving. The basic difference between these two techniques lies in the state of dryness of the paste at the time the decoration is applied. Although I find it convenient to discuss these terms in dichotomous fashion, it should be apparent that they refer to two halves of a continuum in decorative execution, and a precise boundary between them is often difficult to find in practice.

Incising refers to lines which were cut into the vessel when the paste was either plastic (i.e., very wet) or leather-hard (i.e., partially dry). Plastic incisions typically have burred margins and pushed-up heels at the ends of lines -- evidence that the paste was able to "flow" readily as it was being displaced by the tool. Leather-hard incisions, on the other hand, tend to have a compact trough and clean edges -- indicating that the paste was somewhat firmer when the tool was applied (Shepard 1956:198). The Moundville potters used plastic incisions mostly in decorating unburnished jars, and leather-hard incisions mostly in decorating burnished bowls and bottles.

The lines we conventionally refer to as engraved were cut when the paste was considerably less moist, either when it was very dry prior to firing or sometimes even after firing. Such lines tend to be relatively narrow, and often exhibit chipping along the margins and in the trough. Contrary to certain widely-accepted assertions (cf. McKenzie 1966:7), most, if not all, engraving on Moundville pottery was done before firing, not after. Evidence of this fact can be found in the lines themselves: When examined with a hand lens or even with the naked eye, usually some areas of the trough are found to be smooth and compact, a texture which could only have been formed while the clay was still somewhat plastic. On vessels which have been black filmed or smudged in firing, it is also noteworthy that the trough of the engraved line usually exhibits the same dark color as the rest of the surface -- contrary to what one would expect of post-fired engraving, where the line would necesarily cut through the dark surface exposing the lighter color below (Shepard 1956:198). Although it is not uncommon to find vessels where the engraving at first glance does appear to be lighter than the rest of the surface, closer examination almost always reveals that the lighter color is an illusion caused by the presence of very fine soil particles caught in the line. Moundville potters used engraving to decorate burnished bowls and bottles, but never jars.

Some engraved vessels also exhibit the technique of excising, whereby relief is added to certain areas of the design by removing the surface to a shallow depth. Excising at Moundville was apparently not done with a gouge, but rather seems to consist of multiple engraved incisions, as though entire areas were "scribbled in" with the same narrow, pointed tool used in executing the rest of the design.

Punctation as a decorative technique is relatively uncommon at Moundville. It was occasionally used to decorate unburnished jars, and was always done when the paste was still in a wet, highly plastic state. In most cases, the punctating implement had a blunt and narrow (3-4 mm) tip, which was applied perpendicularly to the vessel's surface. Sometimes the punctations exhibit raised centers, indicating that the implement was hollow, perhaps a reed.

Apart from tooled decoration, many kinds of modeled and applique decorations occur in the Moundville assemblage as well. Under this rubric fall applique nodes, notched applique bands, indentations, lugs, handles, applique neck fillets, and various effigy features, to name a few of the more common. However, since I have little to say about these features that is technological rather than purely descriptive, I will not take them up in detail here. What little technological information has been gathered will be presented in the appropriate descriptive sections.

<u>Ceramic Mineralogy and Firing Temperature</u>

Mineralogical studies were carried out on a sample of 10 sherds from Moundville (Table 5). The sherds were selected so as to make the small sample as representative as possible of the paste types and major shape categories present in the Moundville assemblage. Another important

TABLE 5
Sherds from Moundville Used in Mineralogical Studies

Sample Number	Type, Variety	Additional Description
S-1	Bell Plain, Hale	restricted bowl, rim fragment, white slipped
S-2	Moundville Eng., unsp.	subglobular bottle, slab base fragment
S-3	Mississippi Pl., Warrior	jar, rim fragment
S-4	Mississippi Pl., Warrior	flaring rim bowl, rim fragment
S-5	Mississippi Pl., Warrior	jar, shoulder fragment
S-6	Mississippi Pl., Warrior	jar, folded rim fragment
S-7	Moundville Eng., unsp.	cylindrical bottle or bowl, body fragment
S-8	Mississippi Pl., Warrior	jar, rim fragment
S-9	Bell Plain, Hale	subglobular bottle, shoulder fragment
S-10	Bell Plain, Hale	flaring rim bowl, rim fragment

criterion was that they be consistent with what I perceived to be the local style; in other words, obvious imports were avoided. The ten sherds were examined by means of x-ray diffraction in order to identify the mineral phases present in relatively large amounts. In addition, the specimens were thin-sectioned and examined under a polarizing microscope, not only to gather some quantitative and qualitative information on their microstructure, but also to see which, if any, minerals were present in amounts too small to be detected with the x-ray technique.

The major constituents of all the sherds were found to be quartz, muscovite/illite, feldspar, hematite, and calcite (Table 6). Present in minor amounts were the heavy minerals zircon, tourmaline, and possibly garnet -- none of which were sufficiently plentiful to be picked up by x-ray diffraction. Table 7 summarizes the quantitative data on relative abundance for the coarse fraction of the mineral assemblage. These data were obtained by point-counting the thin-sections under a polarizing microscope. Since mineral grains smaller than about 10 microns in size were not resolved at the magnification used, they could only be regarded as "undifferentiated matrix."

Not surprisingly, most of the minerals in the sherds correspond to those in the Moundville clays (see pp. 29-32), with only a few interesting and rather important exceptions. Kaolinite, which occurs in all the clays, is consistently absent in the sherds; and calcite, absent in the clays, is always present in the sherds, having been added by the potters as temper.

By comparing the mineral phases present in the sherds with those in the unfired clay, we can arrive at an estimate

TABLE 6
Mineralogical Composition of Sherds from Moundville

Mineral Phase	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10
Quartz*	X	X	X	X	X	X	X	X	X	X
Muscovite/Illite**	X	X	X	X	X	X	X	X	X	X
Feldspar***	X	?	?	X	X	X	X	X	X	X
Hematite+	X	X	X	X	X	X	X	X	X	X
Calcite (Shell)	X	X	X	X	X	X	X	X	X	X
Zircon	?	X	X	X	?	X	X	X	X	X
Tourmaline++	?	X	-	-	-	X	X	?	X	X
Garnet	-	?	-	-	?	-	?	-	-	-
Unknown (6.6A)+++	-	-	-	X	-	X	X	-	-	X

Key: X = definitely present; ? = possibly present; - = absent or not detected.

* Most grains consist of single crystals. Microcrystalline and cryptocrystalline grains were observed in a few instances, but these forms are rare.

** These two minerals are treated together because they are very similar in their crystalline structure, and hence are difficult to tell apart by means of x-ray diffraction. Fortunately, when dealing with clays, identifying them separately is not critical, because muscovite mica is one parent material from which illite, a clay mineral is formed. Flakes of muscovite can be seen in all the thin sections, and so the presence of illite is strongly implied, even though the latter mineral is too fine-grained to be identified optically.

*** The predominant variety of this mineral seen in our thin-sections is microcline. Only one possible grain of plagioclase was observed in S-4.

+ In thin-section, the hematite usually appears in anhedral, rounded masses of varying size, often containing quartz and/or muscovite inclusions.

++ Most of the crystals observed were yellowish-brown in ordinary light, suggesting that the specific variety may be dravite. A few olive green crystals were also noted which may be schorlite.

+++ This phase is represented by a low, very broad peak at 6.6 Angstroms. Our best (tenuous) guess is that it may be a clay mineral of the attapulgite-palygorskite group (Grim 1968:Table 5-16).

TABLE 7
Relative Abundances of Coarse Mineral Grains in Sherds, Estimated as a Percentage of Total Volume*

Mineral Phase	Specimens									
	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10
Quartz	4.1	4.1	3.3	4.8	2.1	7.8	8.3	5.9	8.5	9.2
Muscovite	-	0.6	0.2	-	-	0.2	0.8	-	0.3	0.2
Feldspar	-	-	-	-	-	0.2	-	0.2	0.2	-
Hematite	1.8	2.2	0.6	4.6	2.9	4.7	3.0	1.7	0.9	1.6
Calcite**	49.7	14.2	33.4	31.6	37.2	35.7	17.9	23.5	23.9	20.0
Zircon	-	-	-	0.4	-	-	-	-	-	0.2
Tourmaline	-	-	-	-	-	-	-	-	0.2	-
Matrix	39.5	75.4	59.6	53.2	53.2	48.0	67.3	64.9	60.8	63.3
Void	4.8	3.5	2.9	5.4	4.7	3.5	2.8	3.8	5.2	5.1
Total %	100	100	100	100	100	100	100	100	100	100
# Points Sampled	767	492	488	541	487	513	532	527	636	564

* Estimates were derived by point-counting under a polarizing microscope at 125x; only grains larger than approximately 10 microns in diameter were sufficently well resolved to be counted.

** Shell.

of firing temperature, since the temperatures at which various phases decompose are known. In this case, the two critical phases for temperature determination are kaolinite and calcite. Kaolinite is known to decompose at temperatures between 550 and 625°C (Searle and Grimshaw 1959:657; Isphording 1974:Fig. 1; Hutchinson 1974:228; Grim 1968:Fig. 9-8). Therefore, since kaolinite is absent in the sherds, we can infer that they were fired at least as high as 550°C. This inference rests of course on the presumption that kaolinite was originally contained in the paste of which the sherds were made. Such a presumption is justified not only by the circumstantial evidence seen in the composition of Moundville clays, but also by the mineralogy of the sherds themselves. Kaolinite is a weathering product of alkali feldspars (Shepard 1956:12), and the presence of the latter in our sherds strongly suggests that the former was once present as well.

Incidentally, a firing temperature this high may also explain why maghemite, a mineral found in some of the reddish local clays (Table 3), does not appear in any of the sherds, since maghemite alters to hematite at between 200 and 700°C (Deer et al. 1962:73-74).

The upper boundary for firing temperature is implied by the presence of calcite. At high temperatures, calcite will decompose to calcium oxide, giving off carbon dioxide in the process. If the calcium oxide is exposed to air, it will gradually hydrate to form calcium hydroxide -- a transformation which entails a large increase in volume. If this reaction takes place within the vessel wall, it will at the very least cause surface spalling and cracking, and at worst will cause the vessel to completely fall apart (Rye 1976:120-121). Neither of these results is desirable, and so it is very much in the potter's interest to prevent the calcite from decomposing in the first place. Most published sources place the rapid decomposition of calcite somewhere in the range between 860 and 910°C (Shepard 1956:22; Hutchinson 1974:453; Searle and Grimshaw 1959:657). I have found experimentally, however, that firing a sherd to as low as 800°C for 45 minutes is sufficient to calcine most of the shell near the surface, resulting in considerable damage to the sherd. Since evidence of such damage is lacking on most Moundville pottery, it is unlikely that firing temperatures reached 800°C for any length of time.

Thus, 550-750°C appears to be he most likely range in which Moundville pots were fired, with 650°C being a good median estimate. This corresponds quite closely to Million's estimate of 600°C for Mississippian pottery in northeast Arkansas, derived by means of replication experiments rather than mineralogy (1975a:600-601). Such temperatures are well within the range that can be achieved in open firing (Shepard 1956:74-91), indicating that kiln devices were not required in manufacturing this ware.

The Effect of Paste Composition on Physical Properties

Moundville pottery can be divided into two broad groups, which differ from each other in both function and paste composition. One group consists mostly of bowls and bottles that were used as eating and storage vessels, but were not used for cooking. Typically, these noncooking vessels are tempered with finely-ground shell, and have a dark surface finish produced by deliberate smudging and reduction during firing. Indeed, the fact that most of them are "black filmed" implies that they were not used for cooking, because contact with a cooking fire would have oxidized the surface and made it lighter.

The second group, the cooking ware, consists of unburnished jars. These vessels, in contrast to the noncooking wares, are usually tempered with coarse shell, and tend to have an oxidized, reddish-brown surface color consistent with what one would expect on a vessel used over a fire.

One can see the difference in the way these two functional groups are tempered by looking at the histograms shown in Figure 5. These histograms illustrate the frequency distribution of the third largest temper particle visible in the vessel's surface, based on a sample of about 50 vessels in each group. (The third largest particle tends to be more representative of the size of the coarse fraction in the paste, since even a finely tempered vessel is likely to have one or two anomalously large shell particles visible on the surface). Although the two distributions overlap somewhat, the unburnished jars clearly tend to have larger shell inclusions than the bowls and bottles. The mean size of the coarse particles is about 4 mm for jars (the cooking vessels) as compared to only 2 mm for bowls and bottles (the noncooking vessels).

Not only do the two groups sort out according to the size of the shell inclusions, but they also tend to differ in amount of visible shell they contain. The histogram in Figure 6 illustrates the volume percentage of visible shell found in the small, but fairly representative sample of ten sherds which were examined in thin-section. One can see

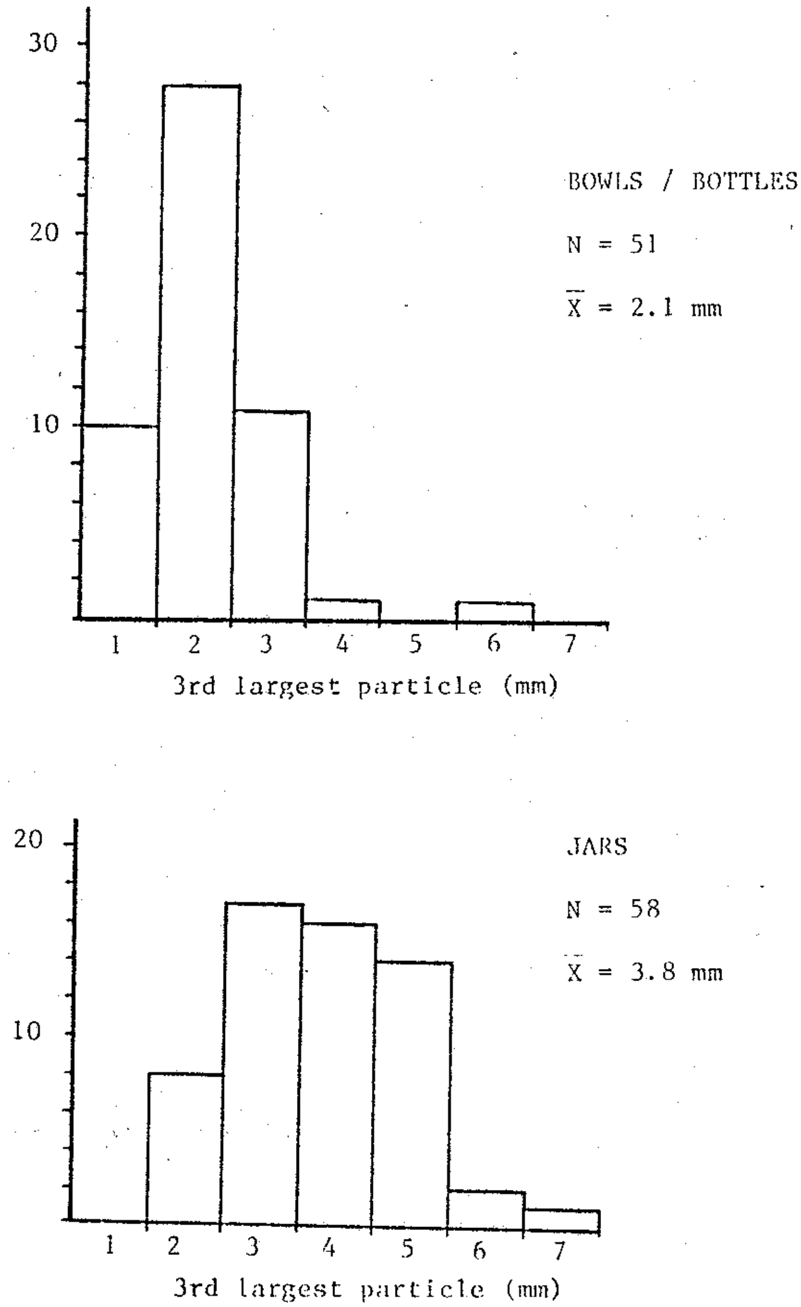

Figure 5. Size frequency distributions for the third largest temper particle in Moundville vessels: top, noncooking vessels; bottom, cooking vessels.

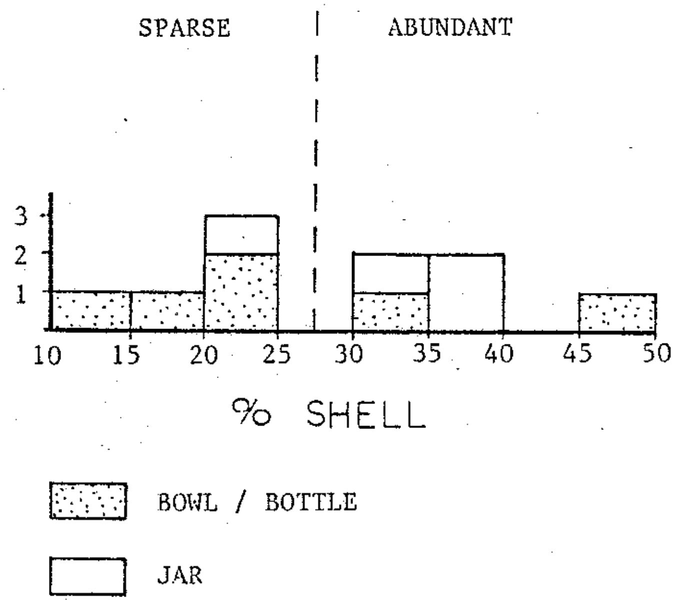

Figure 6. Frequency distribution for the abundance of visible shell temper, expressed as a percentage of total volume (data from Table 7).

that the distribution is bimodal, with most of the cooking vessels having relatively abundant shell, and most of the noncooking vessels having relatively sparse shell.

Quite clearly, Moundville potters tended to use different paste compositions in making vessels designed for different uses. Cooking vessels were usually made with large particles and abundant visible shell, while noncooking vessels were usually made with finer particles and not as much visible shell. Why should this have been so? Many archaeologists, I suspect, have tended to view this distinction as being purely a matter of aesthetics or cultural convention. That is, the fine paste vessels are often thought of as being the "ceremonial" or "nice" ware, while the coarse paste vessels are regarded as the common "utilitarian" ware. The difference in composition is thus implicitly seen as the result of effort minimization: The utilitarian ware did not need to look as nice, and so the Indians did not take the trouble to grind up the shell as finely.

There is good reason, however, to question such an interpretation, at least insofar as the Moundville materials are concerned. Given that the shell was heated before being crushed, very little extra effort would have been required to make the shell particles fine. Moreover, ethnographers have documented a number of cases in which traditional potters make a conscious distinction between cooking and noncooking vessels, and use different paste compositions for each (e.g., Thompson 1958; Arnold 1971; Rye and Evans 1976:28; DeBoer and Lathrap 1979). A number of people have suggested that such customs may well be based on practical considerations, stemming from different physical characteristics required of vessels used for different purposes (Rye 1976; Rye and Evans 1976:8; van der Leeuw 1977; Hulthen 1977).

It therefore seemed reasonable to investigate the possibility that Moundville potters deliberately manipulated paste composition in order to make some vessels more suited for cooking, and other vessels more suited for noncooking tasks. If this explanation for the paste distinctions observed were indeed correct, then logically one would expect to find evidence of two things: first, that the fine paste favored for noncooking wares would impart a high resistance to breakage from mechanical stress -- the kind of stress that might arise when a vessel is accidentally dropped, kicked, and and so on; and second, that the coarse paste favored for cooking wares would impart a high resistance to failure from thermal stress -- the kind that arises when a vessel is subjected to rapid changes in temperature.

The various measurements designed to test these hypotheses were carried out on the ten sherds whose composition had already been determined (Table 5), along with a few additional sherds on which we had no mineralogical information. In order to lessen the possibility of error resulting from post-depositional effects, all the the specimens were carefully chosen so as not to be significantly leached or eroded.

The one major difficulty which hampered our work arose from the unavoidable fact that our archaeological specimens were of limited size. Many of the relevant measurements were destructive, and had to be made on a relatively large piece of the specimen. Thus, even on the larger sherds, not very many measurements could be made before a specimen was entirely used up. The fact that certain kinds of measurements were intrinsically susceptible to statistical error further compounded the dilemma, because in such cases the same measurement had to be repeated more than once. This problem explains why we could not always make a full complement of measurements on every specimen, and also explain why some kinds of measurements, lower in priority, could not be made at all.

Despite these and other minor disadvantages encountered along the way, some consistent and rather intriguing results were obtained. The exposition in the sections below will present the substantive findings, but, out of compassion for the reader, will avoid discussing the intricacies of the measurement techniques employed. An adequate treatment of the latter subject appears in Appendix E.

Resistance to Mechanical Stress

Testing the first part of the hypothesis was relatively straightforward: slabs were cut from each of the ten sherds which had already been thin-sectioned and x-rayed, and their modulus of rupture (s) was measured by means of a three point bending test (Table 8). The modulus of rupture is a

TABLE 8
Physical Properties Measurements

Sample Number	Tensile Strength* (kg/cm2)	Apparent Porosity* (% volume)	Diffusivity* (cm2/sec)	Elasticity* (kg/cm2)
S-1	126.0	29.2	20.2	12240
S-2	174.4	28.0	16.4	18882
S-3	119.2	28.0	14.9	6936
S-4	126.9	27.7	19.0	11904
S-5	117.9	26.7	18.5	13200
S-6	83.5	31.6	18.6	6978
S-7	163.9	30.2	21.0	19092
S-8	116.6	27.2	16.2	7626
S-9	147.5	27.4	21.0	12984
S-10	148.6	30.0	16.0	11646

* The median of two or three measurements on each sherd.

measure of tensile strength; the higher the modulus, the more resistant is the material to fracture from mechanical stress. When the modulus was plotted against the volume percentage of shell temper, exactly the relationship we had expected was found (Fig. 7). The less shell is present in the paste, the higher is the tensile strength. Thus, the finely tempered bowls and bottles (denoted by squares on the diagram) indeed appear to be stronger and more resistant to breakage from mechanical stress than the coarsely tempered jars (denoted by triangles).

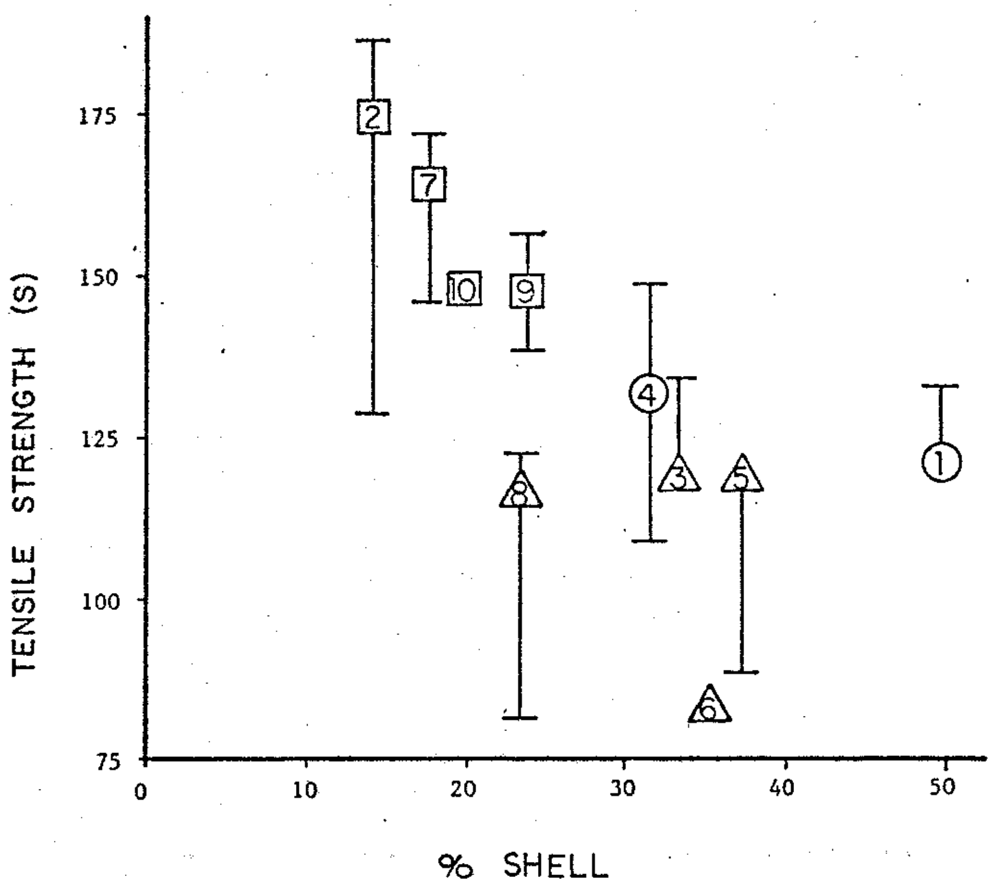

Figure 7. Tensile strength (S) plotted against the percentage of visible shell temper. The median value of S is plotted for each specimen, the error bars indicating the range of values obtained.

Of course, one might legitimately wonder to what extent the strengths we measure might have been affected by the kinds of stresses to which the vessels were subjected when they were actually being used. Could it be, for example, that the coarsely tempered jar sherds have lower strengths because they were subjected to thermal shock and weakened in day-to-day cooking, while the bowls and bottles were not? Perhaps, but note that the two coarsely tempered bowls (denoted by circles), neither of which was likely to have been used for cooking, also have low strengths compared to their more finely-tempered counterparts, making it seem unlikely that the relationship between strength and paste composition is simply a spurious outcome of different thermal histories while in use.

Resistance to Thermal Stress

The first problem one encounters when dealing with thermal stress resistance is in deciding exactly what property one needs to measure. Unlike many other physical properties, thermal stress resistance is not defined in absolute terms; rather, it can best be thought of as a set of related properties, each of which is relevant to a different set of practical situations. In order to see what sorts of measurements may be relevant to the question at hand, it is useful to consider the theory of thermal fracture in ceramics that has been worked out by D.P.H. Hasselman (1969).

The diagram shown in Figure 8 illustrates what happens to the strength of a ceramic material when it is subjected to thermal shock. The vertical axis represents strength, and the horizontal axis denotes the severity of thermal shock. Thermal shock occurs when a body is suddenly quenched from one temperature to another; the greater the temperature difference (ΔT), the steeper is the thermal gradient within the material, and the more severe is the thermal shock. The diagram shows that as the severity of thermal shock increases, there is no change in strength until a certain critical temperature difference (ΔTc) is reached. At that point the material will crack (usually microscopically), and the strength will instantaneously decrease to a lower level. Strength will remain stable at this lower level, until a second critical point is reached ($\Delta Tc'$), after which the stength will decline gradually as ΔT increases.

For present purposes, it is of interest to compare the ware groups at Moundville in terms of two properties, each of which can be taken as a measure of thermal shock resistance. One is the severity of shock necessary to initiate cracking, i.e., the value of the initial critical temperature difference (ΔTc). The second is the amount of loss of strength that occurs when the critical temperature difference is reached. A material with high thermal shock resistance either will have a high value of ΔTc, or else it will exhibit a minimal degradation in strength when ΔTc is reached.

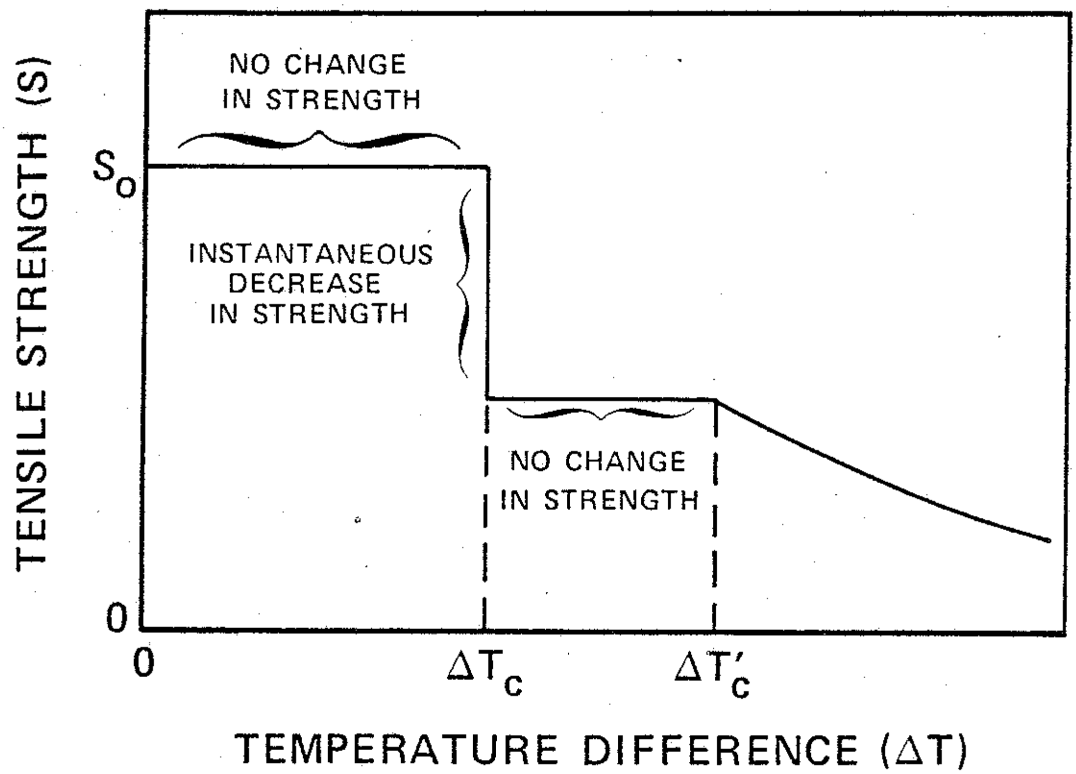

Figure 8. Tensile strength of a ceramic material as a function of thermal history (after Hasselman 1969:Fig. 2).

The ideal approach in measuring these properties would be to determine the shape of such a curve empirically. This would require having lots of slabs of each material, subjecting these slabs to varying degrees of thermal shock, and then measuring their remaining strength. The problem with doing this, however, was the already familiar one of limited specimen size. Each sherd could only be cut into a few slabs, and the strength of each slab could be measured only once. We were thus faced with the prospect of having too few points for accurately characterizing the shape of the curve, and so were forced to begin tackling the problem in a somewhat less direct manner.

The approach we took was to measure a number of physical properties that affect thermal shock resistance, and then to use these measurements to calculate a set of thermal shock resistance parameters, by means of which the different paste compositions could be compared. The relevant properties we were able to measure were apparent porosity, thermal diffusivity (D), elasticity (E), and tensile strength (S) (Table 8).

Porosity, defined as the fractional volume of pore space, can have an effect on thermal shock resistance, but the precise nature of the effect is somewhat ambiguous. Although Shepard (1956:126) and others (Hulthen 1977) have argued that high porosity increases thermal shock resistence, Coble (1958:223) has published evidence to the contrary. One reason for this ambiguity may be that porosity *per se* is often less important in predicting thermal shock resistance than several other closely-related factors -- pore shape, density, and the frequency distribution of pore sizes (Hasselman 1969; Kennedy 1977; cf. Rye 1976). For present purposes, none of these factors had to be assessed directly, since their effect is felt through their influence on other measurable properties which enter into our calculated parameters (e.g., tensile strength, elasticity, diffusivity). Nevertheless, porosity was measured in our specimens anyway, to see if there are any consistent differences between the ware groups. As shown in Figure 9, the apparent porosity of Moundville pottery stays remarkably constant at about 30%, no matter how much shell is added as temper.

Thermal diffusivity (D) measures the ease with which heat is dissipated through a material. The higher the diffusivity, the faster the heat is dissipated. High diffusivity contributes to thermal shock resistance in that it tends to reduce thermal gradients within the material, hence reducing internal stress. The data obtained on our specimens (Fig. 10) show much more scatter than the porosity measurements, but once again no clear pattern is detected in relation to the percentage of shell present.

Elasticity, measured in terms of Young's modulus (E), corresponds roughly to what we think of colloquially as the "stiffness" of a material. More precisely, it expresses the amount of stress (pressure) produced in a material per unit

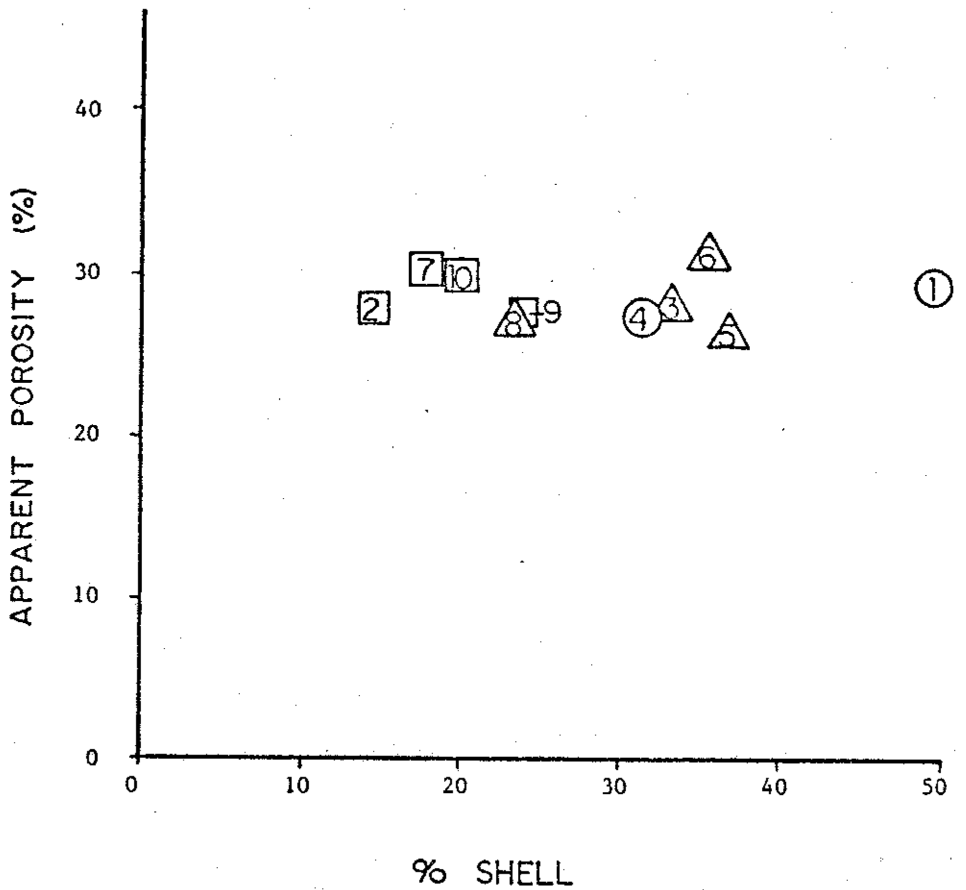

Figure 9. Apparent porosity (% volume) plotted against the percentage of visible shell temper. In every case, the range of values obtained was smaller than the vertical height of the symbol.

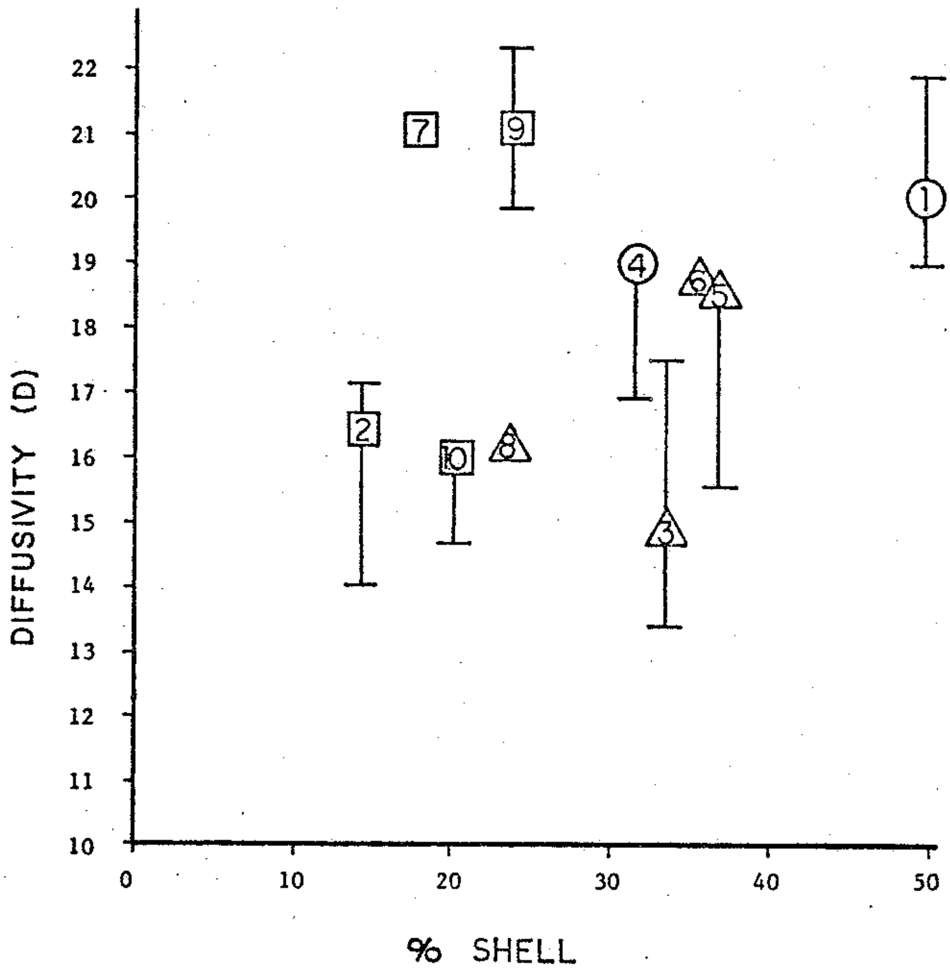

Figure 10. Thermal diffusivity (D) plotted against the percentage of visible shell temper. The median value of D is plotted for each specimen, the error bars indicating the range of values obtained.

of tensile strain (deformation). The effect of elasticity on thermal shock resistance varies, and depends on the kind of resistance being measured. In regard to increasing the severity of thermal shock required to initiate cracking (ΔTc), a low value of E is desirable, because such a material will experience less internal stress for a given amount of thermally-induced strain. Once the critical termperature difference has been reached, however, a high value of E is desirable, because a "stiffer" material tends to inhibit crack propagation, thereby decreasing the material's degradation in strength. The elasticity measurements obtained on our specimens (Fig. 11) reveal a weak, but definite negative correlation with the percentage of shell temper ($r = -0.47$). The less shell, the higher tends to be the value of the elastic modulus. Thus, the finely tempered bowls and bottles tend to be made of stiffer material than the coarsely tempered jars.

Finally, tensile strength (S) is related to thermal shock resistance, and again the nature of the relationship varies with the circumstances. High tensile strength tends to increase the severity of thermal shock that can be withstood before cracking begins, but (for reasons understood only by physicists) also tends to increase the degradation in strength which takes place once cracking has begun. As shown previously, tensile strength is negatively correlated with the percentage of shell in Moundville pottery, the fine wares generally being stronger than the

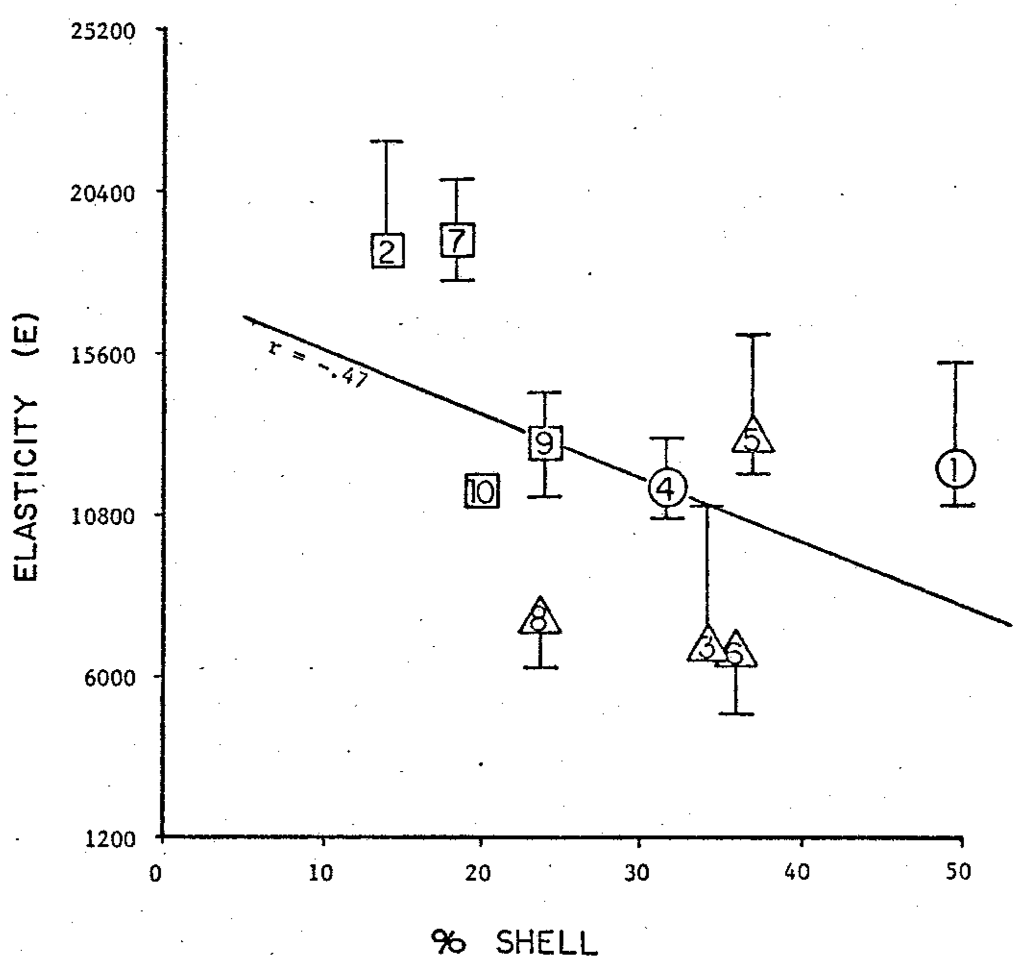

Figure 11. Elasticity (E) plotted against the percentage of visible shell temper. The median value of E is plotted for each specimen, the error bars indicating the range of values obtained.

coarse wares (Fig. 7).

How then are these properties combined to measure thermal shock resistance? In the present case, the resistance to initial cracking from thermal stress can be compared by means of the theoretically-derived parameter:

$$R = S(1-v)D/aE$$

Given the mineralogical similarity of our specimens, and the fact that calcite temper has about the same thermal expansion characteristics as low-fired clay (Rye 1976:117), it is reasonable to assume that Poisson's ratio (v) and the thermal expansion coefficient (a) are constant for our wares (for a definition of the variables v and a, see Nash 1972:6-7). Such being the case, this parameter reduces to:

$$R = SD/E$$

The greater the value of this parameter, the higher is the temperature difference that can be endured before any degradation in strength occurs (at least in theory; Hasselman 1970).

Once cracking has occurred, on the other hand, the resistance to loss in strength should be proportional to:

$$R' = GE/S(1-v)$$

Unfortunately, limitations on the size of our specimens precluded measurement of the surface fracture energy (G) -- which may or may not be affected as the percentage of shell changes. The only thing we can do for now is to treat G as a constant, in which case the parameter reduces to:

$$R' = E/S$$

The greater the value of this parameter, ceteris paribus, the less strength should be lost when the critical temperature difference is reached (Hasselman 1970).

If we plot the values of these parameters against the volume percentage of shell, we can begin to assess the relative effects of paste compositon on thermal shock resistance in Moundville pottery. The parameter R, which pertains to fracture initiation, does show a very weak positive correlation with the percentage of shell (Fig. 12), but the relationship is so weak that it probably has little significance ($r = .21$). Thus, the data suggest that there is probably no substantial difference between coarse and fine wares in the level of thermal shock required to bring on a degradation in strength.

The parameter R', on the other hand, shows a much stronger positive correlation with the percentage of shell (Fig. 13). Although the correlation is not strong enough to inspire absolute confidence ($r = .51$), the relationship is definite enough to suggest that the coarse wares would tend

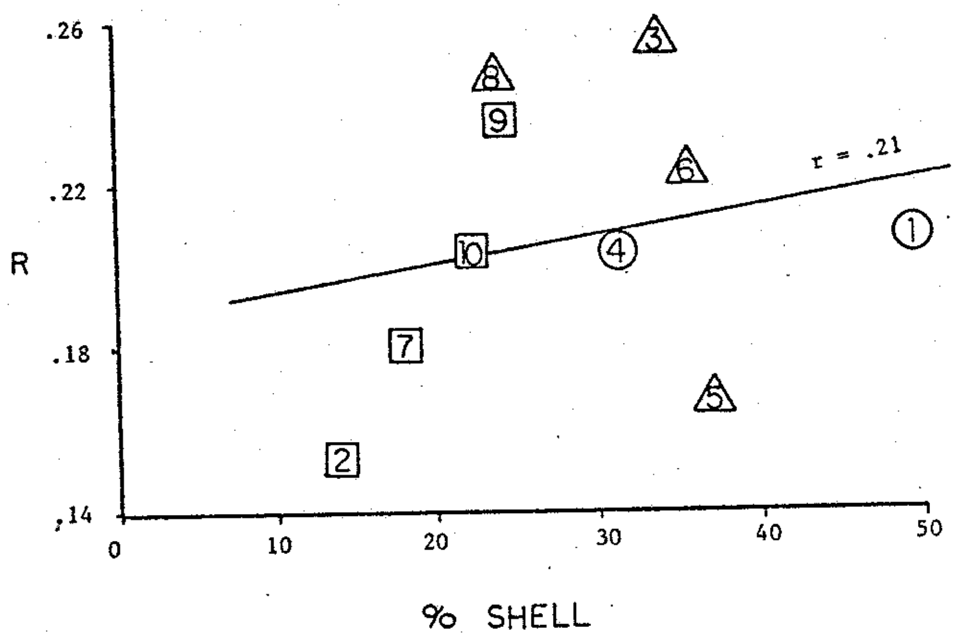

Figure 12. The thermal shock resistance parameter R plotted against the percentage of visible shell temper.

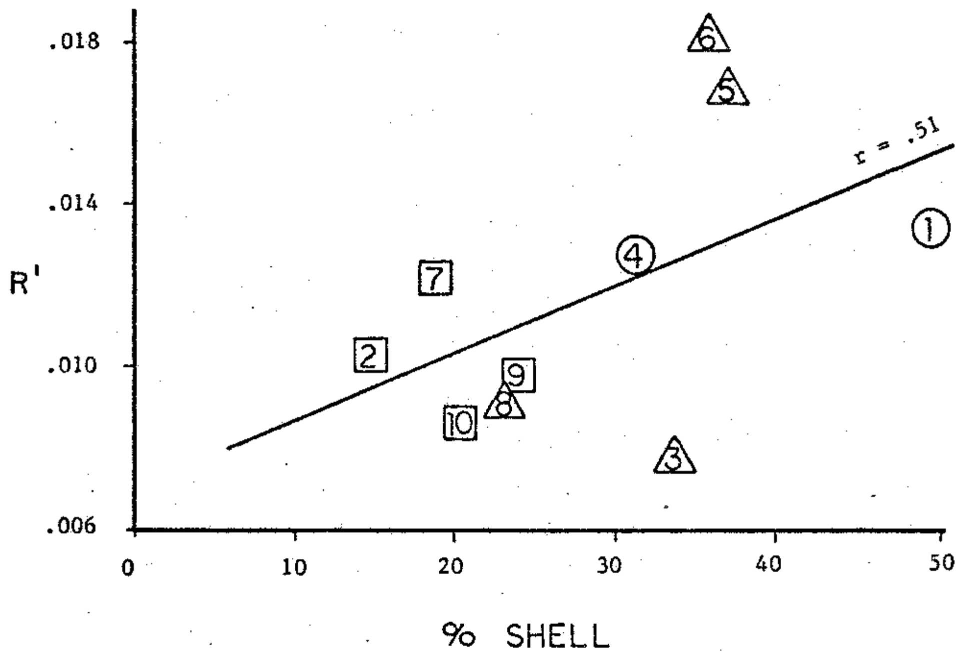

Figure 13. The thermal shock resistance parameter R' plotted against the percentage of visible shell temper.

to lose proportionally less strength once cracking had begun.

One can also look at the same relationship in somewhat different terms: We have just seen that the loss in strength after thermal shock should be inversely related to the percentage of shell temper. Also, we have demonstrated that the percentage of shell temper is inversely related to initial strength. Therefore, the dropoff in strength after quenching should be a direct function of initial strength.

Such a relationship can be seen in Figure 14, which shows strength as a function of quenching temperature for three different sherds. Although we have no accurate data on the composition of these specimens, one can see that the amount of dropoff does seem to be related to initial strength. In looking at these graphs, it is useful to keep in mind that the measured initial strength of the sherds in our overall sample usually falls in the range between 80 and 180 kg/cm2. Notice that the sherds with a moderate initial strength (i.e., the uppermost two) lose only about 10-20% of that strength after quenching, and still retain enough strength to remain in the middle of the usual range of values. The sherd which started out with a very high initial strength, on the other hand, lost more than 50% of its strength after quenching, and ended up at the very bottom of the usual range of values.

Figure 15 shows a plot of the fraction of strength retained versus initial strength for a sample of seven

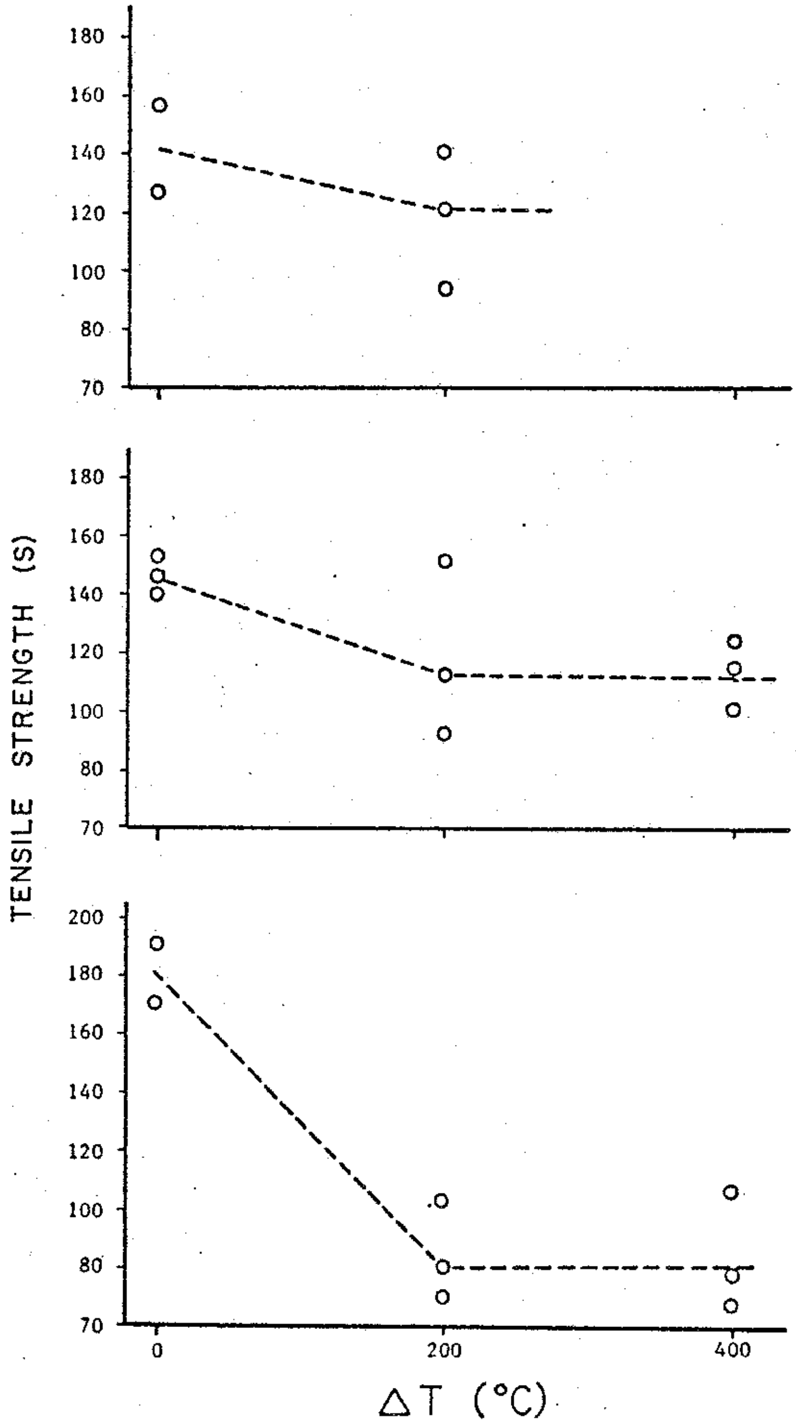

Figure 14. Strength as a function of thermal history for three sherds from Moundville.

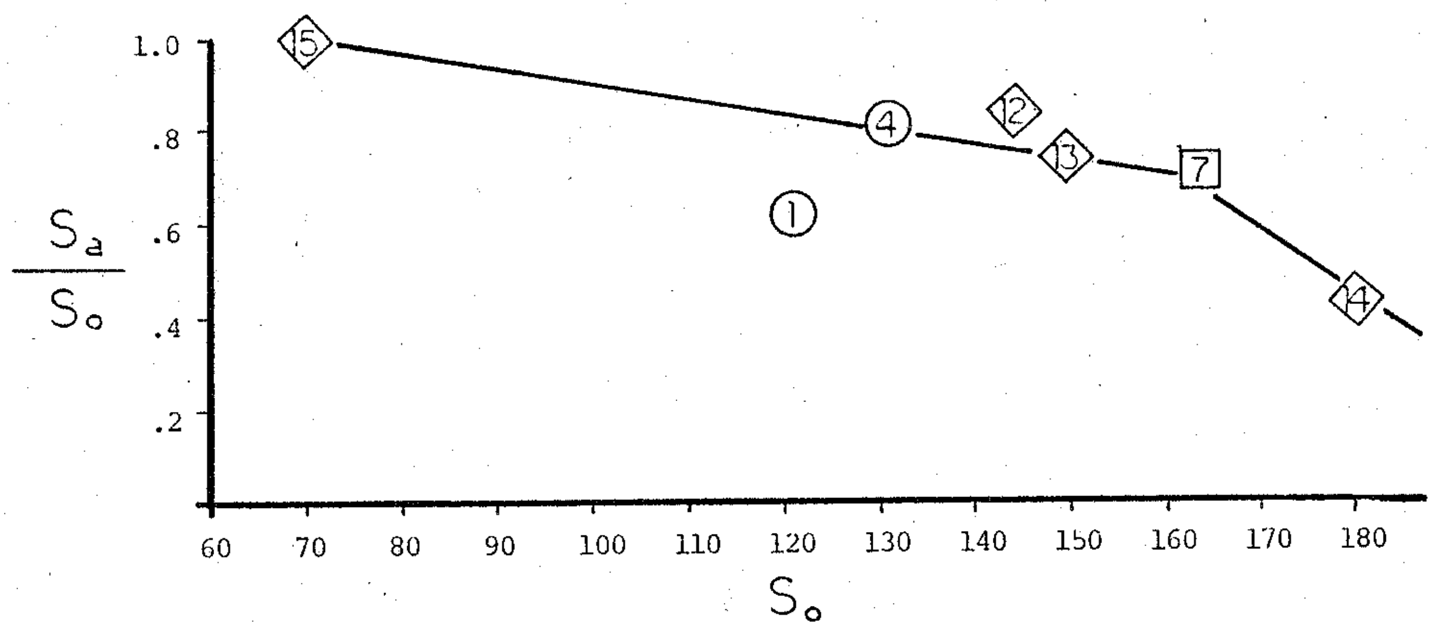

Figure 15. The fraction of strength retained after thermal shock plotted against initial strength.

sherds which were quenched over a temperature difference of 400°C. Although the number of points is small, and the scatter is relatively large, the data do seem to show the expected trend. The higher the initial strength, the more strength is lost after thermal shock (for an interesting parallel case, see Gupta 1972).

All in all, our data suggest that the Moundville potters may have been faced with a tradeoff in choosing which paste composition to use. A finely tempered vessel would have a high initial strength, but would lose a very large proportion of that strength if subjected to thermal shock. A coarsely tempered vessel, on the other hand, would have less initial strength, but would retain most of that strength even after a severe thermal shock. This being the case, a coarsely tempered pot would probably have been more resilient and longer-lasting as a cooking vessel.

Discussion

Our physical properties findings thus tend to support the interpretation that Moundville potters maintained the distinction between coarse and fine wares for reasons that were fundamentally technological, rather than purely aesthetic. Of course, the differences between the two paste compositions would not have been perceived by the Mississippian potters in the same technical terms used here. Instead, the practical advantages of each paste composition would have been discovered through a gradual process of trial-and-error, informed by experience and cultural tradition. The potters themselves could observe that certain compositions result in better pots, ones that could be used for a longer period of time before they broke.

In closing, it perhaps should be stressed again that the argument in favor of the technological hypothesis still rests on rather limited evidence. The thermal shock parameters indeed have been suggestive, but they do not in themselves constitute the strongest kind of empirical proof. Moreover, the number of samples we were actually able to test is rather small. Getting unassailable proof will require doing tests on a large sample of each material, and the only practical way to get such a sample is to replicate the material in large quantities. Our mineralogical work has now given us a basis for sound replication, and further work with larger and better controlled samples will be required to confirm these preliminary results.

CHAPTER III

CLASSIFICATION OF MOUNDVILLE CERAMICS

The purpose of this chapter is to define the morass of classificatory terms I will apply to Moundville pottery. The categories to which these terms refer not only form the basic units of description, but also they are the principal analytical units with reference to which the chronology will be formulated and presented.

The classificatory units we are concerned with fall into six cross-cutting dimensions, each of which can be treated independently of the others:

(1) types and varieties
(2) representational motifs
(3) painted decoration
(4) basic shapes
(5) secondary shape features
(6) effigy features

Dimensions (1) and (4), though formulated with reference to different sorts of criteria, are classifications which operate at the level of whole artifacts, whether vessels or sherds. Dimensions (2), (3), (5), and (6), on the other hand, subsume categories which operate at a different level of specificity. These categories refer not to whole artifacts as such, but rather to features or aspects of whole artifacts which may or may not be present on any given specimen. Such classificatory devices would correspond to what archaeologitss have sometimes called "modes" (e.g., Phillips 1970:28-29). Let me now briefly characterize each of these dimensions in turn.

1.) Types and varieties are classes of sherds and whole vessels defined on the basis of paste composition, surface finish, and tooled decoration. These are the kinds of units traditionally used for pottery analysis in the eastern United States; by convention, such units are given proper names and constitute what is generally called the "ceramic typology".

2.) Representational motifs are certain categories of design which are found on engraved and incised vessels, but which do not uniquely correspond to varieties in Dimension (1), and therefore must be treated separately.

3.) Painted decoration includes categories defined on the basis of deliberate manipulation of the surface color, whether by slipping, smudging, rubbing in pigment, or painting in the strict sense.

4.) Basic shapes are the generalized categories of vessel form which take into account the profile of the entire vessel.

5.) Secondary shape features, on the other hand, refer to various simple kinds of modeled or applique elaborations added onto a basic shape.

6.) Effigy features, last in our list, refer to certain more complex modeled or applique elaborations of basic shape, which generally are intended to make the vessel resemble a life form of some sort.

In applying the various classificatory terms to Moundville ceramics, I have consistently tried to take into account the distinction between local and nonlocal wares. Making this distinction is important for at least two reasons. The first reason has to do with chronology: ceramic styles in different regions do not always change exactly in step, and this may confuse any attempt at seriation or chronological ordering unless the distinction between local and nonlocal wares is recognized. The second reason has to do with description: Southeastern ceramic classifications, especially the traditional typologies, are notoriously region-specific, and this one is no exception. Although in part this regional specificity is a historical phenomenon -- archaeologists working in different regions have used different names for the same sorts of artifacts -- I suspect that it also has something to do with certain properties inherent in the kinds of classification which archaeologists generally find most useful. Most stylistic classifications devised by archaeologists, including the ones used here, are fundamentally polythetic in nature. A polythetic class is one which cannot be strictly defined by specifying a set of necessary and sufficient conditons for membership; rather, it is generally conceptualized as consisting of a set of artifacts which are perceived (by whatever combination of criteria) to be more similar to each other than they are to members of other classes. Because such a class has no intrinsic criteria which are completely definitive, it can only be meaningfully recognized with reference to some bounded universe of possible members. For the archaeologist, the universe usually consists of artifacts manufactured in the context of a regional stylistic tradition. All this is what lies behind the common-sense observation often made by archaeologists, that artifact classifications "don't work" or "don't make sense" when applied to material from outside the region in which they were originally formulated.

The upshot for the present purposes is that vessels (and sherds) which appear to have been made in the Moundville region are described in terms of our local classificatory framework. Vessels which appear to be nonlocal, on the other hand, are generally described according to the typologies appropriate to the regions from which these vessels were presumably brought in. This chapter presents only those terms which pertain to local vessels; nonlocal vessels are described separately in

Appendix F.

One might wonder, of course, how local and nonlocal vessels can be distinguished in the first place. I have had no choice but to do this on the basis of visual criteria, realizing full well that in the absence of good chemical provenance studies any attributions as to place of manufacture are bound to be suspect. Vessels designated local are generally those having nuances of shape, decoration, and paste which occur commonly in the Black Warrior region. Vessels called nonlocal, on the other hand, generally exhibit many unusual and distinctive features, especially features known to occur commonly in other regions. Whenever possible, style comparisons have been used to identify likely source areas for the imported wares. Obviously, all the attributions made in this way, whether local or nonlocal, depend a great deal on subjective judgement, coupled with a detailed knowledge of the variability in Mississippian ceramics at Moundville and elsewhere. Undoubtedly, some of the assignments I have made are mistaken, and will have to be revised when (and if) additional data become available. To the extent that one can tell in such matters, I suspect that my overall tendency has been to err on the side of calling vessels local that really are not. One should also realize that "local" is a relative term; it refers not strictly to Moundville itself, but to a much wider area within which ceramic styles are visually indistinguishable from those at Moundville.

Although it is impossible at this stage to pin precise boundaries on this wider area, it probably includes the Black Warrior drainage, the central Tombigbee drainage, and perhaps extends as far north as the Pickwick Basin in the middle Tennessee Valley.

Of the 1121 whole vessels in our sample 954 (85%) are considered local, and 176 (15%) are considered nonlocal. Of the 8212 excavated sherds, 8191 (99.7%) are classed as local, and only 21 (0.3%) seem to be nonlocal. Without a doubt, the relative paucity of imports among sherds as compared to vessels stems at least in part from problems in recognition, since fragments tend to exhibit fewer distinctive features than do complete artifacts. Yet it is also possible that the differences may reflect behavioral factors as well, in that imports may have been preferentially guarded from breakage and/or preferentially included in the burial contexts from which most of our whole vessels come.

Returning now to the principal issue at hand, the sections which follow will present the classficatory terms falling into the six dimensions discussed earlier. The emphasis will be on concise definition of terms, rather than on a description of the ceramics to which these terms refer. The major effort at describing the pottery, by type and variety, is deferred until Appendix F.

Quantitative information on the number of sherds which fall into the categories described below appears in Appendix

D. Counts of whole vessels by category can be reconstructed from the indexes in Appendices G and H.

Types and Varieties

As its name implies, the type-variety classification makes use of a hierarchical nomenclature, which refers to categories defined at two levels of inclusiveness: Types are the broader categories, and each type may subsume any number of more-specifically defined varieties. My adoption of this sort of nomenclature was partly conditioned by the fact that the ceramic types defined by earlier workers in the area (e.g., DeJarnette and Wimberly 1941; McKenzie 1964; 1966) were too broad to be useful in making the fine-grained temporal distinctions I desired. The hierarchical nomenclature permitted the recognition of finer categories -- varieties -- without having to discard the overall structure of types analogous to those used previously. The adoption of type-variety nomenclature also had the advantage of making the local typology much more consistent with those that have recently been introduced in neighboring regions (e.g., Jenkins 1979; Coblentz 1978; Schnell et al. 1979).

In applying the type-variety system to Moundville pottery, I have for the most part adhered to the methodological and nomenclatural conventions set forth by Phillips (1970:24-28). Types are generally defined on the basis of fairly gross characteristics of paste, surface finish, and decorative technique. Varieties, on the other hand, tend to be defined on the basis of minor variation in paste composition, or on the basis of specific characterisitics of design. Both types and varieties, once defined, are given proper names; variety names are underlined when they appear in the text, in order to prevent them from being confused with type names.

Specimens which can be assigned to a type, but not to a specific variety of that type, are described by the type name followed by the designation "variety unspecified". The unspecified category is a catchall which may subsume both: (1) specimens whose characteristics are known but which do not fit the criteria for any of the established varieties, and (2) specimens which may in fact belong to one of the established varieties but are too fragmentary for positive identification. Specimens which cannot be identified even as to type are simply listed as "unclassified".

The relationships among the local types can be parsimoniously illustrated by means of a dendritic key such as the one in Figure 16. Thus, the local typology is logically a tree-type classification (Whallon 1972) in which: (1) there is a hierarchy of importance among attributes which determines the order in which attributes are considered when assigning specimens to types; and (2) the criteria for definition shift, depending upon which "branch" of the tree one is following in the process of assignment. Here the primary attribute in the hierarchy is temper; shell-tempered types all stem from one branch, grog-tempered types from another. Once the appropriate branch

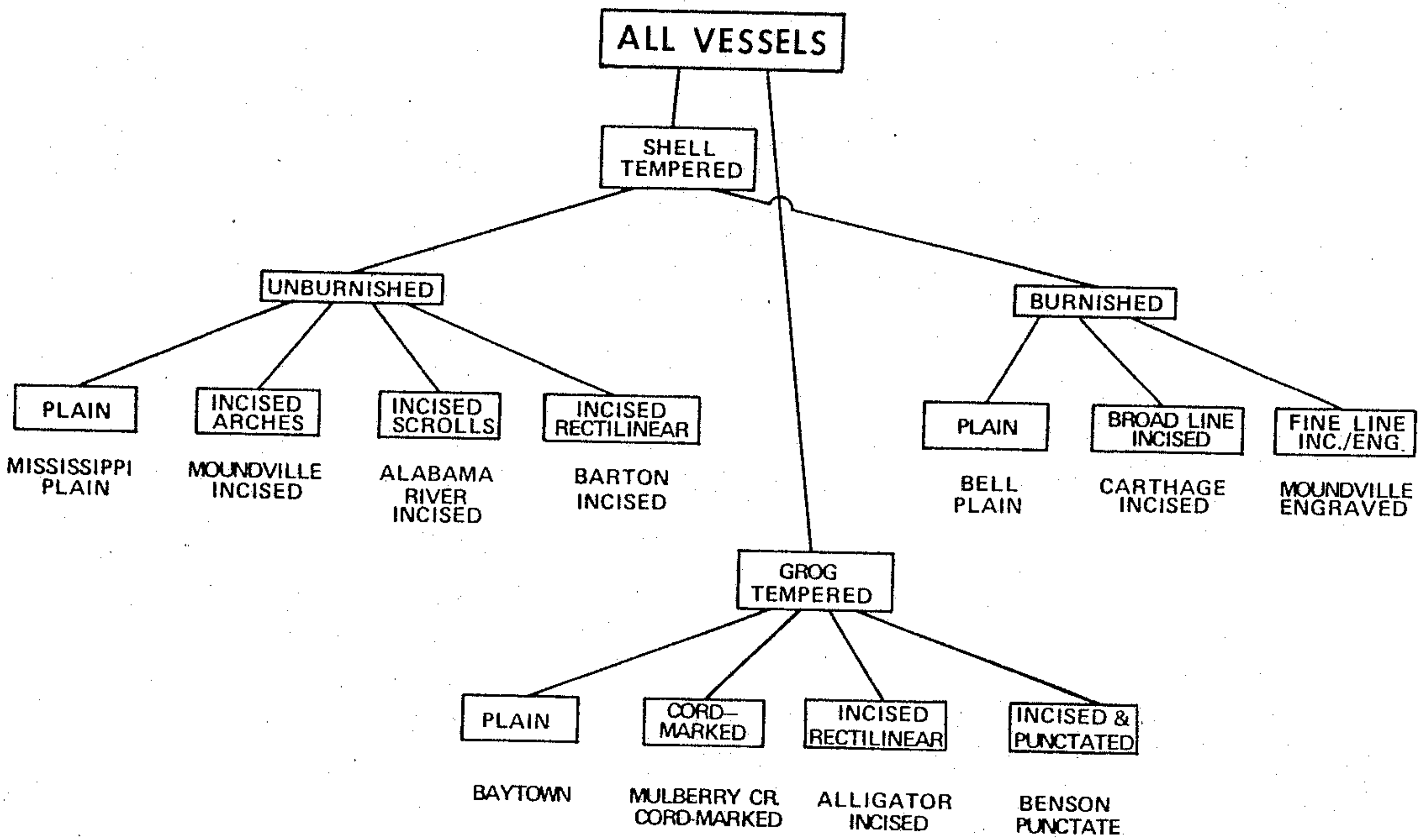

Figure 16. Dendritic key for local types.

has been determined, another set of attributes may then be considered. To differentiate among the shell-tempered types, one takes into account surface finish (burnished/unburnished) and decorative technique, in that order. To differentiate among grog-tempered types, one need only consider decorative technique. Once a specimen has been assigned to a type, a similar process of branching (omitted from the diagram for lack of space) may be followed in determining the variety to which the specimen belongs.

The local types and their varieties are defined in abbreviated fashion below: more complete descriptions -- including complete lists of references to illustrated specimens -- are presented in Appendix F.

<u>Alabama River Incised</u>

This type includes unburnished, shell tempered vessels that are decorated with incised scrolls (not arches), executed in a fairly wet paste. Most vessels of this type are jars (e.g., Fig. 62r). Alabama River Incised is rare at Moundville, and in the absence of a good comparative sample no specific varieties have yet been defined.

<u>Alligator Incised</u>

This type includes ceramics decorated with rectilinear designs, executed with relatively sloppy, wet-paste incisions. The paste, by definition, is tempered predominantly with grog. Only one variety has been recognized in our sample:

Variety Geiger can be recognized by a design consisting of oblique parallel lines in a band which encircles the vessel just below the lip (Fig. 67a).

Barton Incised

Barton Incised subsumes unburnished, shell-tempered vessels that are decorated with rectilinear designs, consisting of multiple parallel lines incised in a wet paste. This is another rare type at Moundville, with only one local variety defined:

Variety Demopolis is characterized by a band of vertical or oblique parallel lines on the neck of a jar (Fig. 56i).

Baytown Plain

By definition, this type includes undecorated vessels that are tempered predominantly with grog, and sometimes with a little sand as well. Only one variety occurs in the Moundville sample:

Variety Roper is tempered with grog alone, lacking deliberate sand inclusions (Fig. 67c-h).

Bell Plain

This type includes shell tempered ceramics which lack tooled decoration but have a burnished surface. The shell temper particles have a tendency to be finer than those in Mississippi Plain, but this in itself is not considered a defining criterion. Grog may also be present as an additional tempering agent.

Variety Hale subsumes all local vessels of this type. Such vessels are usually bottles and bowls, and commonly (but not always) have a darkened or "black filmed" surface (e.g., Figs. 39a, 41c-j).

Carthage Incised

Carthage Incised is defined to include shell tempered vessels with a burnished surface that are decorated with broad, "trailed" incisions. Typically, these incisions are from 1.5 to 2 mm wide and are U-shaped in cross section, having been executed when the vessel was in a leather hard state of dryness. The most common vessel forms in Carthage Incised are bottles and bowls, many of which are black filmed. Six local varieties of this type have been defined, based on variations in design:

Variety Akron includes vessels on which the major design is a horizontal band of 2 or more lines running parallel to and just below the lip (Fig. 17a). The band of lines is commonly embellished with loops and/or folds. This variety is known to occur only on bowls.

Variety Carthage includes vessels decorated with 2-4 line running scrolls (Fig. 17b). Common vessel forms include the subglobular bottle with simple base, the short neck bowl, and the flaring rim bowl.

Variety Fosters is characterized by free-standing

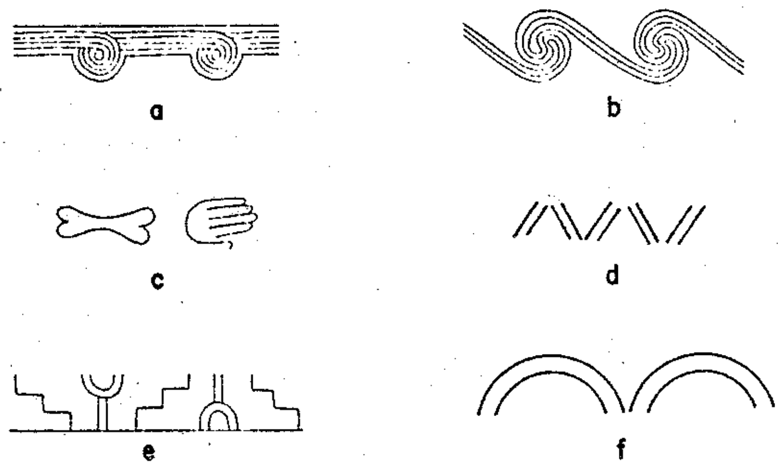

Figure 17. Carthage Incised designs: a, *var.* *Akron*; b, *var.* *Carthage*; c, *var.* *Fosters*; d, *var.* *Moon Lake*; e, *var.* *Poole*; f, *var.* *Summerville*.

representational motifs, usually depicting Hands and Forearm Bones (Fig. 17c). (These representational motifs will be discussed in more detail in a subsequent section of this chapter). Vessels of this variety are usually flaring rim bowls or short neck bowls.

Variety Moon Lake includes vessels decorated with zones of parallel (usually oblique) line segments, arranged in chevron-like patterns (Fig. 17d). Such designs are placed on the interior of flaring rim bowls, or on the exterior shoulder of short neck bowls.

Variety Poole is defined by a design which consists of step motifs enclosing (or alternating with) concentric rayed semicircles (Fig. 17e). It is only known to occur on short neck bowls.

Variety Summerville is characterized by the presence of incised arches arranged end-to-end around the vessel's circumference (Fig. 17f). At Moundville, this variety usually occurs on restricted bowls.

Mississippi Plain

The following characteristics define the type Mississippi Plain: (1) a paste tempered predominantly with shell, (2) a lack of tooled decoration, and (3) a surface which, though it may be smoothed, is not burnished. The shell temper particles in Mississippi Plain tend to be coarser than those in Bell Plain. Predominant vessels forms are jars and bowls. Two local varieties of this type are recognized on the basis of differences in paste composition:

<u>Variety Hull Lake</u> has a paste which contains grog in addition to the shell temper (e.g., Fig. 41p-q).

<u>Variety Warrior</u>, by far the most common in the sample, has a paste which is tempered with shell alone (e.g., Figs. 39l, 41k-o).

<u>Moundville Engraved</u>

In this type are placed shell tempered vessels with burnished surfaces that are decorated with fine, dry-paste incisions or engraving. The lines which make up the design are always less than 1.5 mm wide, and usually are no more than 1 mm wide. The type most commonly occurs on bowls and bottles, which often exhibit a black filmed surface. Twelve local varieties have been recognized, each characterized in terms of a particular decorative motif or set of motifs:

<u>Variety Cypress</u> has a design characterized by scrolls contained within rectangular panels. The horizontal and vertical bands which border the panels are often filled in with lines, concentric semicircles, punctations, and other elements which sometimes occur in the representational designs of <u>variety Hemphill</u> (Fig. 18a). The variety usually occurs on subglobular bottles with simple bases.

<u>Variety Elliots Creek</u> is characterized by engraved designs that are embellished with areas of excision (Fig.

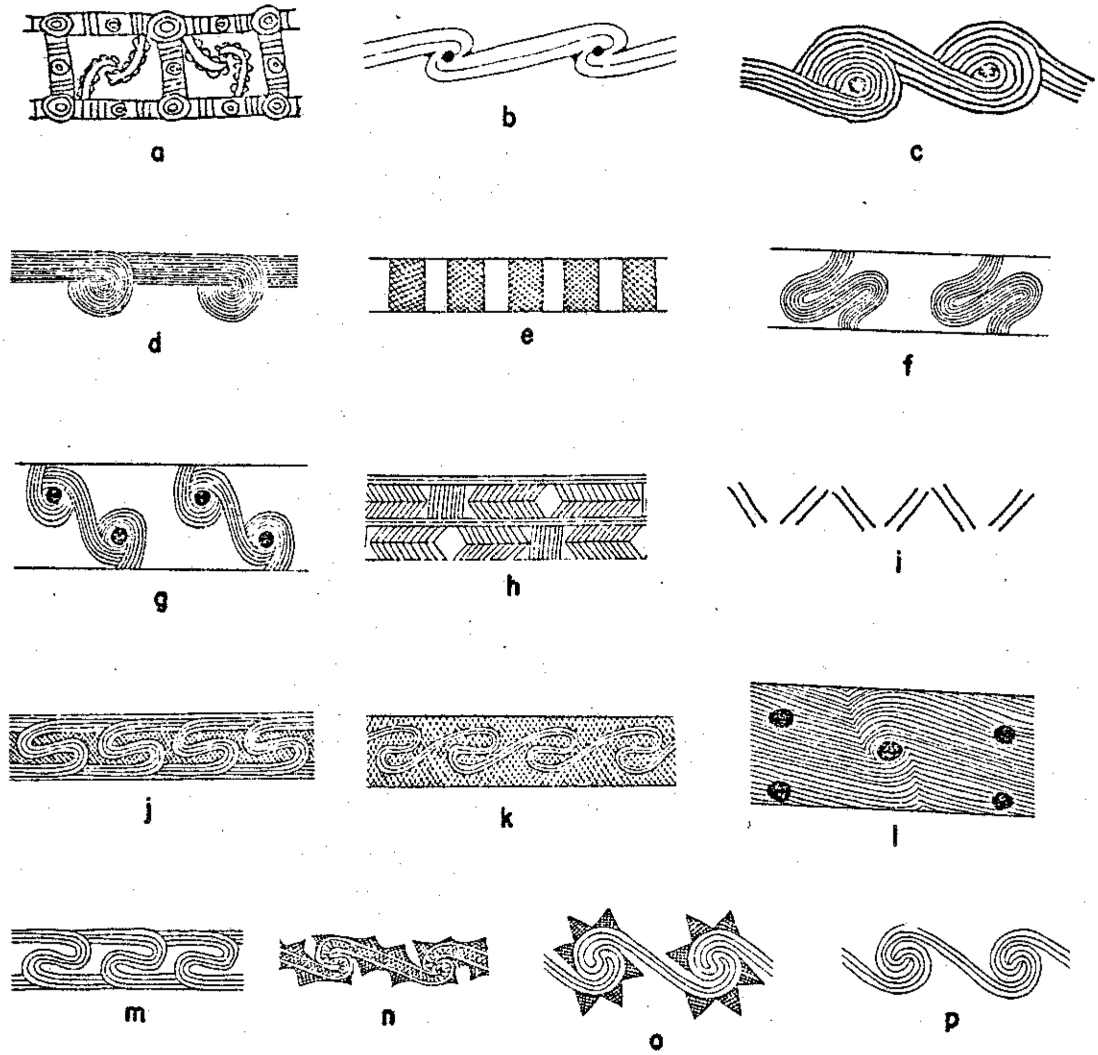

Figure 18. Moundville Engraved designs: a, *var.* *Cypress*; b, *var.* *Elliots Creek*; c, *var.* *Englewood*; d, *var.* *Havana*; e, *var.* *Maxwells Crossing*; f-g, *var.* *Northport*; h, *var.* *Prince Plantation*; i, *var.* *Stewart*; j-k, *var.* *Taylorville*; l, *var.* *Tuscaloosa*; m-p, *var.* *Wiggins*.

18b). The designs themselves may consist of either curvilinear scrolls, or rectilinear patterns made up of numerous closely-spaced lines. This variety occurs on bowls and slender ovoid bottles.

Variety Englewood is decorated with a 6-10 line curvilinear scroll which runs entirely around the vessel's circumference (Fig. 18c). The most common vessel shape is the subglobular bottle with a simple base.

Variety Havana includes vessels on which the major design consists of a horizontal band of two or more lines running parallel to and just below the lip (Fig. 18d). The bands of lines are usually embellished with loops and/or folds. Common vessel shapes are the cylindrical and the simple bowl.

Variety Hemphill is decorated with free-standing or representational motifs, most of which have at one time or another been considered part of the iconography of the Southeastern Ceremonial Complex (SCC). A wide range of specific motifs is included in this variety (Fig. 20), and these will be presented individually in a later section of this chapter. Among the more common vessel shapes found in this variety are cylindrical bowls and subglobular bottles with simple, slab, and pedestal bases.

Variety Maxwells Crossing is characterized by designs which consist mainly of crosshatched vertical bands, spaced at intervals around the circumference of the vessel (Fig. 18e). Occasional variations can occur in this basic theme, such as the presence of additional crosshatched elements in the spaces between the bands, or the presence of bands having an irregular boundary on one side. The variety is found on subglobular bottles with pedestal, slab, or simple bases.

Variety Northport is decorated with 4-10 line vertical scrolls, that is, scrolls which begin at the upper boundary of the design field and end at the lower (Fig. 18f-g). The variety is known to include only subglobular bottles with pedestal or slab bases.

Variety Prince Plantation includes vessels engraved with a herringbone design, in which horizontal bands are filled with zones of vertical and oblique parallel lines. The boundaries between adjacent bands are made up of one or several closely spaced horizontal lines (Fig. 18h). The design is known to occur only on subglobular bottles with pedestal or slab bases.

Variety Stewart is decorated with zones of oblique parallel lines, forming either chevrons or line-filled triangles (Fig. 18i). This variety has been found only on flaring rim bowls, with the design placed on the interior of the rim.

Variety Taylorville has a design made up of a 3-4 line running scroll superimposed on a crosshatched background (Fig. 18j-k). Vessels of this variety include subglobular bottles with simple slab or pedestal bases, cylindrical bowls, and pedestalled bowls.

Variety Tuscaloosa includes vessels decorated with a curvilinear scroll made up of 15-40 closely spaced lines (Fig. 18l). The scroll encircles the vessel and is wide enough to take up almost the entire design field. Vessels of this variety are always subglobular bottles with pedestal, slab or simple bases, and are almost always embellished with indentations in the wall.

Variety Wiggins is characterized by a design consisting of a 2-5 line scroll encircling the vessel's circumference (Fig. 18m-p). Occasionally, the scroll is embellished with fill-in crosshatching or with crosshatched triangular projections. The vessel form most commonly found in this variety is the subglobular bottle with simple base.

Moundville Incised

The designs which characterize this type consist of incised arches arranged end-to-end around the upper portions of the vessel. The surface of these vessels is smoothed but not burnished, and the paste is tempered predominantly with shell. The incision is typically done in a wet paste. Only jars are known to occur in this type. Three local varieties have been defined on the basis of variations in the way the arch is executed:

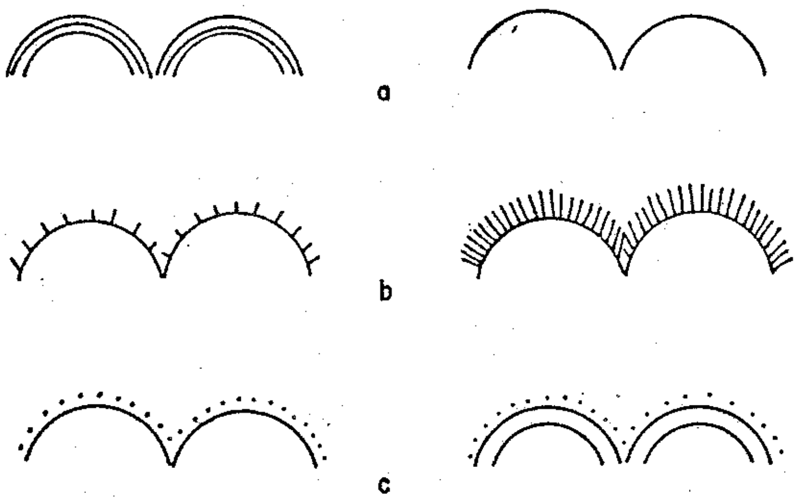

Figure 19. Moundville Incised designs: a, *var.* *Carrollton*; b, *var.* *Moundville*; c, *var.* *Snows Bend*.

Variety Carrollton has a design in which one or more parallel arches occur alone, not embellished with radiating incisions or punctations (Fig. 19a).

Variety Moundville is marked by a design in which numerous short incisions radiate upward from, and normal to the arch (Fig. 19b).

Variety Snows Bend has a design embellished with punctations above the arch (Fig. 19c).

Mulberry Creek Cord-Marked

This type includes ceramics with an overall surface treatment of cord-marking. The paste is tempered predominantly with grog, equivalent in compostion to that of Baytown Plain. One local variety appears in the Moundville sherd sample:

Variety Aliceville includes cord-marked ceramics tempered exclusively with grog, having no significant sand inclusions (Fig. 67b).

Representational Motifs

Let us begin with some definitions. I use the term design to refer to the entire content of the decorated portion of a vessel's surface. The decorated portion itself is termed the design field. A design is made up of one or more motifs; motifs, in turn, may be made up of several elements. Though the whole scheme may sound disarmingly precise, the fact is that deciding where to draw the line between individual motifs, and at what level of specificity to define them, can be a tricky and sometimes arbitrary business. The categories I have isolated as motifs tend to be fairly complex stylistic units which constitute the major portion of any given design -- units which are more or less equivalent to what Phillips has called "themes" (Phillips and Brown 1978). I would not defend these motifs as being necessarily real, in the sense that they need not, and in many cases probably do not, reflect categories that had meaning to the artisans who produced the designs. Rather, I present them simply as useful categories for description and chronological analysis.

The motifs I loosely refer to as representational are found on vessels of two local varieties -- Moundville Engraved, *variety Hemphill*, and Carthage Incised, *variety Fosters*. Most of these motifs depict recognizable (but often not realistic) creatures and objects, and have at one time or another been considered part of the Southeastern Ceremonial Complex or "Southern Cult" (e.g., Waring and Holder 1945). Tentatively, I have also assigned to this group a few of the more complex abstract motifs, which do not depict anything immediately recognizable, but do seem to have certain things in common with the more obviously representational ones. The commonality is evident because they tend to co-occur in the same designs, and/or because they tend to be used in designs in the same way -- i.e., as free-standing depictions, not embedded in any sort of

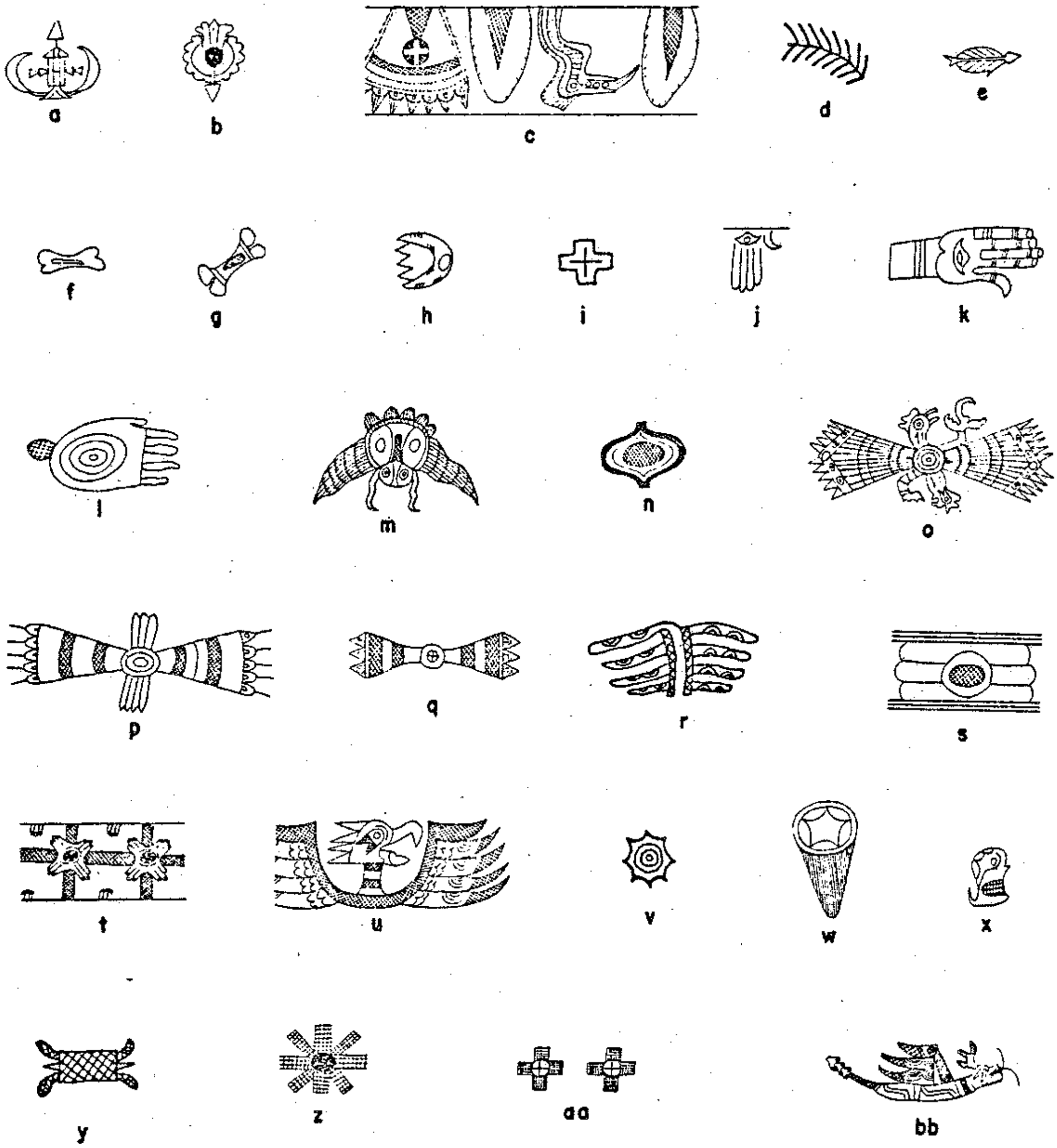

Figure 20. Representational motifs: a-b, Bilobed Arrow; c, Crested Bird (in the round); d, Feather; e, Feathered Arrow; f-g, Forearm Bones; h, Forked Eye Surround; i, Greek Cross; j-l, Hand and Eye; m, Insect; n, Ogee; o-q, Paired Tails; r, Paired Wings; s-t, Radial Fingers; u, Raptor; v, Rayed Circle; w, Scalp; x, Skull; y, Turtle; z-aa, Windmill; bb, Winged Serpent.

directly interlocking or continuous pattern.

Bilobed Arrow. This well-known motif consists of an arrow with two semicircular lobes, one on each side (Fig. 20a-b). (Moundville Engraved, var. Hemphill).

Bird with Serpent Head. This motif depicts a creature having an avian body and a serpentine head, complete with avian wings, tail and feet. It occurs only on one vessel in the entire sample, and unfortunately the only photograph I have of this vessel does not show the motif in its entirety (Fig. 52h). (Moundville Engraved, var. Hemphill).

Crested Bird. This bird, commonly referred to in the literature as the Moundville "woodpecker", is characterized by an even (not jagged) crest, and a head marking that surrounds the eye and runs down the neck (Fig. 20c). Another distinctive feature of this bird is that it often has something resembling a ribbon or a string of beads (yet undoubtedly neither) held in its beak. Although in one case the head appears alone, in most cases the bird is depicted in the round, with the head shown on the front of the vessel, the tail in the back, and the wings on the two sides. In contrast to other creatures depicted in this manner, the crested bird is always shown inverted, with the head, wings and tail hanging from the upper boundary of the design field. Crested bird heads may also occur as an integral part of the paired tails motif, and when they do they are counted under that rubric. (Moundville Engraved, *var*. *Hemphill*).

Feather. A distinctive motif which may represent a feather or the feathered end of an arrow (Fig. 20d). It consists of a central line segment, with a series of oblique parallel line segments attached on either side. The central line segment may be either straight or gently curved. (Moundville Engraved, *var*. *Hemphill*).

Feathered Arrow. Rare as a motif at Moundville (Fig. 20e), it only occurs on one vessel in a design which also exhibits the Bilobed Arrow and the Greek Cross (Moore 1907:Figs. 39,40). (Moundville Engraved, *var*. *Hemphill*).

Forearm Bones. This motif depicts a conventionalized radius and ulna, with a bilobate epiphesis at each end of the combined shafts (Figs. 17c, 20f-g). It is almost always accompanied on local vessels by the hand and eye; in only one case it is not (Fig. 62h). (Moundville Engraved, *var*. *Hemphill*, and Carthage Incised, *var*. *Fosters*).

Forked Eye Surround. Very common as an element in depictions of the Raptor and Winged Serpent, this well-known representation occurs as a free-standing motif only in one case (Fig. 20h; Moore 1905:Fig. 74). (Moundville Engraved, *var*. *Hemphill*).

Greek Cross. This is the equal-armed cross, not filled in with crosshatching (Fig. 20i). It is rare on Moundville vessels, occurring only twice. The possibility should be kept in mind that it and the windmill motif are two variant expressions of the same idea. (Moundville Engraved, _var._ _Hemphill_).

Hand and Eye. A depiction of a human hand, on which one finds either a somewhat naturalistic or fully conventionalized eye (Figs. 17c, 20j-l); in one deviant case, the eye appears beside the hand instead of directly on it (Moore 1905:Fig. 123). This is one of the most common representional motifs on Moundville pottery, and shows quite a bit of stylistic variation. (Moundville Engraved, _var._ _Hemphill_, _and_ _Carthage Incised_, var. Fosters).

Human Head. The one occurrence of this motif is on a vessel illustrated by Moore (1905:Fig. 93). This vessel was not in any of the museum collections I studied, and is known only from the published photograph. Without having had a chance to examine it closely, I would not discount the possibility that it may be nonlocal. (Moundville Engraved, _var._ _Hemphill_).

Insect. A depiction of a beetle-like insect (Fig. 20m), which occurs only on one vessel. (Moundville Engraved, _var._ _Hemphill_).

Ogee. Nicely described by Phillips (et al. 1978:Pl. 16) as "a circular or oval outline (usually double) with two opposite ogival points and a smaller circular or oval nucleus inside" (Fig. 20n). It is found as a free-standing motif on three whole vessels in the sample, and also on a sherd illustrated by Moore (1905:Fig. 142). (Moundville Engraved, _var._ _Hemphill_).

Paired Tails. This is a very common motif at Moundville, what Phillips calls "birds in court-card symmetry" (Phillips and Brown 1978). It minimally consists of two avian tail elements arranged on either side of a circular central element (Fig. 20p-q). Sometimes two bird heads are also appended to the central element; in such cases the heads lie along an axis at right angles to that of the tails (Fig. 20o). The heads appended can be of the Crested Bird, the Raptor, or one of each. (Moundville Engraved, _var._ _Hemphill_).

Paired Wings. A motif which consists of two conventionalized wings, of the sort which are often attached to raptors and winged serpents. The wings are arrayed side by side, but with the feather-like projections pointing in opposite directions (Fig. 20r). The symmetry is thus bilateral around a vertical axis, not the two-fold rotational symmetry ("court-card symmetry") usually found with paired tails. The paired wings motif occurs only on two vessels. (Moundville Engraved, _var._ _Hemphill_).

Radial Fingers. A complex motif in which groups of three or more closely-spaced fingers are arranged radially around a circular central element. In some cases four such groups radiate from the central element (Fig. 20t), in other cases only two (Fig. 20s). (Moundville Engraved, _var._ _Hemphill_).

Raptor. This bird characteristically has a forked eye surround, a hooked beak, and a jagged crest. One common variant shows the bird in the round, head in front, tail in back, and wings on the vessel's sides (Fig. 20u). When so depicted the bird is usually right-side up; only in one case is the bird inverted, with the body parts hanging from the top of the design field (Fig. 52n). An alternative variant shows the raptor's head alone, without the other body parts (Moore 1907:Figs. 7-9). Mention should also be made of the peculiar composite illustrated by Moore (1905:Figs. 114,115) which has a raptor's head connected to an ophidian neck which turns into a wing. The raptor's head may also occur as an element in the Paired Tails motif. (Moundville Engraved, _var._ _Hemphill_).

Rayed Circle. Concentric circles with triangular elements projecting from the outer circumference (Fig. 20v). The motif occurs twice on local Moundville vessels. In one case the innermost circle contains a Greek Cross (Moore 1907:Figs. 39,40). (Moundville Engraved, _var._ _Hemphill_).

Scalp. This motif basically consists of a circular element from which depends a line-filled triangular element (Fig. 20w). It probably represents a scalp stretched in a hoop (Hudson 1976:251). (Moundville Engraved, _var._ _Hemphill_).

Skull. A motif which appears to be a conventionalized death's head (Fig. 20x). In designs it is usually accompanied by the hand and eye, and/or forearm bones. (Moundville Engraved, _var_. _Hemphill_).

Turtle. The motif depicts what appears to be a turtle as viewed from above (Fig. 20y). It occurs only on a single vessel. (Moundville Engraved, _var_. _Hemphill_).

Windmill. This motif consists of a circular central element, with minimally four crosshatched bars radiating from it horizontally and vertically (Fig. 20z-aa). The crosshatch lines within each bar virtually always parallel the dimensions of the bar itself. The windmill could well be semantically a variant of the greek cross. It also may bear some relationship to the radial fingers motif, since the latter is sometimes drawn superimposed upon an element similar to the windmill. (Moundville Engraved, _var_. _Hemphill_).

Winged Serpent. This is one of the most common representational motifs in the Moundville sample, depicting a rattlesnake-like creature with wings (Fig. 20bb). Optional features include antlers and a forked eye surround. The tail usually terminates in ophidian rattles, although rarely it is replaced with the tail of a bird. The typical pose shows the creature from the side. Examples also exist presenting the winged serpent in the round, head on the front of the vessel, tail on the back, and wings on the sides. In such cases the creature is positioned as if the thorax, which may or may not be actually depicted, passes under the vessel along the base (Moore 1905:Figs. 160,161; 1907:Fig. 56). (Moundville Engraved, var. Hemphill).

Painted Decoration

Painted decoration is here broadly construed to refer to any kind of deliberate manipulation of surface color, whether by smudging, adding a clay slip, rubbing in pigment, or painting in the strict sense. Exactly how painted decoration enters into the classificatory framework depends a great deal on where the vessel being classified appears to be from. For local vessels, painted decoration never enters into the definition of types and varieties; rather, painted decorative treatments are counted independently as modes which crosscut types and varieties. The same, however, does not necessarily hold true for nonlocal vessels, which are here generally described with reference to the nomenclature used by archaeologists in their place of origin. It is not uncommon for nonlocal types to be defined with painted decoration as a key criterion, and I have made use of such typological designations where appropriate.

The various painted surface treatments found on local vessels are enumerated and briefly defined below. A consideration of the technological means by which these colored effects were produced has been presented in Chapter II (pp. 40-49).

Black Film. A black or very dark brown coloring which covers the entire exterior and/or interior surface. The term is limited here to refer to such coloring only when it occurs on a burnished surface (e.g., Fig. 4, right).

Red Film. A bright red coloring which covers the entire exterior and/or interior of the vessel. The surface may be either burnished or unburnished (Figs. 41j-k, 49h, 56m-p).

White Film. A white coloring covering the entire exterior and/or interior of the vessel. The surface is usually burnished (Figs. 4,left; 41j-k; 49i-j; 56j-k).

Red and Black. Zones of red coloring on a surface that is everywhere else black filmed (Fig. 49k, 56l).

Red and White. Zones of red coloring on a surface which is otherwise white. Usually the red pigment is applied directly over the white, but in some cases the red and white colorants are applied separately to different parts of the surface. In most cases the red pigment is confined to the area of the rim (Fig. 51g,o; 62p-q).

Black on White. Zones of black color appearing on a white filmed background. In most cases, the black seems to be applied by means of negative painting (Fig. 41i).

Red and Black on White. A treatment in which a white surfaced vessel was first painted with zones of red, and later was negative painted in black (Fig. 63d).

Red Engraved. This term describes a treatment in which engraved lines are filled with red pigment (Figs. 40c,h,i,l,o,p; 63a-b).

White Engraved. A treatment analogous to the one described above, except that the engraved lines are filled with white pigment (Fig. 40n).

Basic Shapes

Most vessel shapes at Moundville are variants of three overarching categories: bottles, bowls, and jars. Also present in the collection are a number of composite and double vessels, whose profiles are, in effect, combinations of two simpler shapes.

In discussing shapes it is convenient to refer to a set of "characteristic points" which can be recognized in a vessel's profile. These characteristic points are of four kinds: (1) end points of the profile, occurring at the base and at the lip; (2) points of vertical tangency, which correspond to points of maximum diameter where the profile is concave, and to points of minimum diameter where the profile is convex; (3) inflection points where the curvature changes from concave to convex, or vice versa; and (4) corner points where there is a sharp change in the profile's contour (Shepard 1956:226). Examples of such points as they occur on bottles, bowls and jars are shown in Figure 21.

It is also handy to assign names to certain portions of

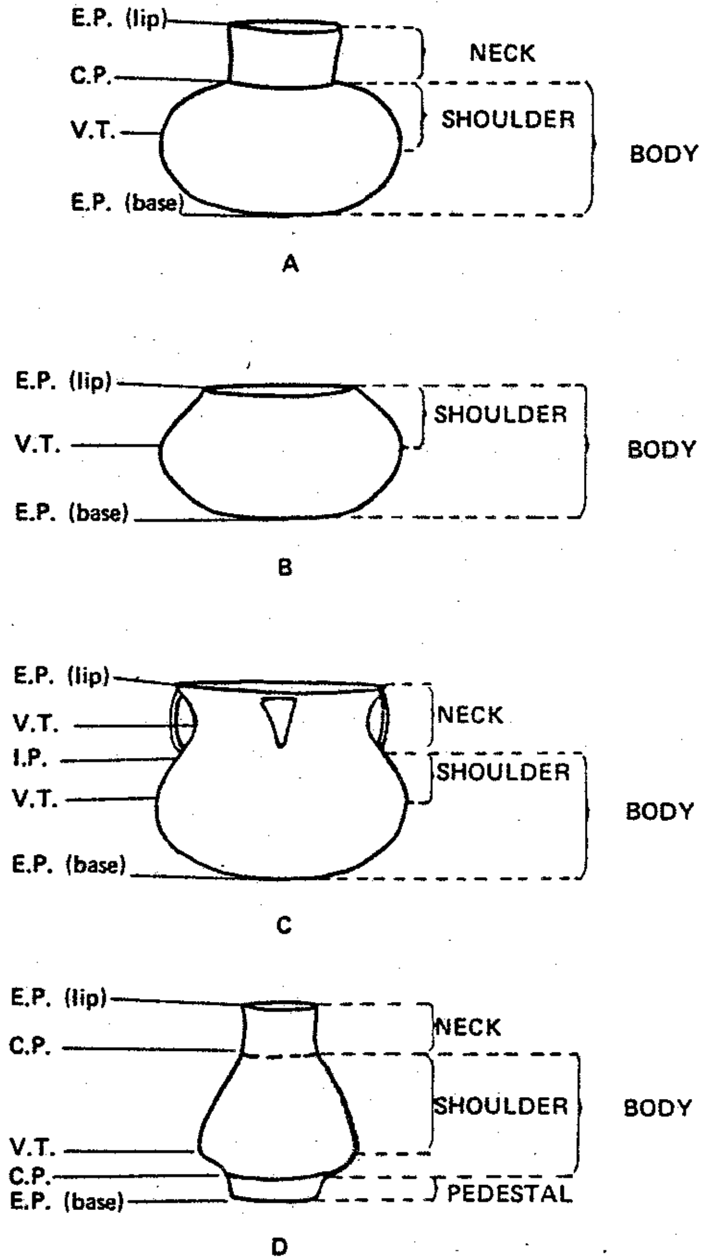

Figure 21. Critical points in a vessel profile: a, bottle; b, bowl; c, jar; d, bottle with pedestal base.

the vessel which can be defined in terms of such points. Generally speaking, the body of a vessel is that portion between the base and the highest inflection or corner point; if no such inflection or corner point exists (as is the case with most bowls), then the top of the body is simply defined by the lip. The neck, when present, is situated directly above the body, and is defined as that portion of the vessel between the highest inflection or corner point and the lip. The shoulder is a subdivision of the body, being that portion above the point of (convex) vertical tangency. These rules are modified slightly when applied to vessels having a pedestal at the base, in that the lower bound of the body is considered to be the corner or inflection point which defines the top of the pedestal (Figure 21d).

Brief definitions of all the recognized basic shapes in the local complex will now be presented under the four general headings mentioned earlier -- bottles, bowls, jars, and composite/double shapes.

Throughout the report, individual vessels which do not find any of the more specific shape categories are described using a more inclusive term, such as "bowl" or "jar".

<u>Bottles</u>

In the most general sense, I take bottles to be vessels which have a distinct body and a more or less vertical neck. Characteristically, the neck is at least a third as high as the body, and the diameter at the rim is less than three-fourths the maximum diameter of the body. The specific

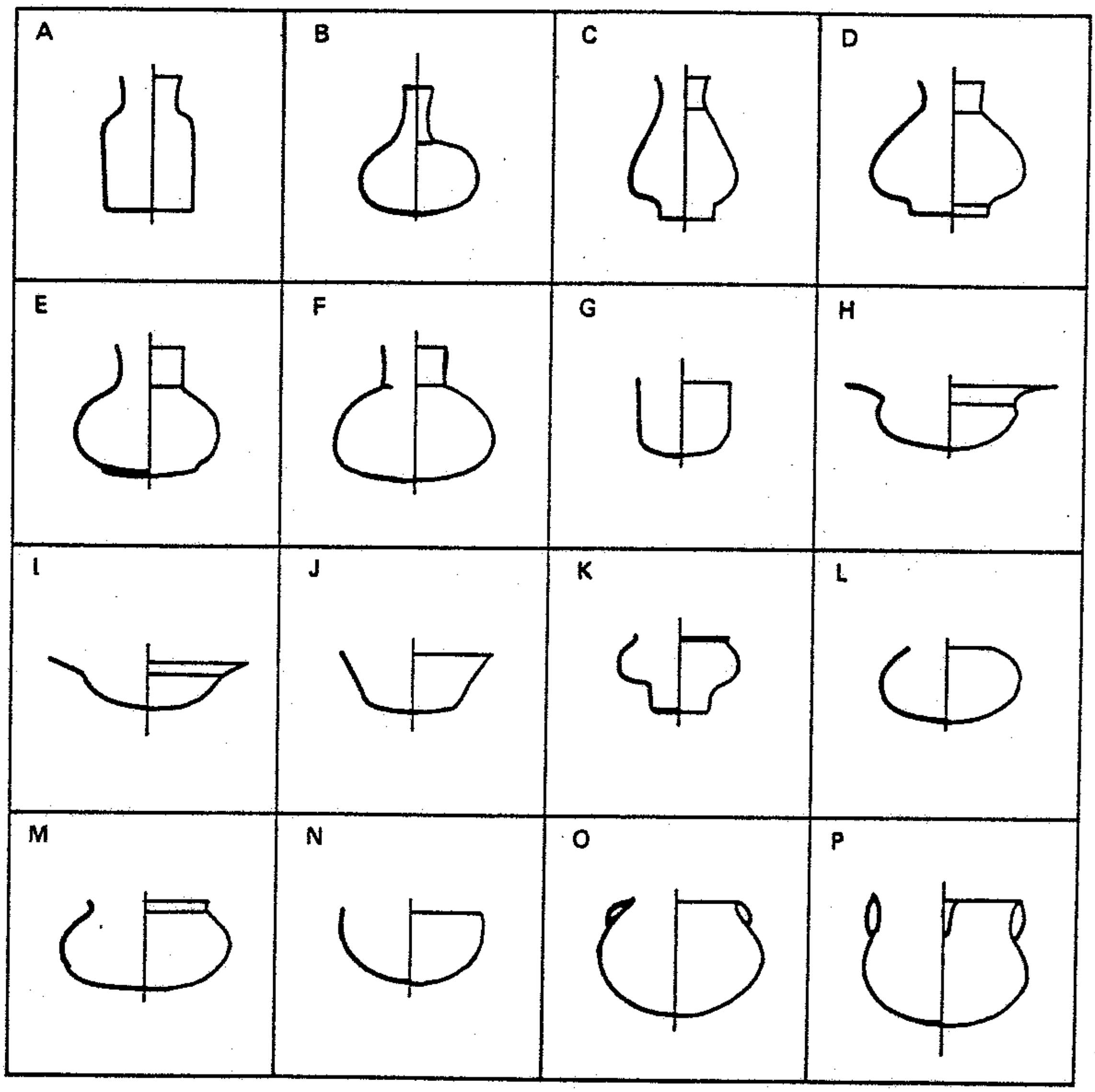

Figure 22. Basic shapes: a, cylindrical bottle; b, narrow neck bottle; c, slender ovoid bottle; d, subglobular bottle with pedestal base; e, subglobular bottle with slab base; f, subglobular bottle with simple base; g, cylindrical bowl, h, flaring rim bowl (deep); i, flaring rim bowl (shallow); j, outslanting bowl; k, pedestalled bowl; l, restricted bowl; m, short neck bowl; n, simple bowl; o, neckless jar; p, standard jar.

kinds appear below.

Cylindrical bottle. A bottle with an approximately cylindrical body and a relatively wide neck (Fig. 22a).

Narrow-neck bottle. A bottle with a moderately tall, narrow neck, a subglobular body, and an unmodified, rounded base. The neck usually has a gracefully curving biconcave profile, like the so-called "carafe" form (Fig. 22b).

Slender ovoid bottle. A bottle which has an ovoid "teardrop" body, a pedestal base, and a relatively wide neck of medium height. The maximum diameter of the body is small relative to the total height (Fig. 22c).

(Subglobular bottle). The term appears in parentheses because I hardly ever use it as a category in itself, without a modifier describing the base. It is listed here separately only for convenience's sake so that I can define it once and thereby avoid repetition. A subglobular bottle is characterized by a globular, ellipsoidal, or wide ovoid body, with the point of vertical tangency situated no higher than midway up the body's height. This sort of bottle always has a wide neck of medium height.

Subglobular bottle, pedestal base. A subglobular bottle (see above) whose body rests atop a distinct pedestal. The pedestal base is hollow and is an integral part of the vessel as a container, rather than merely a stand on which the container rests (Fig. 22d).

Subglobular bottle, simple base. A subglobular bottle (see above) with a base that is neither visibly thickened on the exterior, nor is separated from the rest of the body by a distinct corner or inflection point. Such a base is commonly rounded; Sometimes it is flattened, but not sharply enough to create a distinct corner point (Fig. 22f).

Subglobular bottle, slab base. A subglobular bottle (see above) with a base that is visibly thickened, but not hollow as is a pedestal base. The slab base always has a distinct edge in profile along the exterior surface. This sort of base is intermediate, morphologically and chronologically, to the pedestal and simple forms, and it grades into both (Fig. 22e).

Bowls

Vessels of this category either have no neck at all, or at most a relatively short vertical neck, everted lip, or diagonally flaring rim. The height of bowls typically does not exceed twice their maximum diameter.

Cylindrical bowl. A bowl having straight, approximately vertical sides in the upper half to two-thirds of its profile. By "approximately" I mean that the straight sides should not not diverge from the vertical by more than 20 degrees. The lower portion of the body may be cylindrical as well, but usually it is rounded (Fig. 22g).

Flaring rim bowl. Bowls in this category have a more or less hemispherical lower portion and a sharply outflaring rim (the latter could be called a "neck" in the strictest sense of our definition, but I prefer not to use the term in this case because of its somewhat misleading connotations). Two subcategories of flaring rim bowls are recognized, depending upon the shape of the profile. Bowls which have a point of vertical tangency on their body are referred to as "deep" (Fig. 22h), and those which lack a point of vertical tangency are designated as "shallow" (Fig. 22i).

Outslanting bowl. A bowl with relatively straight walls in the upper half to two-thirds of its profile, which slant outward at an angle greater than 20 degrees from the vertical. The "relatively straight" portion of the wall may sometimes contain an inflection point, but the degree of inflection is not pronounced. The base of such vessels is generally rounded (Fig. 22j).

Pedestalled bowl. A bowl whose body rests atop a distinct pedestal. The pedestal is hollow and forms an integral part of the vessel as container. Usually, the lip on such vessels is sharply everted, and is either scalloped or notched (Fig. 22k).

Restricted bowl. A bowl with a smoothly curving subglobular profile, whose diameter at the lip is less than three-quarters the maximum diameter of the body (Fig. 22l).

Short neck bowl. A bowl which has a subglobular body, a restricted orifice, and a short vertical neck (Fig. 22m).

Simple bowl. A bowl which has an approximately hemispherical profile, without inflection or corner points. The lip diameter must be greater than three-fourths the maximum diameter; on simple bowls which lack a point of vertical tangency, the lip diameter is equivalent to the maximum diameter (Fig. 22n).

Terraced rectanguloid bowl. These are perhaps the most unusual forms at Moundville; Clarence Moore was so unsure of one he found that he chose to call it an "object of earthenware" rather than a vessel (1907:357). As their name implies, these bowls are rectangular, and have a terraced or castellated rim (Fig. 63c-e; Moore 1907:Figs. 22,23). Usually, the rim on one side of the vessel is lower than it is on the other three sides. A total of six such bowls have turned up at Moundville, and only two are known from sites elsewhere: one example was found at Smith Plantation on the Big Black River in Mississippi (Ford 1936:121-122), and another was quite recently excavated at the Lubbub site on the central Tombigbee (Peebles, personal communication).

Jars

These are vessels which have a more or less globular body, and a wide neck that is constricted in profile. The neck is typically less than one-third the height of the body, and the minimum diameter of the neck is no less than three-quarters the maximum diameter of the body. Jars in the present sample almost always exhibit two or more handles in the area of the neck.

(Burnished jar). This is not strictly speaking a basic shape category, but I use it often enough as though it were, and so it seems reasonable to define it here. The label refers to any jar that has a burnished suface finish, as distinct from a jar whose surface is smoothed but not burnished (Figs. 46f, 54m). Making this distinction is useful in several respects, prime among them being the fact that burnished jars tend to exhibit strongly contrasting stylistic features when compared to unburnished ones. For example, burnished jars are usually black filmed, never have more than two handles, and often exhibit beaded rims or frog effigy features. Unburnished jars, in contrast, are usually not filmed, often have four or more handles, and generally lack effigy features. There is also a major functional difference, in that black filmed burnished jars were certainly not designed for cooking, whereas unburnished jars probably were (see p. 57 ff.). Leaving aside the attribute of surface finish, most burnished jars have the basic shape of a standard jar (described below).

Neckless jar. The name of this category may be a bit misleading, because such jars do indeed have a neck as defined by an inflection point below the lip. What sets these jars apart from other categories is that the neck never reaches a point of vertical tangency; in other words, the tangent to the profile slants inward at the lip (Fig. 22o). Although all the neckless jars in the Moundville sample are too fragmentary to positively identify the number of handles, it seems unlikely that they generally had more than two, given their chronological position within the sequence (see Chapter IV).

Standard jar. The distinguishing characteristic of this jar form is that the neck slants outward at the lip. Thus, either the neck is concave in profile and has a point of vertical tangency, or else the neck is approximately straight and leans outward from a corner point at the top of the body (Fig. 22p). Unburnished standard jars can have two, four, eight, or even more handles, depending largely upon the chronological phase during which they were made.

Composite and Double Shapes

Under this heading fall vessels which are made by compounding a pair of simpler basic shapes. Composite vessels are those where one shape is portrayed resting upon or partly inserted in another. Double vessels consist of two shapes joined side-by-side.

Composite bowl. A vessel which in profile appears to consist of one bowl set on top of another (Figs. 46g, 62k). There are three such whole vessels in the collection.

Composite bowl/jar. A shape built to look as though a bowl had been set on top of a jar (Fig. 46c). In the sample of whole vessels this form occurs only once.

Composite jar/bowl. A vessel which in profile appears to be a jar set on top of a bowl. Only one occurs in the collection.

Double bowl. A vessel which consists of two bowls connected to each other side by side. There are five double bowls in the collection: one consisting of attached simple bowls (Fig. 51k), one of cylindrical bowls (WP71), one of rectanguloid bowls (SW21), and two effigies in which each half resemble a mussel shell (EE82, SWG67).

Secondary Shape Features

Under this heading are described some simple elaborations of form which appear on Moundville vessels. Obviously, it is not possible to list every feature of this kind, since the number of idiosyncratic variations in form that one could seize upon and describe is endless. The secondary shape features enumerated below were selected either because they seem to show significant time-dependence, or because they are distinctive enough to be useful in drawing comparisons with assemblages elsewhere.

Applique neck fillets. A form of modeled decoration in which strips of clay are applied to the neck area of a standard jar. The strips are placed vertically or obliquely, and are closely spaced around the neck's circumference (Figs. 59t, 62r).

Band of nodes. A series of closely-spaced nodes arranged in a horizontal band around a vessel's circumference. The feature appears on the shoulder of one burnished jar (Fig. 62j), four restricted bowls, and just below the lip of one simple bowl.

Beaded rim. This term refers to the presence of a notched applique band, positioned horizontally on the rim just below the lip (Figs. 44f,i-j; 46c,f,g; 49d-e; 51f-k; 54m; 58f-j). Usually, the band completely encircles the circumference; the only consistent exception is found on fish effigy bowls, where the notched applique band depicts the dorsal fin and therefore continues only partway around the vessel. The beaded rim is a very common feature on simple bowls and burnished jars.

Beaded shoulder. A notched applique band placed horizontally well below the lip, usually at the point of maximum diameter on a restricted bowl (Figs. 41c, 46h-h', 51c, 62m). The feature may occur independently (<M>13), or it may be found as an integral part of most alligator and turtle effigies, and even of a few fish effigies where the dorsal fin has been placed farther than usual below the lip. There is one bottle in the collection which has a beaded shoulder, but it is so unusual in shape that it could well be an import (<M>4).

Cutout rim. A feature found on certain pedestalled bowls where the lip is not horizontal, but is broken up by a series of cutouts in the rim. The cutouts may be terrace-shaped, V-shaped, or keyhole-shaped. This feature is invariably accompanied by a lowered rim (see below) on one side of the bowl. Two examples are known from Moundville (Fig. 63f; Moore 1905:Fig. 76), and one from Bessemer (DeJarnette and Wimberly 1941:Fig. 67).

Downturned lugs. Lugs placed at the lip of a standard jar, which are tilted downward at the same angle as the top of the handles, and which are also the same width as the tops of the handles. Such lugs alternate with handles around the circumference of the rim. The feature occurs twice on jars with two handles (Fig. 54j) and twice on jars with four handles (Fig. 54c,h).

Folded rim. A jar rim that is folded over to the exterior, and thereby thickened. The lip on such a rim is rounded (Figs. 39m; 41o; 42h,m; 43m-p,u; 60a). Although this feature is quite common in sherd collections from Moundville, it occurs only twice on our whole vessels. The reason for this discrepancy is mainly chronological: the feature is diagnostic of the Moundville I phase, a time from which we have very few gravelots at the site.

Folded-flattened rim. A rim that is thickened by folding or adding a coil to the exterior, and on which the lip is distinctly flattened. The flat lip may be either horizontal or beveled to the interior (Fig. 43v-w). In the Moundville sherd collections, this sort of rim is found on unburnished standard jars and neckless jars. It also commonly occurs on sherds at Bessemer (DeJarnette and Wimberly 1941:Fig. 66, top). None of the jars in our whole vessel sample have a folded-flattened rim, but again this lack is probably due to the fact that we have very few gravelots dating to the time during which this feature was popular (Moundville I phase).

Gadrooning. A form of modeled decoration in which the body of the vessel is vertically fluted at regular intervals around the circumference. There is one gadrooned bottle from a gravelot at Moundville (Fig. 441), and another from Bessemer (DeJarnette and Wimberly 1941:Fig. 65), but it is difficult to be sure whether they are in fact local. The only other place where gadrooning occurs with any frequency is in and around the Cairo Lowland of southeast Missouri. However, our Alabama specimens differ radically in shape from the typical Cairo Lowland bottles, thereby depriving us of the only known alternative source.

Grouped nodes. Nodes that are placed in a horizontal band around the vessel, but are not uniformly spaced; rather, the nodes are clustered in groups, the groups themselves (usually four in all) being widely spaced from each other. At Moundville, this feature occurs on the shoulder of one burnished jar (Rw480, Fig. 41b), one restricted bowl, and on the rims of five simple bowls. Grouped nodes also occur on the shoulder of a pedestalled subglobular bottle from the Lubbub site (Jenkins 1979:Fig. 63).

Handles. Handles are common appendages on the necks of jars; the top of the handle is typically attached at or just below the lip, and the bottom is attached to the shoulder (Figs. 39l-m; 43q-s; 46a-e; 48h-k; 50h-i; 54a-o; 57a-d; 59p-r; 60c; 63i-k). Handles tend to be equidistantly spaced around the circumference, and their total number on any given jar is almost invariably a multiple of two. The number of handles, as well as their shape, are both good chronological indicators, but discussion of this must be deferred to Chapter IV. Among the burnished jars at Moundville, 21 have two handles and four are without handles entirely. Among unburnished jars, 60 have two handles, 56 have four handles, one has five handles, 12 have eight handles, and four have more than eight handles, the actual number ranging from 12 to 24.

Indentations. Round shallow indentations, about 1-3 cm in diameter, placed in the vessel wall. Thirty-six local bottles in the whole vessel sample have indentations on the body; any given bottle can exhibit as few as four, spaced equidistantly around the plane of maximum diameter, or as many as 27, arranged around the body in several tiers (Figs. 45e,f,h,j; 52e,o; 63g-h). Bowls sometimes have indentations as well. One cylindrical bowl has a simple indentation on the base (Fig. 44e'), and one simple bowl exhibits four indentations on its sides (NE38).

<u>Lowered lip</u>. A feature of certain bowls, on which a portion of the lip dips downward forming a kind of window in one side of the vessel. The inventory of lowered lips at Moundville is as follows: four terraced rectanguloid bowls (Fig. 63c-e; Moore 1907:Fig. 22), and four pedestalled bowls (Fig. 63f; Moore 1905:Figs. 76,135). There is also a pedestalled bowl from Bessemer (DeJarnette and Wimberly 1941:Fig 67). Interestingly on all these vessels the lip apart from the lowered portion is always somehow elaborated -- either by means of terraces, cutouts, notches, or nodes.

<u>Notched everted lip</u>. A bowl lip that is turned abruptly upward and/or outward and is notched along the top (Fig. 53f; Moore 1907:Fig. 15). This feature occurs on six pedestalled bowls, two restricted bowls, two simple bowls, and one miniature cylindrical bowl.

<u>Notched lip</u>. A lip that is notched, but not necessarily everted (see notched everted lip above). In terms of whole vessels which appear to be local, a notched lip is found on two flaring rim bowls (Fig. 53j) and three simple bowls. The feature turns up in our sherd tallies as well (Table 21; Figs. 47f, 58l). All in all, notched lips occur on imported vessels much more often than they do on local ones at Moundville.

<u>Opposing lugs</u>. Two lugs placed on opposite sides of a

bowl, projecting horizontally outward from the lip. Two possibly local vessels at Moundville have this feature, an outslanting bowl and a simple bowl. The lugs on the latter vessel (NE54) are elaborated with vertical ridges, and the whole thing may have been intended as an effigy of some sort.

Scalloped rim. A feature of flaring rim bowls, where the rim is elaborated by a continuous series of round projections. A scalloped rim occurs only once among our whole vessels (NE89), but turns up with greater frequency in the sherd collections (Table 21; Figs. 41d-e, 58n).

Single lug. A broad horizontal lug that projects outward from the lip of a bowl with no other appendages (Figs. 44a-c; 53m-n,p). A single lug is most commonly associated with cylindrical bowls (28 occurrences), and less often with simple bowls (13 occurrences).

Spouts. This term refers to the presence of two spout-like appendages added to the rim of a bowl, projecting outward on opposite sides of the vessel. Thus, when viewed from above, the lip is roughly ogival in outline. The four occurrences at Moundville are all on simple bowls (Fig. 44i).

Vertical lugs. Vertically-oriented, elongate lugs applied to the exterior of a bowl, widely-spaced, and positioned a short distance below the lip. The lone occurrence at Moundville is on a fragment from a bowl (NE461), which judging from its decoration probably was made in late Moundville III times.

Widely spaced nodes. Applique nodes which are placed individually at wide equidistant intervals around the circumference of a bowl or jar. Usually there are four such nodes on any given vessel, but one can find examples with as few as two or as many as six. On jars and restricted bowls, the nodes are placed on the shoulder, at or just above the point of maximum diameter; on simple bowls, the nodes are generally a short distance below the lip. The tally of whole vessels in the Moundville sample is follows: nine simple bowls (Figs. 44g-h,i; 46j), one restricted bowl (Moore 1905:Fig. 150), one pedestalled bowl, seven burnished jars (Fig. 54m; Moore 1905:Fig. 155), and three unburnished standard jars (Fig. 63i-k). All the unburnished jars with the feature are decorated with incised arches (Moundville Incised), the nodes positioned at the points where adjacent arches meet.

Effigy Features

Effigy features are, in a sense, secondary shape features too. The only excuse for treating them separately is that effigies in many cases are made up of several different kinds of secondary shape features, appearing together on a single vessel. A fish effigy bowl, for example, may have appropriately modeled adornos to depict the head and tail, simple nodes to depict the ventral fins, and a beaded rim for its dorsal fin. Thus, we are here concerned just as much with how particular features are combined, as we are with what those features consist of.

Speaking in general terms, there are two sorts of effigy vessels at Moundville. One sort is the lug and rim effigy bowl, made by adding two complementary appendages to the rim of a bowl, usually a simple bowl. On one side of such vessels is an adorno depicting a head, which projects upward from the lip; on the opposite side is a horizontal lug which projects outward from the lip. Apart from these appendages, the basic shape of the bowl remains unaltered. The second sort of effigy vessel can be called, for lack of a better term, the structural type. Rather than having the appendages stuck to the rim, such effigies consist of various features applied to and modeled in the vessel wall. In certain cases the degree of modeling is extensive enough to fundamentally alter the vessel's basic shape.

Some effigies represent their subjects with enough detail to make them easily recognizable, and these are easy to name. Others, however, are so conventionalized (or incompetently done) that identification of their subject matter is considerably less reliable. Of course, such trifling impediments have never deterred archaeologists from attaching labels anyway. I have long suspected that the "identification" of the more obscure Mississippian effigy forms generally tells us more about the archaeologist's imagination than it does about the Indian's. The upshot is that none of the names with which I refer to effigy forms should be taken too literally, since many are just convenient guesses. Where there is considerable doubt about the validity of the guess, the effigy label is followed parenthetically with a question mark.

Alligator (?). This effigy form is constructed by placing two conical protrusions of similar dimensions on opposite sides of the vessel. One protrusion represents the head and is endowed with eyes and sometimes a mouth. The second protrusion is presumably the tail. A notched applique band runs completely around the vessel's shoulder and onto the protrusions, perhaps meant to convey the impression of the jagged scales around the edge of the alligator's back. A notched applique strip is also added to the top of the tail and (usually) to the head, running from the vessel wall to the tip of the protrusion. This effigy type occurs three times at Moundville, once each on a simple bowl, a restricted bowl (Fig. 62m), and a burnished jar without handles (Moore 1905:Fig. 69).

Beaver. This effigy is constructed by adding adornos representing the head, legs and tail to the sides of a bowl. The beaver is depicted gnawing on a stick that is being held in its front two paws. This sort of effigy is found once on a simple bowl (Fig. 51d) and once on a restricted bowl.

Bird. This is by far the most common representative at

Moundville of the lug and rim effigy bowl, the modeled head being that of a bird. In most cases there is good reason to believe tht the bird is a duck, but the level of detail in the depiction is seldom enough to warrant certainty. Two variant forms of the head adorno occur on these bowls: One is "flat" variant, which is highly conventionalized, rarely has a distinct neck, and exhibits a two-dimensional quality that can be described as a "cookie-cutter" appearance (13 occurrences; Figs. 39e-f; 63l; Moore 1905:Fig. 51; McKenzie 1966:Fig. 11c). The second variant is the "gracile" form, which tends to be a bit more naturalistic in execution, usually has a distinct neck, and shows its modeled features in three dimensions (six occurrences; Figs. 51a, 62l; McKenzie 1966:Fig. 11a). These two variants of the bird effigy adorno also tend to differ in how they are oriented on the rim. Most of the flat heads face inward, while all of the gracile heads face outward (Table 9). As will be discussed in Chapter IV, this variation is mostly related to time, the flat, inward-facing heads being early, and the gracile, outward facing heads being late. It is worthwhile noting that most of the lug and rim effigy bowls with the head adorno now missing were probably bird effigies to start with; in at least two cases we can be certain of it, since the bowls have incised wings depicted on the sides (WP153, WP218; Fig. 39i).

<u>Conch shell</u>. This is a structural effigy, characteristically a modified bowl. A circular or

TABLE 9
Crosstabulation of Head Form Versus Orientation on Effigy Bowls

Orientation	Form: Flat	Form: Gracile	Total
Inward	10	0	10
Outward	3	6	9
Total	13	6	19

semicircular arrangement of nodes is placed on one side to represent the spire, and a spout-like projection is modeled in or applied to the opposite side to represent the "beak" or tip of the shell (Fig. 39h; Moore 1905:Fig. 94). There are five such bowls in our sample of whole vessels, and one fragment from the excavations north of Mound R (Fig. 41g).

Feline (?). This is a lug and rim effigy form which occurs only once in our sample (Fig. 62q). The outward-facing head has a slightly upturned snout and what may be a snarlng mouth, highly coventionalized; the lug is made to look like a tail which curls upward into a spiral. A sherd from Moundville which depicts a similar head has been illustrated by Holmes (1903:Pl. 58f).

Fish. Fish effigies are built by adding a modeled head to one side of the vessel, and a modeled tail to the other. The two remaining sides are taken up by fins: the dorsal fin is represented by an applique band, usually notched, and the ventral fins are usually depicted with applique nodes. When the vessel is standing upright, the fish appears to be lying on its side. Among local vessels, such features are found on ten simple bowls, seven restricted bowls, (Fig. 51c), one composite bowl (Fig. 62k), one burnished jar, and two bottles (Moore 1907:Fig. 26).

Frog. Unmistakeable effigies of this creature are among the most common at Moundville. The head is modeled or applied on one side of the vessel, and often a small node or dimple on the opposite side suggests the derriere. The legs are depicted on the remaining sides of the vessel by applying strips of clay. Local frog effigies were usually made from burnished jars (11 occurrences; Fig. 51b; Moore 1905:Fig. 78; McKenzie 1966:Fig. 14), and occur less commonly on restricted or simple bowls (two occurrences), and bottles (three occurrences; Moore 1907:Fig. 30).

Frog heads. This effigy form occurs twice on bowls, and consists of four frog heads applied to or modeled in the vessel wall at equal intervals around the circumference.

Human head medallions. This term refers to medallions of clay modeled in the form of human heads, which are then applied to the vessel wall. Vessels with this feature which may be locally made are all simple bowls with a beaded rim (six occurrences; Fig. 51f). Each bowl has four medallions at or just below the lip, spaced at equal intervals around the circumference. Given the great frequency with which beaded rim bowls occur in our sample, it is reasonable for now to regard those with human head medallions as local. However, one should also note that virtually identical "medallion" bowls are a common item in Tennessee (Myer 1928:Pl. 115a; Thruston 1890:Fig. 58,Pl. VIII; Lewis and Kneberg 1946:Pl. 54), raising the possibility that some, if not all, of the Moundville specimens may be imports.

Mammal, unidentified. This designation is applied to bowls of the lug and rim effigy type, where the identity of the mammalian creature whose head is depicted is unclear. Effigies of this sort have at times been called "bat" and "bear", to which list one could add squirrel and beaver as equally good possibilities. The features are simply not distinctive enough to be sure. In two cases the heads are inward-facing (SWM95, McKenzie 1966:Fig. 13b; WP160), and one case it is outward-facing (SED7). The last vessel is highly unusual in that it has a modeled, apron-like collar which extends from the lug to the effigy head along each side of the rim (Fig. 62n). The collar seems to be part of the effigy, but what it was meant to represent is unclear.

Mussel shell. A structural effigy, consisting of a bowl modeled into the shape of a mussel shell (Fig. 46i). In five cases, only a single valve is represented; in two cases, a pair of valves are joined at the hinge, forming a double bowl (McKenzie 1966:Fig. 13).

Shell spoon. This is a bowl which has a notched lug on one side and is modeled into the shape of a shell spoon. It occurs only once in the sample. The real shell spoons, of which this is a ceramic imitation, were typically made from the shell of a freshwater bivalve (see Peebles 1979:Fig. IV-25; Thruston 1890:Fig. 219).

Turtle. An effigy made from a bowl, to the shoulder of which have been added a modeled head, tail, and a notched applique band (Fig. 46h-h'). The notched applique band is positioned horizontally at the level of the head and tail, and probably is intended to represent the edge of the carapace. When the bowl is upright, so is the turtle. Among whole vessels there are four restricted bowls and one simple bowl, the latter unusual in that it lacks the notched applique band (SD855).

Turtle (?), inverted. Here is a form so conventionalized that calling it an effigy may just be wishfulness. It is made by adding six horizontally-projecting lugs to the rim of a single bowl. The lugs are not equidistantly spaced, but arranged in such a way that they could conceivably represent the head, tail and legs of a turtle. When the bowl is inverted, the alleged turtle is upright, with the bottom of the bowl as its carapace. The lugs on our one vessel (NE451) hardly look turtle-like in any way. The only reason to suspect that they are, in fact, effigy features lies in their uneven, but bilaterally symmetrical spacing, analogous to that of the more realistic adornos which are found on inverted turtle effigies in Tennessee (Thruston 1890:Fig. 57).

Also present in the Moundville sample are a number of (presumably) local effigy vessels which cannot be placed into any of the categories described above. Some are simply too fragmentary for identification, as is the case with 17 lug and rim effigy bowls, and one restricted bowl which originally was a structural effigy of some sort (SEH88). A few others defy being pigeonholed despite the fact that they are complete: one is a miniature bird effigy bowl with a head attached to the vessel wall below the level of the lip (SED3); three more are unique effigy forms whose subjects are too conventionalized for easy recognition (Moore 1905:Figs. 12,79,108).

CHAPTER IV

CERAMIC CHRONOLOGY

The late prehistoric chronology in the Black Warrior drainage is schematically set forth in Figure 23. Here we are concerned only with the span of time between A.D. 900 and A.D. 1700, beginning with the terminal phase in the Late Woodland period, and lasting through the Mississippi period up until the onset of European colonization. The period names on the left side of the diagram correspond to those advocated more than thirty years ago by Griffin (1946), which have by now become entrenched (with minor variations) in the archaeological vernacular throughout the eastern United States. On the right side of the diagram are the five phases which currently can be recognized within this span. The first and last of these phases -- West Jefferson and Alabama River, respectively -- were already defined as culture-historical units at the time the present study began, and so all we will do here is to briefly review the content of their known ceramic complexes. It is the definition and chronological placement of the middle three phases -- Moundville I-III -- to which the greater part of this chapter is devoted.

Before moving to a discussion of the gravelot seriation

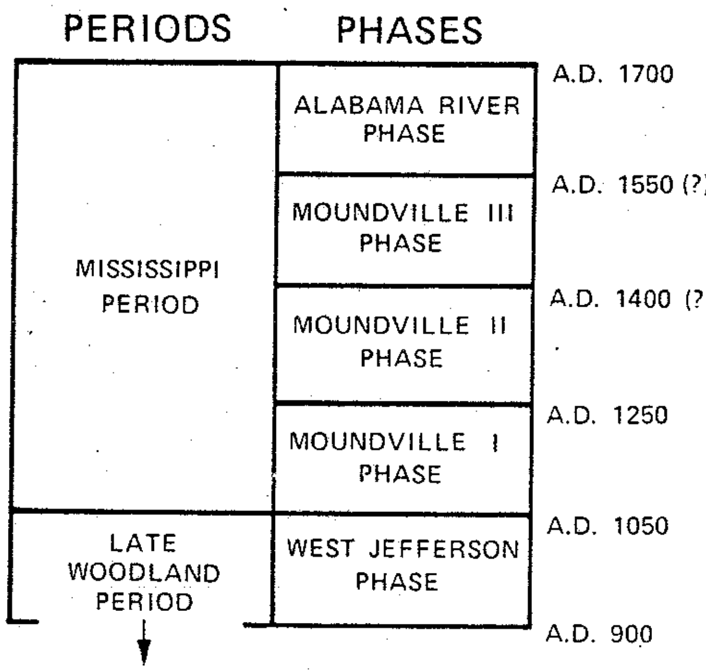

Figure 23. Late prehistoric chronology in the Black Warrior drainage.

and the stratigraphic evidence on which the middle portion of the sequence is based, let us briefly characterize the ceramics which were manufactured during the two phases previously defined.

West Jefferson phase. This phase was first recognized by Ned Jenkins, on the basis of material excavated from three small sites on the Locust Fork of the Black Warrior River, west of Birmingham (Jenkins and Nielsen 1974). Later reanalysis of the same material (O'Hear 1975), along with the excavation of another component in the upper reaches of the Cahaba drainage (Ensor 1979), have also helped to refine our understanding of this phase.

The ceramic complex consists almost entirely of undecorated grog-tempered pottery, classified as Baytown Plain, var. Roper (Fig. 67c-h). The very few decorated grog-tempered sherds (usually less than 1%) most often fall into the types Mulberry Creek Cord-Marked, var. Aliceville (Fig. 67b), Alligator Incised, var. Geiger (Fig. 67a), and Benson Punctate, var. unspecified (see Jenkins 1979 for a discussion of these ceramic types vis a vis the temporally equivalent Gainesville phase on the central Tombigbee). Recognizable vessel shapes include bowls and jars, but not bottles. Many of the jars were made in the standard form with two handles -- virtually identical in shape to the shell-tempered Moundville I phase examples. The handles themselves tend to be parallel-sided and relatively thick.

Traces of shell-tempered pottery sometimes turn up in

West Jefferson phase contexts as well. Among the types found are Mississippi Plain, *var. Warrior*, and Moundville Incised, *var. Carrollton*. As might be expected, the appearance of shell-tempered sherds in otherwise Woodland contexts has engendered a terrific debate between those who would see in them evidence for the in-migration of Mississippian peoples (e.g., Jenkins 1976), and those who would regard them simply as evidence that local potters were beginning to experiment with new techniques (e.g., Peebles, in press). For present purposes only two things need to be stressed: First, the kinds of West Jefferson contexts in which shell-tempered sherds have been found strongly imply that these sherds are indeed *in situ*, and are not there simply as a result of stratigraphic mixture whether aboriginal or recent. Second, it appears that in the Warrior drainage the wholesale adoption of shell-tempering by the local potters was an extremely abrupt process. West Jefferson contexts, however late, rarely have more than 2% of their sherds containing shell temper, but in the immediately following Moundville I phase, virtually 100% of the sherds contain shell.

Ten good radiocarbon determinations have been obtained on the West Jefferson contexts found at four different sites, and these dates are summarized in Table 10. The dates range from A.D. 875 to A.D. 1065, suggesting a span for the phase of about A.D. 900-1050.

By statistically analyzing the radiocarbon dates from

TABLE 10
West Jefferson Phase Radiocarbon Dates

Site	Lab. No.	Date*	Reference
1Je32	UGa-625	A.D. 1060±60	Jenkins and Nielsen 1974
1Je31	UGa-649	A.D. 1060±75	Jenkins and Nielsen 1974
1Je33	UGa-611	A.D. 1005±70	Jenkins and Nielsen 1974
1Je33	UGa-612	A.D. 1005±70	Jenkins and Nielsen 1974
1Je32	UGa-624	A.D. 965±65	Jenkins and Nielsen 1974
1Je33	UGa-610	A.D. 995±65	Jenkins and Nielsen 1974
1Je33	UGa-609	A.D. 945±60	Jenkins and Nielsen 1974
1Je32	UGa-633	A.D. 900±60	Jenkins and Nielsen 1974
1Je34	---	A.D. 900±60	Ensor 1979:8
1Je31	UGa-652	A.D. 875±70	Jenkins and Nielsen 1974

* Dates (uncorrected) based on 5568 year half-life.

1Je31, 1Je32 and 1Je33, O'Hear (1975:26-27) was able to identify certain changes in the ceramic assemblage through time. He calculated a weighted average of A.D. 1014±30 (corrected) for those contexts which contained shell-tempered pottery, versus A.D. 928±43 (corrected) for those which did not, suggesting that pottery tempered solely with shell did not appear in the complex until after about A.D. 1000. The one pit at 1Je34 which yielded a date of A.D. 900±60 did, however, contain a single shell and grog tempered sherd, indicating that such mixed paste compositions may have come into use somewhat earlier (Ensor 1979:8, Fig. 13D).

Alabama River phase. The Alabama River phase, which comes after Moundville III, was first named and formally defined by Cottier (1970), and later was described in more detail by Sheldon (1974). Cailup Curren's very recent fieldwork in the Black Warrior Valley, much of it still unpublished, has also contributed a great deal to our understanding of the phase. Though its formally-defined status is relatively new, the phase had been recognized informally since the turn of the century, when it was simply referred to as the "burial urn culture" of central and southern Alabama (e.g., Moore 1899; Fundaburk and Foreman 1957).

In terms of the present typology, the Alabama River phase ceramic complex includes Mississippi Plain, var. Warrior and Bell Plain, var. Hale as its principal undecorated wares; among the decorated wares are Carthage Incised, vars. Carthage, Poole and Fosters, Barton Incised, var. Demopolis (Fig. 56i), along with a number of distinctive variants of the types Alabama River Incised (Figs. 56h, 62r), Carthage Incised, and Moundville Engraved (Fig. 62o), to which formal variety names have not yet been assigned. Common vessel forms include simple bowls, flaring rim bowls (both shallow and deep), short neck bowls, and subglobular bottles with simple bases. Standard jars are common, generally having at least four handles, and often more than ten. Jars lacking apparently functional handles are often embellished with stylized handles, consisting of applique fillets or pinched-up ridges of clay, closely-spaced and positioned vertically or obliquely on the rim. Black filming is present but decidedly less common than in the preceding phases. Vessels painted red-and-white are found in the complex as well.

The only radiocarbon dates for this phase are a few mid-sixteenth and seventeenth century determinations recently obtained by Cailup Curren on his sites in the Warrior Valley (personal communication). In round numbers, a reasonable span for this phase would seem to be A.D. 1550-1700. At present, our absolute dating is not refined enough to say for sure whether the DeSoto dateline of 1540 fell within the late Moundville III or the early Alabama River phase; suffice it to say that it must have fallen very close to the transition between the two.

Gravelot Seriation

Gravelots are ideal archaeological units with which to construct a temporal seriation. For one thing, gravelots represent events in time of short, and approximately equivalent duration, and so it is eminently reasonable to try to order them serially, without worrying a great deal about problems of overlap and differing spans through time. Second, inasmuch as the artifactual associations within graves are relatively free from the ambiguities inherent in stratigraphically mixed deposits, a sequence of such "closed finds" usually provides a reliable framework on which a detailed ceramic chronology can be based.

With regard to the data from Moundville, three procedural questions had to be resolved before the analysis could proceed. First, which gravelots should be selected for the analysis? Second, on which ceramic attributes within the gravelots should the seriation be based? And third, by what method should the sequencing of the gravelots be accomplished? The solutions adopted to these questions are described in the sections which follow.

Choice of Gravelots and Ceramic Attributes

It is best to discuss the procedures used in selecting gravelots and attributes under the same heading, since, as will soon become apparent, the two kinds of choices were somewhat interdependent. In each case, selectivity was dictated not only by the requirements of the method, but also by a desire for efficiency in the analysis.

To begin with, it was decided to consider only those gravelots which contained at least two vessels on which we had recorded data. Such gravelots tended to exhibit much more stylistic information than gravelots with only a single vessel; adding single-vessel gravelots to our seriated sample would have greatly increased the trouble involved in the analysis, without materially improving the result.

The prime criterion in choosing stylistic attributes on which to base the sequencing was that they be chronologically sensitive, i.e., that they exhibit a consistent pattern of change through time within the period encompassed by our sample. Such attributes were initially identified by doing a "quick and dirty" seriation by hand. Photographs of all the vessels found in each gravelot were placed in a separate row, and the rows were arranged and rearranged on a (very, very large) tabletop until some consistent patterns of stylistic change were discerned. It was on the basis of this initial attempt that a preliminary article on the Moundville chronology was written (Steponaitis 1980).

In looking for chronologically-sensitive attributes, and indeed in all aspects of producing the final seriation, obvious nonlocal vessels were excluded from consideration. This strategy was adopted as a precaution against violating the assumption of smooth stylistic change on which the validity of seriation depends. Since there was no guarantee that stylistic developments in neighboring regions proceeded in step with those at Moundville, the inclusion of foreign vessels had the potential of introducing serious errors in sequencing.

Once a preliminary list of chronologically-sensitive attributes was formalized, each of the selected gravelots was examined in turn, and the attributes were recorded as being either present or absent. Any gravelot that did not have at least two of these attributes present was discarded, since such a gravelot would have contributed little chronological information in the final analysis. For the most part, attributes present in fewer than five gravelots were also eliminated, again for the sake of computational efficiency. The process of discarding gravelots and eliminating attributes was repeated several times in succession, until a "stable" configuration was reached in which no gravelot had fewer than two attributes present, and no attribute (with some exceptions) was present in fewer than five gravelots. Exception to the latter rule-of-thumb was made in the case of three attributes which seemed to appear only in the very earliest or the very latest gravelots, since without these attributes the two extreme ends of the sequence would not have been represented in the seriation at all.

The resulting dataset contained 87 gravelots of vessels (Fig. 25, left column), characterized by 24 chronologically-sensitive attributes of shape, design, and painted decoration (Table 11). It was this dataset to which the numerical seriation method was applied.

Numerical Seriation

The numerical seriation of gravelots was accomplished using an elegant method devised by Cowgill (1972), which is especially suited for presence/absence datasets in which the number of attributes is considerably less than the number of gravelots to be sequenced. The method involves three steps:

1) Compute a symmetric matrix of distance coefficients between attributes, using a coefficient which estimates the relative separation of these attributes in time, based on their degree of co-occurrence in gravelots.

2) Based on the distance coefficients calculated in Step 1, scale the attributes (nonmetrically) in a

TABLE 11

Chronologically Sensitive Attributes Used in Seriation

Types and Varieties
- (17) Carthage Inc., _var._ _Summerville_
- (18) Moundville Eng., _var._ _Havana_
- (15) Moundville Eng., _var._ _Northport_
- (14) Moundville Eng., _var._ _Taylorville_
- (16) Moundville Eng., _var._ _Tuscaloosa_
- (13) Moundville Eng., _var._ _Wiggins_ or Carthage Incised, _var._ _Carthage_*

Representational Motifs
- (22) Hand and Eye
- (21) Paired Tails
- (20) Winged Serpent

Painted Decoration
- (19) red and white

Basic Shapes
- (1) cylindrical bowl
- (2) short neck bowl
- (3) flaring rim bowl (deep)
- (4) slender ovoid bottle
- (5) subglobular bottle, pedestal base
- (6) subglobular bottle, slab base
- (7) subglobular bottle, simple base
- (8) burnished jar
- (23) standard jar (unb., 8 or more handles)

Secondary Shape Features
- (9) beaded rim
- (10) widely sp. nodes (bowl, burn. jar)
- (11) indentations

Effigy Features
- (12) lug and rim effigy (inward facing)
- (24) fish effigy

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* These two varieties were combined for the purposes of seriation because they exhibit exactly the same design motif, differing only in the width of the line with which the motif is executed.

2-dimensional space, and isolate the dimension which corresponds to the passage of time. The relative positions of the attributes along this temporal dimension can then be measured.

3) With reference to the relative temporal positions of the attributes estimated in Step 2, compute a "best-fit" or most probable position for each gravelot, based on the attributes present within it. When the gravelots are ordered according to this "best-fit" criterion, the sequencing has been achieved.

The procedures involved in each of these three steps will now be described, as will the results of their application to the data at hand. I will deliberately keep discussion of the mathematical end of things short, going into only as much detail as is necessary for the reader to get a basic understanding of the results. Anyone interested in the fine points of, and the justification for, the mathematical techniques employed is strongly urged to read Cowgill's own lucid exposition (1972).

The distance coefficient computed in the first step of the process is based on a model which conceives of each attribute as having a chronological range, which range can be characterized in terms of a midpoint and an overall span. Suppose that we have an ideal set of gravelots, whose attributes can be seriated perfectly into vertical columns, without gaps, just like the ones in Figure 26. In such a situation, the span of an attribute can be thought of as the number of gravelots in which it occurs, and the degree of overlap between the spans of any two attributes can be thought of as the number of gravelots in which they both occur together. By means of a rather lengthy logical argument, Cowgill (1972:399-406) has shown that one can calculate a useful index of "distance" between the midpoints of any two attributes, by taking into account their total span and their degree of overlap -- both of which variables can be estimated prior to actually seriating the gravelots. One begins by determining four simple quantities: Aij is the number of gravelots in which attributes i and j occur together; Bij is the number of gravelots where i occurs but not j; Cij is the number of gravelots where j occurs but not i; and G is the total number of gravelots. One can then calculate the distance (Wij) between the midpoints of the two attributes as follows:

$$W_{ij} = 0 \quad \text{if either } B_{ij} \text{ or } C_{ij} \text{ is zero} \tag{1a}$$

$$W_{ij} = 1 \quad \text{if } A_{ij} \text{ is zero} \tag{1b}$$

$$W_{ij} = (B_{ij} + C_{ij})/G \quad \text{otherwise} \tag{1c}$$

In situations where the two attributes do not overlap (i.e., co-occur) at all, the distance coefficient takes on a value of one. In situations where the overlap is complete (i.e., the presence of one attribute is always accompanied by the presence of the other), the distance coefficient becomes zero. And in situations of partial overlap (i.e., each attribute occurs sometimes, but not always, without the other), the coefficient takes on values that are intermediate between zero and one.

After the distance coefficients are calculated, the next step in the procedure is to arrange the attributes (or their midpoints in time) into a plausible relative sequence. To accomplish this, Cowgill's method relies on a well-established mathematical technique called nonmetric multidimensional scaling, which, though computationally intricate, nowadays can easily be done with the aid of a computer (R. Shepard 1962; Kruskal 1964a, 1964b; Guttman 1968; Lingoes and Roskam 1971; R. Shepard et al. 1972). Briefly put, multidimensional scaling is a way of seeking configurations of points, each point representing an entity, such that the rank order of the distances between the points correspond as closely as possible to the rank order of a set of distance coefficients specified between the entities at the outset. For example, if one were to begin with a table of mileages between cities, nonmetric scaling could be used to reconstruct, at least approximately, the positions of these cities relative to one another in space. Applied to the problem of chronological ordering, the technique works in essentially the same manner: We begin with a set of chronological "distances" between pairs of attributes, and, based on these distances, nonmetric scaling produces the best possible "map" to fit these distances, showing the approximate relative positions of the attribute midpoints in time.

As its name implies, the technique is capable of producing configurations of points in any number of dimensions (limited only by the number of entities being compared), and the choice of an appropriate dimensionality depends to a large extent on the circumstances of the particular application. Since the distance coefficient should reflect the separation between attribute midpoints principally with respect to time, one might logically expect in this case to find an adequate configuration of points in one dimension only. But as Cowgill (1972:397) and others (Kendall 1971:223; Kruskal 1971) have emphasized, it is usually desirable to work with a configuration in two dimensions, for several reasons. One advantage in doing so is strictly computational: the computer algorithm, when working in only one dimension, has a much greater change of stopping at a suboptimal configuration, even when a better solution exists. The second reason, more a matter of interpretive importance, is that the two-dimensional scaling of points provides a built-in test of the assumptions on which the seriation's validity depends. As Cowgill (1972:384) put it,

> multidimensional scaling in two or more dimensions ... amounts to a test of the 'one-axis' hypothesis. The data may or may not fit into an essentially one-dimensional pattern. If they do, and if chronological data from other sources are consistent with this one axis being a time axis, then it makes sense to go ahead with a pure

seriation technique.

Otherwise, if a one-dimesnional configuration fails to appear, then the investigator is forced to reconsider the appropriateness of the analysis in terms of at least two possibilities. Either the gravelots do not vary significantly with respect to time and the entire analysis is misconceived, or the attributes being measured are poor chronological indicators and should be replaced with better ones.

Practical experience with multidimensional scaling applied to archaeological seriation has shown that acceptable one-dimensional configurations found in two-dimensional space need not always be linear. In fact, linearity seems to be the exception rather than the rule; it is much more common for the points to end up in an arcuate or sinuous configuration, what Kendall (1971) refers to as a "twisted one dimensional object" (also see LeBlanc 1975:35; Drennan 1976a:293-294, 1976b:52-53).

With this background in mind, let us now return to a consideration of the data from Moundville. Using the distance coefficients calculated by means of Eq. (1) as input, our attributes were scaled in two dimensions by means of the Guttman-Lingoes program MINISSA-I (Lingoes 1973:39-79). The resulting configuration of points is shown in Figure 24. Not surprisingly, the configuration is an enlongated, essentially one-dimensional arc; the coefficient of alienation, a statistic which measures departure from a

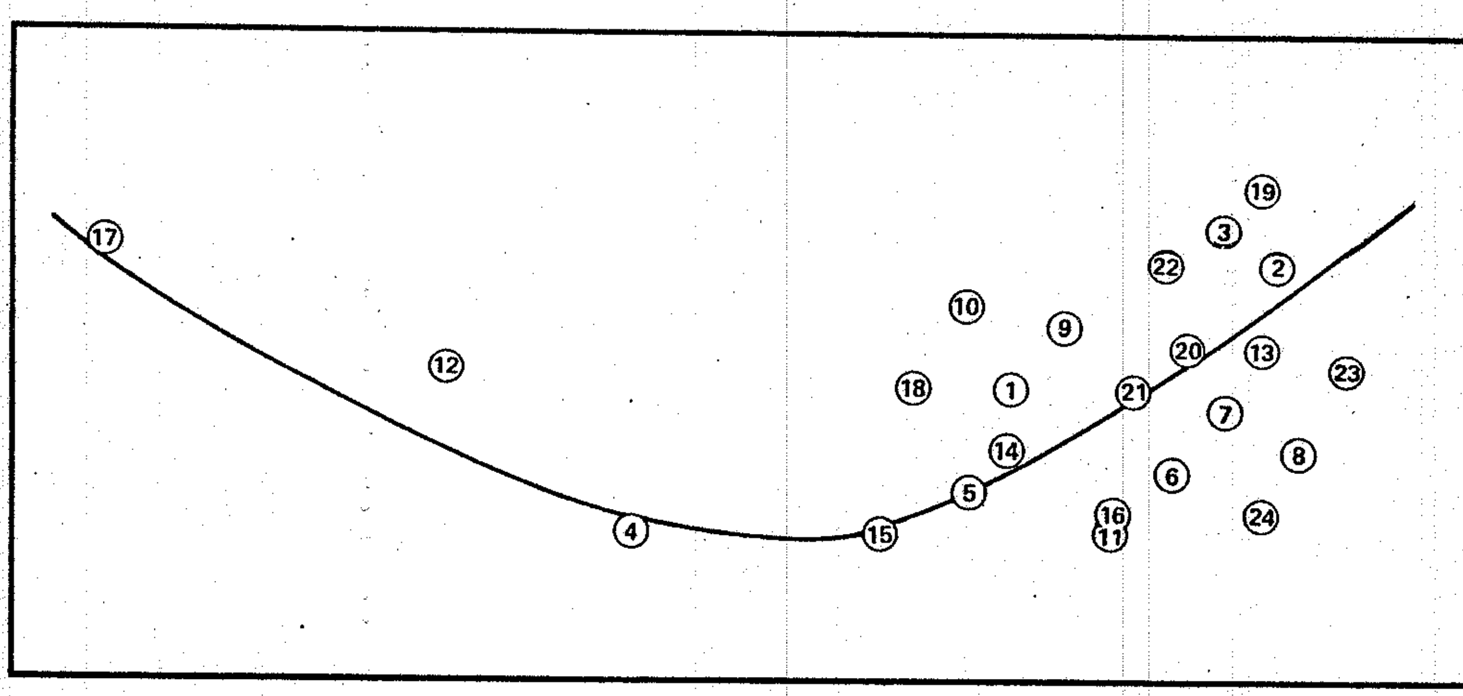

Figure 24. Nonmetric scaling of attributes in two dimensions. The fitted curve represents time (Guttman-Lingoes' coefficient of alienation = 0.155; Kruskal's stress = 0.123).

perfect rank correspondence between the input and the achieved distances, takes on a value of 0.155 indicating a reasonably good fit (see Drennan 1976b:50-52; Kruskal's stress, an analogous statistic, also has a low value of 0.123).

In order to scale more precisely the relative positions of the points along this (presumably) temporal dimension, a curve was fitted to the configuration by eye (Fig. 24), and the positions of the points were projected perpendicularly onto the curve. Each point's location along this curve, measured from left to right in millimeters, could then be regarded as the predicted midpoint, in an arbitrary timescale, of the corresponding stylistic attribute.

Finally, once the attribute midpoints have been scaled in this manner, the third step in Cowgill's method involves actually seriating the gravelots themselves. This sequencing is accomplished by calculating a probable or "best-fit" position for each gravelot, taking into account the stylistic attributes it contains. The equation Cowgill proposes for doing this can be written in its most general form as:

$$Lu = \sum(Mi/Gi\ )/\sum(1/Gi^{k}) \qquad (2)$$

summed over the attributes present in gravelot U, where Lu is its best-fit position, Mi is the estimated midpoint (in our arbitrary timescale) of attribute i, Gi is the total number of gravelots containing attribute i, and k is a parameter which can take on a values of 0, 1, 2, and so on, depending upon the result desired. Cowgill's equation is essentially a weighted mean of Mi for all the attributes that are present in gravelot U; the greater the value of k chosen, the more weight is given to rare attributes at the expense of common ones in assigning the gravelot's position. Having tried various values for this parameter in ordering the Moundville gravelots, I obtained the most satisfying result by setting k equal to zero, in which case Equation (2) reduces to:

$$Lu = \sum Mi / \sum 1 \qquad (3)$$

which is simply the unweighted arithmetic mean of the attribute midpoints. The sequence of Moundville gravelots ordered by means of this expression is illustrated in Figure 25.

<u>Chronological Interpretation</u>

Abstracting a chronology from the seriation diagram in Figure 25 is fairly straightforward, provided that one caveat is kept in mind: the exact position of any particular gravelot in this sequence must not be taken too literally. Each gravelot is assigned a best-fit position on the basis of the attributes it contains, but the best-fit is by no means the only possible position, nor is it necessarily the "true" position in any strict sense -- it is only the most likely position given the data at hand. Thus, all we can reasonably expect is that most gravelots have

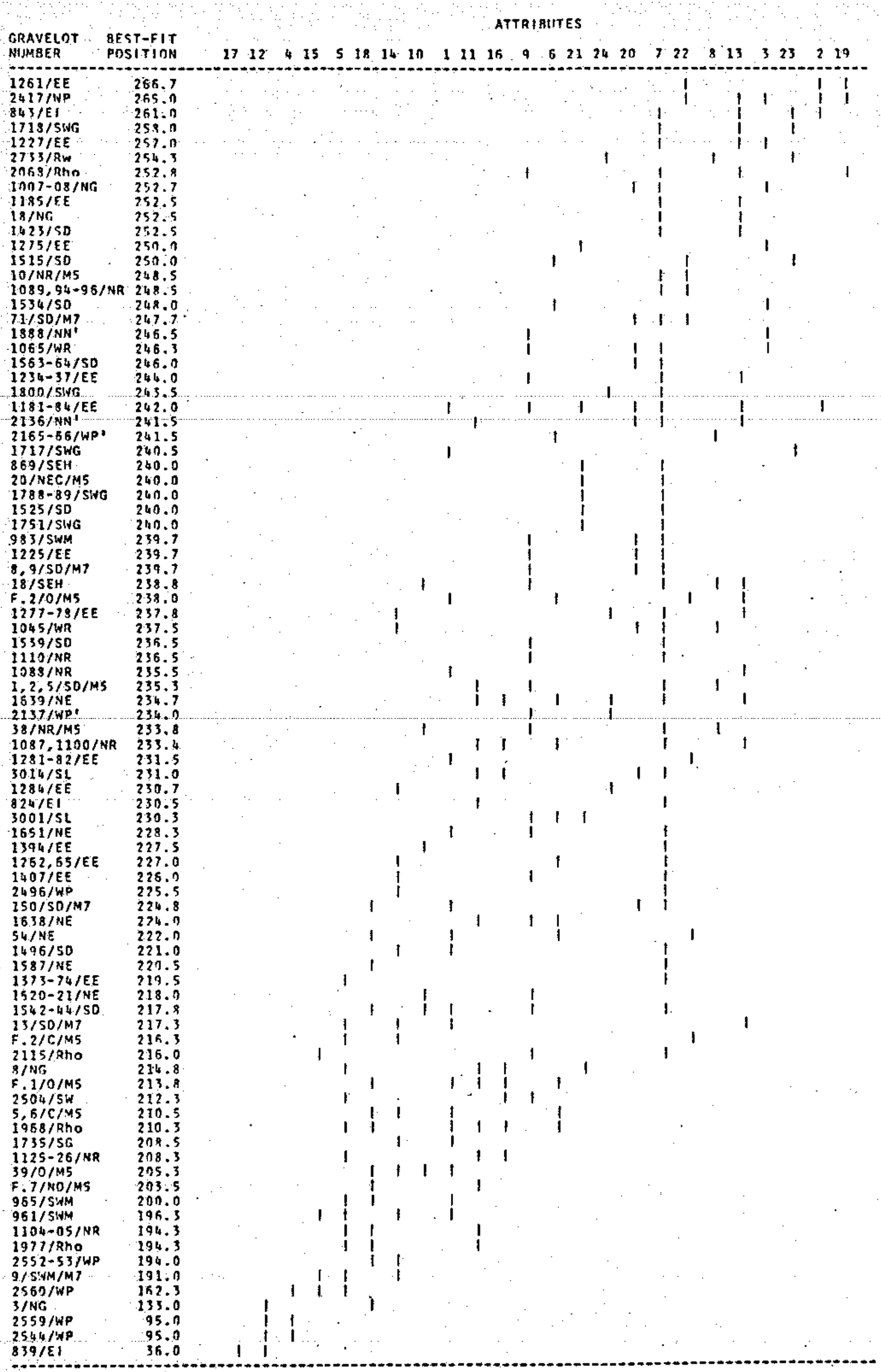

Figure 25. Seriated sequence of gravelots.

ended up in the right neighborhood, so to speak, without necessarily being at the correct address. This being the case, the overall chronological pattern among the attributes should be fairly accurate, despite the fact that some individual gravelots may be misplaced (for further discussion of the matter, see Cowgill 1972:414-417).

A convenient way to look at the results when building a chronology, then, is simply to divide the seriated sequence into segments, and to treat each segment as if it were a stratigraphic level of sorts. In this way, we can best characterize the trends through time, without being forced to put too much faith in the very fine details of where individual gravelots happen to be sequenced.

Actually deciding where boundaries between segments should be placed was a bit difficult at first, since no major discontinuities in the Moundville sequence exist. Based on the seriation diagram in Figure 25, another diagram was produced which depicted the total span of each attribute as an unbroken vertical bar (Fig. 26). Horizontal boundaries were then positioned on this diagram so as to maximize the difference between adjacent segments, especially with reference to attributes which are relatively common in the collection and/or are easily recognizable on sherds; though this kind of judgment was relied on as much as possible, the placement of each boundary was nevertheless somewhat arbitrary. All in all, it was useful to distinguish five segments within the sequence, which

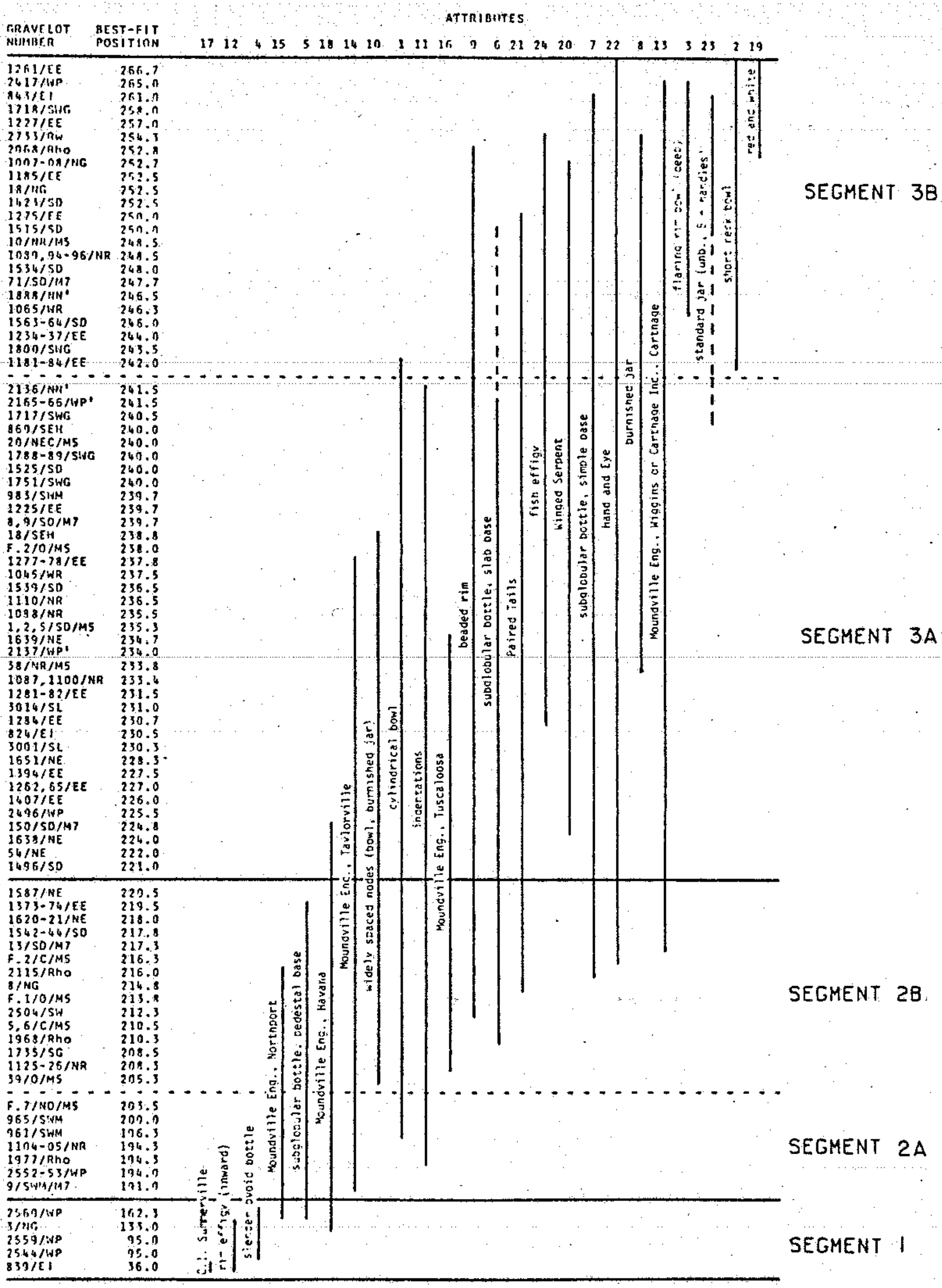

Figure 26. Segments within the seriated sequence.

correspond to our ceramic phases as follows:

Segment 3B - late Moundville III

Segment 3A - early Moundville III

Segment 2B - late Moundville II

Segment 2A - early Moundville II

Segment 1 - Moundville I

To say that a segment "corresponds to" a phase does not imply that all the gravelots within the segment necessarily date to that phase; the problems with placing too much interpretive emphasis on the seriated positions of individual gravelots have already been mentioned. Rather, the correspondence should be taken to mean only that the ceramic assemblage within a given segment is stylistically equivalent to the complex associated with a given phase. Assigning plausible dates to individual gravelots is a procedure analytically separate from the seriation itself, and is taken up in Chapter V.

The data on types and varieties, shapes, motifs, and other features of the vessels falling within each segment are summarized in Tables 12 through 17. All local vessels from the pertinent gravelots are tabulated, whether or not they exhibit an attribute that was used in formulating the original seriation. Discussion of these data with reference to the ceramic chronology at Moundville must be deferred for the time being, until after the complementary evidence from the stratigraphic excavation has been presented.

TABLE 12
Seriated Distribution of Types and Varieties

Type, Variety	Segment 1	2a	2b	3a	3b
Bell Plain, *Hale*	6	3	17	32	18
Mississippi Pl., *Warrior*		1	5	13	20
Carthage Inc., *Akron*	3	1		1	
" " *Carthage*				1	6
" " *Fosters*					2
" " *Moon Lake*				1	
" " *Poole*					1
" " *Summerville*	1				
Moundville Eng., *Englewood*				2	1
" " *Havana*	1	4	7	1	
" " *Hemphill*		1	4	29	14
" " *Northport*	1	4	1		
" " *Taylorville*		2	4	8	
" " *Tuscaloosa*			5	3	
" " *Wiggins*			2	6	9
unclassified			1	1	
Total	12	16	46	98	71

TABLE 13
Seriated Distribution of Representational Motifs

Representational Motif	Segment 1	2a	2b	3a	3b
Bird with Serpent Head					1
Crested Bird				3	
Forearm Bones				1	2
Forked Eye Surround		1			
Hand and Eye			1	3	6
Ogee			1		
Paired Tails			1	6	2
Paired Wings				1	
Radial Fingers				2	1
Raptor				3	
Scalp				1	1
Skull				1	
Turtle					1
Windmill			1	1	
Winged Serpent				5	4

TABLE 14
Seriated Distribution of Painted Decoration

Painted Decoration	Segment 1	2a	2b	3a	3b
black film	*	*	*	*	*
red film					1
red and white					4

* Present on most burnished vessels, but precise count not available.

TABLE 15
Seriated Distribution of Basic Shapes

Basic Shape	Segment 1	2a	2b	3a	3b
cylindrical bottle		2		1	
narrow neck bottle					1
slender ovoid bottle	3				
subglob. bottle, ped. base	1	6	8		
subglob. bottle, slab base			4	8	2
subglob. bottle, simple base			5	34	26
bottle (misc.)			1	4	1
cylindrical bowl		3	8	9	1
flaring rim bowl (deep)					7
flaring rim bowl (shallow)				2	1
pedestalled bowl			1	2	
restricted bowl	2		1	3	3
short neck bowl					4
simple bowl	4	4	9	16	7
terraced rectanguloid bowl		1			
bowl (misc.)			1		1
burnished jar			1	5	1
stand. jar (unb., 2 hand.)			2	3	3
stand. jar (unb., 4 hand.)			3	8	9
stand. jar (unb., 8 hand.)				1	2
stand. jar (unb., 10+ hand.)					2
jar (misc.)					1
composite bowl			1		
composite bowl/jar			1		
double bowl				1	
unident. shape (fragmentary)	2			1	
Total	12	16	46	98	71

TABLE 16
Seriated Distribution of Secondary Shape Features

Secondary Shape Feature	Segment 1	2a	2b	3a	3b
beaded rim			7	17*	7
beaded shoulder	1		1+	1#	
downturned lugs				1	2
indentations		2	5	8	
lowered lip		1			
notched everted lip			1	2	
notched lip				1	
single lug		2	7	6	1
spouts			1		
widely spaced nodes: (bowl, burn. jar)......			3	3	

* Three are dorsal fins on fish effigy bowls.

+ The carapace edge on a turtle effigy.

The dorsal fin on a fish effigy.

TABLE 17
Seriated Distribution of Effigy Features

Effigy Features	Segment 1	2a	2b	3a	3b
beaver				1	
bird (flat head, i.f.)	1				
bird (gracile head, o.f.)				1	
fish				4	2
frog				3	1
human head medallions				2	1
mammal, unidentified	1				
mussel shell			1		
turtle			1		
turtle, inverted			1		

Stratigraphy

All our stratigraphic data come from the 1978-79 test excavations north of Mound R. These excavations consisted of two 2x2 m squares, designated 6N2W AND 8N2E, which were trowelled down to subsoil mostly by natural levels (see p. 26, Appendix C). The cultural deposits within these squares basically took the following form: The uppermost 40 cm or so consisted of midden and/or fill, containing scattered pits and various hearth-like features, but exhibiting no definite floors, that is, no distinct horizontal lenses that could be interpreted as living surfaces. The next 30 cm or so was comprised of similar midden/fill, except that it was interspersed with occasional traces of sand floors; most of these floors were discontinuous, and could well have been aboriginally disturbed. Finally, the lowest 130 cm of deposit consisted of a series of closely superimposed sand floors, each usually no more than 5 cm thick, sometimes interspersed with thin lenses of midden. At the very bottom of 6N2W, a portion of a sunken house was encountered. This house apparently represents the initial episode of occupation in the deposit, since it was built intruding directly into sterile soil.

For the purpose of discussing the ceramic stratigraphy, I have found it convenient to group contiguous levels with similar ceramic assemblages into a set of Analysis Units (AU). Such Analysis Units were formulated for each excavation separately, since the stratification in the two profiles could not always be securely matched. Each AU is listed below, along with the levels which comprise it, and the chronological phase to which its assemblage mostly pertains:

6N2W

AU.3B	L.1-L.2	late Moundville III (somewhat mixed)
AU.3A	L.3-L.5	early Moundville III (somewhat mixed)
AU.2	L.6-L.7	Moundville II (somewhat mixed)
AU.1	L.8-L.28	Moundville I

8N2E

AU.3	L.1-L.3	Moundville III (somewhat mixed)
AU.2	L.4-L.6	Moundville II (somewhat mixed)
AU.1	L.7-L.26	Moundville I

For the most part, levels assigned to comparable Analysis Units in the two excavations more or less correspond in terms of their position within the overall depositional sequence. The only apparent exception to this state of affairs occurs in the case of L.5/6N2W and L.4/8N2E. According to the information supplied by the excavator (Appendix C), these two levels should correspond approximately to the same depositional stratum, yet I have assigned one to AU.3A/6N2W (early Moundville III) and the other to AU.2/8N2E (Moundville II). Given that both these levels stratigraphically adjoin the Moundville II-Moundville III transition, it may be more realistic to regard their assemblages as having elements from both phases. The disjunction in assignment comes about as a result of differences in the nature of the mix: L.5/6N2W contains considerably more Moundville III material than does L.4/8N2E, so for the sake of clarity in presentation it makes sense to group the former assemblage with the levels above it, and the latter assemblage with the levels below.

Why L.5/6N2W should contain more Moundville III material is a question that may be difficult to resolve conclusively. However, it seems likely that there was an intrusion, undetected during excavation, which contaminated the deposit with artifacts from above. Note, for example, that sherds from a single vessel of Carthage Incised, _var_. _Carthage_, were found stratigraphically scattered through levels 4, 5, and 6; similarly, pieces of a single vessel of Mound Place Incised, _var_. _Mobile_ were spread vertically from Level 2 to Level 6 (Appendix D); one can also point to the fact that our only two Alabama River phase diagnostics turned up in Level 3, rather than at the very top where one would expect them. All this would bode ill for our attempts to refine the later end of the ceramic chronology, were it not for the fact that our stratigraphic data are supplemented with a seriated sequence of closed finds.

The sherd and attribute frequencies for each Analysis Unit are presented in Tables 18 through 21. With these and the seriated data now before us, let us turn to a discussion of the three ceramic phases which have emerged.

TABLE 18
Stratigraphic Distribution of Types and Varieties

Type, Variety	6N2W								8N2E					
	AU.1		AU.2		AU.3a		AU.3b		AU.1		AU.2		AU.3	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Bell Plain, Hale	626	40.5	185	28.2	469	28.9	241	26.7	347	27.3	228	28.9	364	25.4
Mississippi Pl., Hull Lake	5	0.3	1	0.2	3	0.2	2	0.2	3	0.2	5	0.6	5	0.3
" " Warrior	796	51.6	428	65.1	983	60.6	599	66.3	821	64.7	494	62.6	980	68.4
Carthage Inc., Akron	3	0.2			1	0.1	1	0.1	2	0.2			1	0.1
" " Carthage			2	0.3	9	0.6	3	0.3			6	0.8	1	0.1
" " Posters					1	0.1	2	0.2						
" " Moon Lake	1	0.1							2	0.2				
" " Poole							1	0.1					1	0.1
" " Summerville					1	0.1								
" " unspecified	7	0.5	6	0.9	16	1.0	14	1.5					16	1.1
Moundville Eng., Cypress													1	0.1
" " Elliots Cr.	1	0.1							7	0.6				
" " Havana	3	0.2	2	0.3	1	0.1					2	0.3	2	0.1
" " Hemphill			2	0.3	11	0.7	6	0.6			1	0.1	5	0.3
" " Maxwells Cr.					1	0.1								
" " Stewart									1	0.1				
" " Taylorville					3	0.2							1	0.1
" " Tuscaloosa			1	0.2	2	0.1					3	0.4	1	0.1
" " Wiggins					5	0.3	1	0.1					1	0.1
" " unspecified	20	1.3	13	2.0	47	2.9	12	1.3	35	2.8	22	2.8	21	1.5
Moundville Inc., Carrollton	4	0.3	2	0.3	5	0.3	5	0.6	2	0.2	1	0.1	2	0.1
" " Moundville	49	3.2	9	1.4	6	0.4	4	0.4	27	2.1	7	0.9	10	0.7
" " Snows Bend	1	0.1			1	0.1			1	0.1	2	0.3		
" " unspecified	13	0.8	1	0.2	3	0.2	1	0.1	9	0.7	1	0.1	1	0.1
Ala. River Inc., unspecified					1	0.1								
Barton Inc., Demopolis					1	0.1								
Woodland period types	7	0.5	2	0.3	9	0.6	2	0.2	7	0.6	4	0.5	1	0.1
nonlocal types	3	0.2			14	0.9	2	0.2			2	0.3	1	0.1
unclassified	5	0.3	3	0.5	23	1.4	9	1.0	5	0.4	11	1.4	17	1.2
total	1544	100.	657	100.	1616	100.	905	100.	1269	100.	789	100.	1432	100.

TABLE 19
Stratigraphic Distribution of Painted Decoration

Painted Decoration	6N2W AU 1	6N2W AU 2	6N2W AU 3a	6N2W AU 3b	8N2E AU 1	8N2E AU 2	8N2E AU 3
black film	469	146	426	208	318	183	313
red film	4	2	21	12	7	3	12
white film	15	6	11	8	4	2	5
red and black			1		1	2	
black on white					3		
red engraved	3				10		
white engraved					1		

TABLE 20
Stratigraphic Distribution of Basic Shapes

Basic Shapes (rims & base frags.)	6N2W								8N2E					
	AU.1		AU.2		AU.3a		AU.3b		AU.1		AU.2		AU.3	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
bottle (rims)	9	9.0	2	5.6	6	5.2	1	1.5	4	6.0	4	6.0	2	2.4
bottle (ped. base frags.)	3	-	2	-					3	-	3	-		
bottle (slab base frags.)					1	-					3	-	1	-
cylindrical bowl (rims)					1	0.8	1	1.5					1	1.2
flaring rim bowl (rims)	9	9.0	6	16.7	10	8.6	7	10.3	7	10.4	2	4.5	10	11.8
outslanting bowl (rims)											1	2.3		
restricted bowl (rims)	5	5.0	2	5.6	7	6.0	5	7.4	1	1.5	2	4.5	1	1.2
short neck bowl (rims)							5	7.4					2	2.4
simple bowl (rims)	14	14.0	1	2.8	12	10.3	5	7.4	7	10.4	4	9.1	12	14.1
burnished jar (rims)									2	3.0				
neckless jar (unburn., rims)	1	1.0	1	2.8					2	3.0				
standard jar (unburn., rims)	40	40.0	12	33.3	47	40.5	29	42.6	30	44.8	15	34.1	26	30.6
miscellaneous rims	16	16.0	8	22.2	28	24.1	13	19.1	9	13.4	11	25.0	27	31.8
total rims	100	100.	36	100.	117	100.	68	100.	67	100.	44	100.	85	100.

TABLE 21
Stratigraphic Distribution of Secondary Shape Features

Secondary Shape Features	6N2W				8N2E		
	AU 1	AU 2	AU 3a	AU 3b	AU 1	AU 2	AU 3
beaded rim			6	3		2	5
beaded shoulder					2		
folded rim	20		2	5	20		2
folded-flattened rim	2				1		
indentations			2			1	1
notched lip		1		1		2	3
scalloped rim	4		1		5		1

Moundville I Phase

The Moundville I ceramic complex is most clearly exemplified by AU.1/8N2E and AU.1/6N2W, the lowest levels in the test excavations north of Mound R (Tables 18-21). Segment 1 of the seriation also pertains to this complex, but the number of whole vessels which can be securely dated to this phase at Moundville is rather small (Tables 12-17). Fortunately, this shortfall in our own whole vessel sample can be mitigated somewhat by referring to the vessels excavated at two other sites of this phase, both of which contain ceramics virtually identical to those at Moundville. One of these sites is Bessemer, located in the upper Black Warrior drainage about 100 km to the northwest (DeJarnette and Wimberly 1941). The other site is Lubbub (1Pi33), located in the central Tombigbee valley about 56 km to the west (Jenkins 1979).

Types and Varieties (Tables 12, 18)

The most frequently occurring categories in Moundville I sherd collections are the undecorated varieties Mississippi Plain, *var. Warrior* (Fig. 41k-o) and Bell Plain, *var. Hale* (Fig. 41c-j), which together make up some 90% of the assemblages in AU.1/8N2E and AU.1/6N2W. Also present in very small quantities is Mississippi Plain, *var. Hull Lake* (Fig. 41p-q).

In regard to the decorated types, Carthage Incised is represented by the varieties *Akron* (Figs. 39e-h, 40q), *Moon Lake* (Figs. 39k, 40r), and *Summerville* (Figs. 39j, 41a-b).

Moon Lake, though it may occur on other vessels shapes in later phases, is found only on shallow flaring rim bowls in Moundville I (Fig. 39k; DeJarnette and Wimberly 1941:Fig. 64, Vessel No. 8).

The varieties of Moundville Engraved which most commonly appear in this complex are Elliots Creek (Figs. 39b, 40a-d, 63a-b), Havana (Fig. 40f-g), Stewart (Fig. 40e), and Northport (Fig. 39c). The last of these varieties seems to reach its greatest popularity during Moundville II, and I suspect that its appearance in Moundville I contexts is relatively late.

Decorated jars in this phase usually fall into the type Moundville Incised. The most common varieties of this type found in the Warrior drainage are Moundville (Figs. 39m, 42a-h) and Carrollton (Fig. 42i-l), with var. Snows Bend being quite rare (Fig. 42c).

There is reason to believe that the type Barton Incised also forms a part of the local Moundville I complex, despite the fact that none of it happened to be found in the early levels of our test excavations. A surface collection from Ha8, a small site only 13 km south of Moundville, contains a sherd of Barton Incised with a folded-flattened rim -- a very distinctive local feature which dates to this phase. Also, small quantities of Barton Incised sporadically turn up in 11th-12th century contexts on the central Tombigbee, just west of the Warrior basin (Jenkins 1979:59).

Painted Decoration (Tables 14, 19)

The technique of black filming or smudging was frequently used during Moundville I to darken the surfaces of burnished vessels. Over 70% of the burnished sherds in AU.1/8N2E and AU.1/6N2W had been darkened in this way (e.g., Figs. 40a-r, 41a-g).

A white film also sometimes occurs on Moundville I vessels; some 5% of the burnished sherds in the early levels exhibit this treatment (Fig. 41h). It is interesting to note that almost all of the white-filmed rims in our excavation come from restricted bowls.

Three sherds from AU.1/8N2E exhibit black-on-white decoration, that is, a design formed by black negative painting over a white filmed surface (Fig. 41i). Although the sherds could well be imported examples of the type Nashville Negative Painted, the possibility that they were locally made should not be too rapidly dismissed. One of the terraced rectanguloid bowls found at Moundville exhibits black negative painting over a white filmed and red painted surface (Fig. 63d). Admittedly, this vessel is unique in its decoration, but the fact that such bowl forms rarely occur outside the Moundville area suggests that the vessel is not an import, and that the local potters did indeed sometimes make use of the negative painting technique.

Red filming also turns up in the ceramic complex of this phase. Of the 11 red filmed sherds in our Moundville I levels, six are painted on the exterior surface only, two on the interior only, and three on both exterior and interior (Fig. 41j-k). The only possible Moundville I vessel which shows this treatment is a Moundville Incised, _var._ _Carrollton_ jar with a red painted interior (Rho132).

The red-and-black treatment occurs on a singe rim sherd, probably from a bottle, found in good Moundville I context (AU.1/8N2E). The one whole vessel which exhibits this treatment is a pedestalled subglobular bottle (Moore 1907:Fig. 21), which on the basis of its shape could be either Moundville I or Moundville II in date.

Finally, the addition of pigment to engraved lines appears to be an excellent Moundville I phase diagnostic. Some 20% of all the Moundville Engraved sherds in our early levels are red-engraved (Figs. 40h,i,l,o,p; 63a-b), and a single example (1.5%) is white-engraved (Fig. 40n). It should also be noted that one red-engraved (or "hemagraved") vessel was excavated at Bessemer (DeJarnette and Wimberly 1941:90-91).

Basic Shapes (Tables 15, 20)

The most characteristic Moundville I bottle form is the slender ovoid bottle, which always has a pedestal base (Fig. 39a-b). Subglobular bottles with pedestal bases occur as well, probably with greater frequency in the later portions of the phase than in the earlier (Fig. 39c). Occasionally, bottles with simple bases turn up in Moundville I contexts; such bottles tend to be small in size, and are generally quite rare (Fig. 39d).

Common Moundville I bowl forms include the simple bowl (Figs. 39e-g,i; 43f-g), the restricted bowl (Figs. 39j, 43d-e), and the shallow flaring rim bowl (Figs. 39k, 43k-l). Considerably rarer is the pedestalled bowl; although no pedestalled bowls can be tied into a secure early context at Moundville itself, one such bowl (with a cutout lip and lowered rim) was found at Bessemer, where the Mississippian component is pure Moundville I (DeJarnette and Wimberly 1941:Fig. 67).

Most unburnished jars in the Moundville I complex are of the so-called standard shape (Figs. 39l-m, 43m-s). Neckless jars occur less commonly but nevertheless are a good marker for the phase (Fig. 43t-w). Judging from the eight whole specimens found in securely datable contexts at Moundville, Bessemer and Lubbub, it appears that unburnished jars of this phase typically have only two handles (Table 22).

Burnished jars occasionally turn up in Moundville I stratigraphic contexts (AU.1/8N2E) and gravelots (bu. 2884/Rw), but none of the specimens is complete enough to indicate whether or not such vessels had handles (Figs. 41a,b,f; 43j).

<u>Secondary Shape Features</u> (Tables 16, 21)

Grouped nodes were sometimes added to bowls, bottles, and burnished jars. It is not uncommon to find such nodes on vessels of Carthage Incised, <u>var.</u> <u>Summerville</u>, positioned at the points in the design where adjacent arches meet (Fig.

41b; Jenkins 1979:Fig. 63).

A feature much more tenuously assigned to this phase is the band of nodes. Nowhere is the feature found in good context. It does occur on a number of vessels which, judging from their overall shape and decoration, could conceivably date to Moundville I, but could just as easily be later. Among the vessels in question are two Moundville Engraved, _var. Havana_, restricted bowls (Rho48, EI2) and a Bell Plain, _var. Hale_, jar with no handles (Fig. 62i).

A scalloped rim is often found on flaring rim bowls dating to this phase (Figs. 41d-e, 43l; DeJarnette and Wimberly 1941:Fig. 63, upper right). About half the rims from such bowls in AU.1/6N2W and AU.1/8N2E exhibit this feature.

Beaded shoulders turn up in good Moundville I contexts (AU.1/8N2E; bu. 3/NG), but not with great frequency. The fragments in our sample come from either burnished jars or restricted bowls, but none are sufficiently complete for definite identification as to shape (Fig. 41c).

The cutout rim and the lowered lip are definitely part of this complex, since both features are evident on the single (and rather unusual) pedestalled bowl from Bessemer (DeJarnette and Wimberly 1941:Fig. 67).

Gadrooning is a rare feature which sometimes occurs on bottles. Although there are no known examples which date to this phase at Moundville, one gadrooned bottle was excavated at Bessemer (DeJarnette and Wimberly 1941:Fig. 65).

Widely spaced nodes are found on several unburnished jars of type Moundvile Incised, which for all we know could date to this phase or to the subsequent Moundville II (Fig. 63j-k). It is important to note, of course, that widely spaced nodes do not appear on burnished jars and bowls until late Moundville II.

There are two rim modes on unburnished jars which are excellent temporal diagnostics for Moundville I: the folded rim (Figs. 39m; 41o; 42m; 43m-p,u) and the folded-flattened rim (Fig. 43v-w). Among the unburnished jar rims found in AU.1/6N2W and AU.1/8N2E, 53% are folded, 4% are folded-flattened, and the rest are unmodified.

Handles on Moundville I jars tend to be parallel-sided rather than strongly tapered, and occur in a range of forms, including loop, strap, and intermediate types (Fig. 41l-m). These generalizations can be put more precisely by making use of two descriptive ratios, each computed between a pair of measurements made on the handles themselves (Table 22). The first ratio, that of top-width to bottom-width, reflects the degree of taper; parallel-sided handles have values close to 1.0, and tapered handles values somewhat higher. The present sample exhibits ratios ranging from 0.8 to 1.7, with a mean of 1.2 indicating relatively little taper. The second descriptive ratio, that of middle width to thickness, is a convenient measure of "strapishness"; loop handles tend to have values around one, and strap handles values of two or higher. Our Moundville I specimens range from 1.0 to 2.5

TABLE 22
Handle Measurements, Moundville I Unburnished Jars (Bessemer, Lubbub, Moundville)

Site	Type, Variety	Proven-ience	# Han-dles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thick ness (mm)	Vert. Ht. (mm)	Clear ance (mm)	T.W./ B.W.	M.W./ Th.
Bessemer*	Mississippi Pl., Warrior	bu.1	2	--	ca.16	--	--	ca.25	--	---	---
Lubbub**	Mississippi Pl., Warrior	bu.15	-	28	20	24	8	60	16	1.2	2.5
"	Mississippi Pl., Warrior	bu.16	2	10	10	13	6	36	8	0.8	1.7
"	Moundville Inc., Moundville	bu.20	2	32	20	19	12	65	17	1.7	1.7
"	Mississippi Pl., Warrior	bu.23	2	16	16	18	10	39	11	0.9	1.6
"	Mississippi Pl., Warrior	bu.28	2	15	13	12	9	37	9	1.2	1.4
"	Moundville Inc., unspec.	bu.31	2	7	4	5	4	18	3	1.4	1.0
"	Moundville Inc., Moundville	bu.31	2	9	6	9	3	20	7	1.0	1.0
Moundville	Moundville Inc., Moundville	bu.1455	2	10	9	10	5	25	6	1.0	1.8
"	Mississippi Pl., Warrior	L.22/GN2W	-	28	22	22***	7	--	--	1.3	3.1
"	Mississippi Pl., Warrior	L.12/8N2E	-	23	17	17***	10	--	--	1.4	1.7
										x=1.2	x=1.8

* DeJarnette and Wimberly 1941:87,Fig. 64.

** Jenkins 1979:Figs. 59,60,62,64,65; the handles were measured by the present author.

*** estimated.

on this index, with the mean value being 1.8. Most handles are luted directly to the lip itself, and it is not uncommon to find the uppermost portion of the handle rising slightly above the level of the lip (Fig. 43q-s). In at least a few cases, the bottom of the handle is attatched to the shoulder by riveting.

Jar handles are also sometimes decorated with applique nodes. Common arrangements include one, two, or three nodes aligned horizontally at the top; two nodes aligned vertically, one at the top and one in the middle; or three nodes in a triangular arrangement, with two at the top and one in the middle. Another decorative elaboration consists of a series of parallel notches along the top of the handle, transverse to the lip (Fig. 41m).

Effigy Features (Table 17)

The most common Moundville I effigy form appears to be the simple bowl with a horizontally-projecting lug on one side, and an inward-facing effigy head on the other. Usually, the effigy adorno is a stylized bird head, having a rather flat, "cookie-cutter" appearance (Fig. 39e-f). Two rather distinctive rim effigy bowls have the additional feature of wings, depicted on the sides by means of modeling and incising (WP153, WP218; Fig. 39i); on both these vessels, however, the effigy heads are missing, leaving us totally in the dark as to the nature of the birds being represented. Only one rim effigy bowl found in good Moundville I context depicts a non-avian subject (WP150, bu.

2544/WP): Its inward-facing head appears to be that of a mammal, possibly a bear (Fig. 39g).

Another distinctive effigy form is a bowl made to resemble a conch shell cup (Figs. 39h, 41g), examples of which have been found in both gravelot and stratigraphic contexts dating to this phase (bu. 2562/WP, L.7A/8N2E).

Dating

Arriving at an absolute time range for the Moundville I phase is relatively straightforward compared to some of the other units in our sequence. Not only do we have radiocarbon dates from Moundville itself, but we can also make use of published dates on comparable material from Bessemer and various sites in the Tombigbee drainage to the west. The seven most pertinent absolute dates are listed in Table 23, and are discussed individually below.

In terms of association, the best radiocarbon date we have for this phase at Moundville is A.D. 1260±60 (DIC-1243). The charcoal sample was obtained in our test excavation from Level 8B/8N2E, which consisted of debris from a wall that had burned and collapsed over a house floor. Stratigraphically this stratum occurs near the top of the Moundville I deposits, and the date should therefore correspond to the late end of the phase. A second charcoal sample from a different part of the same stratum (L.9/6N2W) was also processed, but it yielded an embarrassing date of A.D. 1830±60 (DIC-1241), quite obviously spurious.

The Bessemer date of A.D. 1070±55 was obtained on

TABLE 23
Moundville I Phase Radiocarbon Dates

Site	Lab. No.	Date*	Sample comp.	Context and Associations	Reference
Moundville	DIC-1243	A.D. 1260±60	Wood Charcoal	North of Mound R, Unit 8N2E, Level 8B. Charcoal from fallen wall debris, stratigraphically within AU.1/8N2E and equivalent to L.9/6N2W.	
Moundville	DIC-1241	A.D. 1830±60	Wood Charcoal	North of Mound R, Unit 6N2W, Level 9. Charcoal from fallen wall debris, stratigraphically within AU.1/8N2E, and equivalent to L.8B/8N2E.	
Bessemer	UGa-1663	A.D. 1070±55	Charred Cane	Structure 13. A Square, wall-trench structure which almost certainly belongs to the Mississippian component at Bessemer (DeJarnette and Wimberly 1941:56, figs.45-46).	Walthall and Wimberly 1978
Kellogg Village (22Cl527)	UGa-910	A.D. 1195±70	Charcoal	Feature 6. A postmold containing a large sherd of Moundville Incised, *var. Moundville*.	Blakeman 1975:95-98, 176-177.
Lubbub (1Pi61)	DIC-1003	A.D. 1240±80		Feature 17, Structure. A sunken, rectangular house with a sherd of Mississippi Plain, *var. Warrior, in situ* on the floor (Jenkins, personal communication).	Jenkins 1979: Table 12
Lubbub (1Pi61)	DIC-1002	A.D. 1030±55		Feature 92, Structure 4. A sunken, rectangular house adjacent to Feature 17, Structure 1 (Jenkins, personal communication).	Jenkins 1979: Table 12
Lyons Bluff (22Ok1)	UGa-1361	A.D. 1210±65	Wood Charcoal	A post mold pertaining to the early occupation of the site, the Tibbe Creek phase.	Marshall 1977

* Dates (uncorrected) are based on the 5568 year half-life.

W.P.A.-excavated material, in this case charred cane associated with a square wall-trench structure (Walthall and Wimberly 1978). Although no tabulation of the artifacts from this particular structure is available, the architectural style of the house is distinctively Mississippian, and the entire Mississippian component at Bessemer is ceramically equivalent to Moundville I.

On the central Tombigbee, the Kellogg Village site (22Cr527) has yielded a relevant date of A.D. 1195±70 (UGa-910; Blakeman 1975:95-98,176-177). The postmold which contained the dated sample also contained a large sherd of Moundville Incised, _var._ _Moundville_, a good marker for this phase.

Two other absolute dates which probably pertain to Moundville I were recently obtained at the Lubbub site (1Pi61), also on the central Tombigbee (Jenkins 1979). The dates are A.D. 1240±80 (DIC-1003) and A.D. 1030±55 (DIC-1002), and they are associated with a pair of rectangular, partly subterranean houses whose cultural affiliation is a matter of some debate. Because more than 90% of the sherds in the fill of these sunken houses were grog tempered, and less than 1% were shell tempered, Jenkins assigned them to the Gainsville phase of the Terminal Woodland period (1979:271). One can just as reasonably argue, however, that these are in fact Mississippian houses which were built on an earlier Woodland midden, and after abandonment were mostly filled in with that midden.

Supporting this alternative interpretation are two major pieces of evidence: 1) the only sherd found definitely in situ on one of the floors was shell tempered, and 2) a formally similar sunken house was found in the lowest Moundville I phase levels of the test excavation at Moundville (L.28/6N2W; Scarry 1980).

Finally, at the Lyon's Bluff site (22Ok1) in east-central Mississippi, Marshall (1977) has reported a date of A.D. 1210±65 for the Tibbe Creek phase, the ceramic complex of which is very similar to that of Moundville I.

Considering this evidence, and taking into account the terminal dates for the West Jefferson phase (p. 144), one can reasonably estimate that the Moundville I phase lasted from about 1050 to 1250 A.D.

Moundville II Phase

Moundville II is in many respects the least well-defined of our phases. For one thing, the segments of the seriation which pertain to this phase, 2A (early) and 2B (late), contain only a rather modest number of whole vessels (Tables 12-17). And although material from this phase definitely appears in our stratigraphic tests, not much of it could be isolated in relatively pure context. Moundville II ceramics make their strongest showing in AU.2/6N2W and AU.2/8N2E, but in each case there could well be some mixture with earlier and/or later materials (Tables 18-21).

Types and Varieties (Tables 12, 18)

The undecorated wares again make up the largest part of the assemblage. In AU.2/6N2W and AU.2/8N2E, Mississippi Plain, var. Warrior accounts for about 60% of the sherds (Fig. 48f-n); Bell Plain, var. Hale makes up about 30% (Fig. 49a-k); and Mississippi Plain, var. Hull Lake remains a small minority at 0.2% (Fig. 48o).

The varieties of Moundville Engraved which occur in the complex include Havana (Figs. 44a,b,d; 46h-h'; 47e-g), Northport (Fig. 45g,j), Taylorville (Fig. 44c), and Hemphill (Figs. 44e-e',h,k,l,n; 45h-i; 47c-d). Late in the phase, Northport seems to decline greatly in popularity, and two new varieties, Tuscaloosa (Figs. 45e-f, 47a-b) and Wiggins (Fig. 44m; Moore 1905:Fig. 31; 1907:Fig. 14), make their first appearance. The varieties Maxwells Crossing (Fig. 45l) and Prince Plantation (Fig. 45k) were also produced during this phase, since most examples occur on subglobular bottles with pedestal and slab bases -- shapes which are good Moundville II markers (Figure 27). The absence of some of the engraved varieties just mentioned in the stratigraphic counts should not be too worrisome, because on small sherds they tend to be difficult to recognize, and thus often get sorted as Moundville Engraved, var. unspecified (Fig. 47h-l).

The type Carthage Incised is present during Moundville II as well, primarily in the form of var. Akron. Variety Moon Lake, since it is known to occur both in Moundville I

	ELLIOTS CR.	NORTHPORT	TUSCALOOSA	PRINCE PL.	MAXWELLS CR.	TAYLORVILLE	WIGGINS	CYPRESS	ENGLEWOOD	CARTHAGE	FOSTERS	MOON LAKE	POOLE
SHORT NECK BOWL	–	–	–	–	–	–	–	–	–	3	1	3	2
FL. RIM BOWL (DEEP)	–	–	—	–	–	–	–	–	–	1	1	–	–
SUBGL, BOTTLE, SIMPLE BASE	–	1	2	3	1	11	31	2	5	9	–	–	–
SUBGL. BOTTLE, SLAB BASE	–	3	11	1	5	4	5	1	–	–	1	–	–
CYLINDRICAL BOWL	–	–	–	–	–	6	4	–	–	2	–	–	–
SUBGL. BOTTLE, PED. BASE	–	11	8	1	2	1	3	–	–	–	–	–	–
SLINDER OVID BOTTLE	2	–	–	–	–	–	–	–	–	–	–	–	–

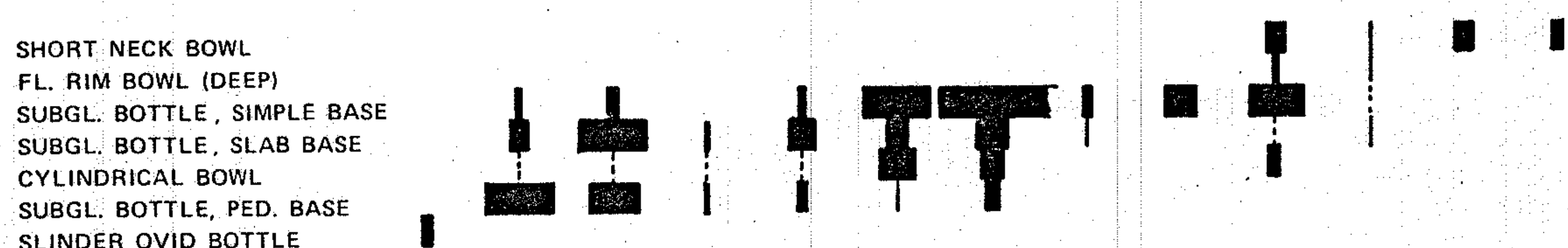

Figure 27. Distribution of varieties by vessel shape for Moundville Engraved (Elliots Creek, Northport, Tuscaloosa, Prince Plantation, Maxwells Crossing, Taylorville, Wiggins, Cypress, Englewood) and Carthage Incised (Carthage, Fosters, Moon Lake, Poole).

and in Moundville II, may also be an element of this complex -- but we have yet to find any in secure context. Two sherds of var. Carthage were found in AU.2/6N2W, but they are almost certainly intrusive from above, and not a part of the complex dating to this phase. Note that var. Carthage turns up only in Moundville III gravelots (Table 12), and that despite its abundance in the sample, it never occurs on pedestal or slab base bottles -- the two forms most characteristic of Moundville II (Fig 27).

The type Moundville Incised also presents a bit of a problem. It is relatively abundant among decorated sherds in stratigraphic contexts, but it does not occur in the seriated gravelots at all. The question is, in which part of this conflicting evidence do we have more trust? Is the presence of the type in stratigraphic context the result of mixture, or is its absence in the gravelots the result of sampling error? In this case, I feel that the latter explanation is the more likely. Moundville Incised as a type is restricted to unburnished jars, and only four such jars occur in the appropriate portion of the seriated sequence, all in Segment 2B. Thus, if the type were indeed around at this time, as I believe it was, we would have little opportunity to find it in our gravelots. The varieties of Moundville Incised recognized in AU.2/6N2W and AU.2/8N2E are Moundville (13%) (Fig. 48a-b), Carrollton (0.2%) (Fig. 48e), and Snows Bend (0.1%) (Figs. 48c-d, 63i). Given the type's popularity in Moundville I, and its virtual absence in Moundville III, I strongly suspect that most of the Moundville II examples date to the early part of the phase.

<u>Representational Motifs</u> (Table 13)

Representational motifs in the Moundville II ceramic complex occur only on vessels of Moundville Engraved, var. Hemphill. Motifs which appear in the seriated gravelots are: the Forked Eye Surround (bu. 7/ND/M5, Moore 1905:Fig. 74), Hand and Eye (F.2/C/M5, Moore 1905:Fig. 21), Paired Tails (bu. 8/NG, Fig. 44e-e'), and Windmill (bu. 5,6/C/M5, Moore 1905:Fig. 30). Other motifs which do not occur on the seriated sample but can nevertheless be assigned to Moundville II on the basis of their association with pedestalled subglobular bottles are the Bilobed Arrow (e.g., Fig. 45h; Moore 1905:Figs. 87,148), Radial Fingers (e.g., Moore 1905:Fig. 143). The Rayed Circle, Greek Cross, and Feathered Arrow can all be placed in this phase as well, since they are found in the same design with a Bilobed Arrow on at least one vessel (Moore 1907:Fig. 39), and occur in gravelot association with other Moundville II markers (bu. 1437/SD, bu. 1520/SD). The Feather motif adorns slab-base bottles (Fig. 62a), which could date to late Moundville II, or equally well to early Moundville III (Fig. 28).

Also worthy of note are three unusual vessels, classified as <u>Hemphill</u>, which on the basis of their shape and gravelot associations fall into Moundville II. In each case, the design is placed on one side of the vessel only,

	BILOBED ARROW	OGEE	RADIAL FINGERS	WINDMILL	HAND + EYE	FEATHER	SCALP	RAPTOR	PAIRED TAILS	CRESTED BIRD	WINGED SERPENT
SUBGL. BOTTLE, SIMPLE BASE	—	1	2	4	9	—	2	4	13	3	30
SUBGL. BOTTLE, SLAB BASE	—	—	1	2	3	2	2	4	4	—	—
CYLINDRICAL BOWL	—	—	2	—	4	—	1	2	3	1	—
SUBGL. BOTTLE, PEDESTAL BASE	2	2	1	2	3	—	—	—	—	—	—

Figure 28. Distribution of SCC motifs by vessel shape on Moundville Engraved, variety Hemphill (unique motifs are excluded).

not at all the symmetrical or repetitive arrangement one usually finds on Moundville Engraved. Moreover, the designs tend to contain aberrant renditions of certain motifs which more commonly appear in later phases. The vessels in question are: (1) an outslanting bowl with a Greek Cross (?) and a Scalp (Fig. 44n), (2) a simple bowl with a Rayed Circle (Fig. 44k), and (3) a pedestalled and gadrooned subglobular bottle decorated with the head of a Raptor (Fig. 44l). Assuming these vessels are of local manufacture -- certainly a debatable proposition -- they may represent an episode of experimentation with certain designs which were later to become much more abundant and standardized elements in the ceramic repetoire.

<u>Painted Decoration</u> (Tables 14, 19)

Black filming is again the prevalent treatment on burnished wares, with 70% of the burnished sherds in our Moundville II levels exhibiting a smudged surface (e.g, Figs. 47a,d,e,g-i,l-q; 49a-d,g).

Red filming is present as well. Of the five sherds with this treatment found in Moundville II levels, two had red paint on the interior only, and three on the exterior only (Fig. 49h).

The red-and-black decoration is evident on two sherds from AU.2/8N2E (Fig. 49k). Both sherds come from a single vessel -- a pedestalled bottle, not unlike the whole vessel exhibiting this treatment which was excavated by Moore (1907:Fig. 21).

Some 2.3% of the burnished sherds in the Moundville II levels are white filmed (Fig. 49i-j), an abundance similar to that in the levels below.

Finally, the red-and-black-on-white treatment probably dates somewhere around the early part of Moundville II, since the only occurrence in our sample is on a terraced rectanguloid bowl (Fig. 63d).

Basic Shapes (Tables 15, 20)

The predominant bottle form throughout Moundville II is the subglobular bottle with a pedestal base (Figs. 44l-m; 45a-b,e,g-l; 50n). Cylindrical bottles occur as well, but not with great frequency (Moore 1905:Fig. 74; 1907:Fig. 19). Subglobular bottles with slab bases and simple bases begin to appear mainly in the later portion of the phase (Figs. 45c-d,f; 50o).

Moundville II bowls were made in simple (Figs. 44f-k; 50b), cylindrical (Figs. 44a-e; 50c-e), and restricted shapes (Fig. 46h,j). Flaring rim bowls, which occur in our stratigraphic sample but not in our seriated gravelots, were probably of the same shallow form as one finds in Moundville I and early Moundville III (Fig. 49a-c). Other distinctive but relatively uncommon shapes are the outslanting bowl (Figs. 44n, 50f), the pedestalled bowl (Moore 1907:Figs. 15-16), and the terraced rectanguloid bowl (Fig. 63c-e).

Unburnished jars are most commonly of the standard form (Fig 46a-b,d-e), and have an unmodified rim (Fig. 50g-m). One rim sherd from a neckless jar was found in AU.2/6N2W

(Fig. 48l); significantly, it was neither folded nor folded-flattened, both of which modes seem to be associated predominantly with earlier vessels. Judging from our few whole specimens in good context (Table 24), both two- and four-handled jars occur in this phase.

Burnished jars are found in Moundville II contexts, but in relatively small numbers. The one specimen from a seriated gravelot (Fig. 46f) was made without handles.

The composite vessel is another relatively rare category which turns up late in the phase. We have two examples in seriated gravelots: a composite bowl/jar (Fig. 46c) and a composite bowl (Fig. 46g). It is reasonable to suppose that composite jar/bowls were made in late Moundville II as well, since they share many similarities with the other composite forms just mentioned. Also, it is worthwhile to note that a double bowl occurs in a gravelot (bu. 3001/SL) which happened to get seriated in Segment 3A, but based on the distinctive features the gravelot contains, it could just as easily date to late Moundville II.

Secondary Shape Features (Tables 16, 21)

Indentations are a common feature of Moundville II bottles (Fig. 45e,f,h,j), and are sometimes found on cylindrical bowls as well (Fig. 44e'). Usually these indentations occur on engraved vessels, and serve as focal points around which the design is organized.

A single lug, projecting outward horizontally from the lip, is found on most cylindrical bowls and rarely on simple bowls (Fig. 44a-c). Of the 11 cylindrical bowls in Segments 2A and 2B, nine have such lugs.

A beaded shoulder is an integral part of the turtle effigy bowls which show up in late Moundville II (Fig. 46h). Whether this secondary shape feature was used on vessels early in the phase is uncertain, but given that beaded shoulders are known from Moundville I contexts, the continuity of this feature throughout Moundville II is a fairly good bet.

The beaded rim first appears late in the phase, and is found on both simple bowls and burnished jars (Figs. 44f,i,j; 46c,f,g; 49d-e).

Widely spaced nodes have differing chronological significance, depending on whether they are found on burnished or unburnished vessels. On burnished vessels, the feature seriates late in the phase, and is often associated with beaded rims (Figs. 44g,h,j; 46j). On unburnished jars, the feature may well occur earlier, since the unburnished vessels on which it is found are invariably of the type Moundville Incised (e.g., Fig. 63i-k).

Grouped nodes are found on one bowl (NR106) in late Moundville II context, and probably persisted as a feature throughout the phase, given their earlier presence in Moundville I.

The band of nodes is a highly distinctive feature whose chronological distribution we know almost nothing about. Inasmuch as it occurs on vessels of Moundville Engraved, var. Havana (Rho48, EI2), it could date to Moundville II as easily as almost anywhere else.

Spouts are a late Moundville II feature, appearing on simple bowls. This mode may occur in combination with a beaded rim and widely spaced nodes (Fig. 44i).

In general, lip notching is a rare embellishment on local vessels during this phase, sporadically turning up on bowls both with and without a flaring rim (e.g., Figs. 47f, 49c). Pedestalled bowls, infrequent as they are in the sample, almost invariably have a notched everted lip (Moore 1907:Fig. 15).

Gadrooning occurs on a single pedestalled bottle found in Moundville II context (Fig. 44l). This vessel is one of the unusual examples of Moundville Engraved, var. Hemphill, discussed earlier; whether or not it was made locally is a matter of some doubt, as is the matter generally of whether to regard gadrooning as an element of the indigenous ceramic repetoire.

A lowered lip occurs on most terraced rectanguloid bowls (Fig. 63c-e), including the one which seriated in Segment 2A (bu. 9/SWM/M7; Moore 1907:Fig. 22). Thus, it is safe to regard this feature as continuing at least into early Moundville II.

Previous mention was made that only four unburnished jars were found in secure Moundville II gravelots, all from the later end of the phase; the handle measurements from these jars are summarized in Table 24. Three of the jars

TABLE 24
Handle Measurements, Late Moundville II Unburnished Jars (Segment 2B)

P.S. Number	Type, Variety	Burial Number	# Handles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thickness (mm)	Vert. Ht. (mm)	Clearance (mm)	T.W./ B.W.	M.W./ Th.
NE444	Mississippi Pl., Warrior	1620-21	4	19	16	18	6	44	10	1.1	2.7
NE452	Mississippi Pl., Warrior	1620-21/NE	4	17	13	15	7	35	9	1.1	1.9
SW40	Mississippi Pl., Warrior	2504/SW	2	20	16	17	6	31	6	1.2	2.7
SG15	Mississippi Pl., Warrior	1735/SG	4	34	15	16	6	34	8	2.1	2.5
										x=1.4	x=2.5

have parallel-sided handles, while on the fourth (SG15) the handles are strongly tapered near the bottom. Top-width to bottom-width ratios vary from 1.1 to 2.1, with the mean value being 1.4. Generally the late Moundville II handles tend to be a bit more strap-like than most Moundville I examples; their middle-width to thickness ratio varies from 1.9 to 2.4, with a mean of 2.5.

As in the previous phase, unburnished jar handles are sometimes embellished with nodes (Fig. 48j-k). Distinctive patterns which our small sample include two or three nodes in a vertical arrangement, and four nodes in a rectangular arrangement. Other handle embellishments which have been observed on probable Moundville II vessels are two nodes placed horizontally at the top, and multiple parallel notches transverse to the lip.

Effigy Features (Table 17)

There are two lug and rim effigy bowls in secure Moundville II gravelots. Unfortunately, the effigy head on each vessel is broken off, and so we cannot tell what sort of creatures were depicted or in what direction they faced. Thus, all we can do for now is to engage in a bit of stylistic interpolation. Given that bird effigies appear in abundance during Moundville I and Moundville III, it is reasonable to suppose that they were also abundant during Moundville II. This being the case, it seems likely that the rim effigies in early Moundville II were more like those in Moundville I -- flat "cookie-cutter" head facing inward;

similarly, that the rim effigies in late Moundville II were generally more like those in Moundville III -- gracile, less conventionalized head facing outward. In the absence of conflicting evidence (or any evidence at all), Moundville II also seems to be the most likely time slot in which to place the three specimens having flat heads facing outward (SED13, SEB82, NB43), bird effigies stylistically intermediate between the two polar chronological types (Fig. 63l). As to what other sorts of lug and rim effigy bowls may have been present in this phase, nothing can be said until more data become available.

In regard to the structural effigies, one form definitely present in Moundville II is the mussel shell bowl (Fig. 46i). Another form present may be the conch shell bowl, but here the evidence for assignment is weak: No conch shell bowls have been found in contexts which can be independently dated to Moundville II, but the modeled beak on some of these effigies (e.g., SE2) is very similar to the spouts which sometimes occur on late Moundville II simple bowls, suggesting that they may be contemporary.

One turtle effigy bowl found its way into Segment 2B of the seriation (Fig. 46h-h'). However, the vessel occurs in a borderline context (bu. 1587/NE) that could just as easily have been included in Segment 3A. It is therefore probably best to regard this form as dating to late Moundville II and early Moundville III, without confining it exclusively to one phase or the other.

The alligator effigy (Fig. 62m) is in many ways morphologically similar to the turtle effigy, and on this basis I suspect it also dates to late Moundville II and early Moundville III. One can further point to the formal similarity, both in basic shape and in the presence of a beaded rim, between the alligator effigy excavated by Moore (1905:Fig. 69) and the burnished jar (lacking effigy features) which seriated in Segment 2B (Fig. 46f).

Finally, based on its position in Segment 2B of the seriation (bu. 1620/NE), the inverted turtle effigy can also be assigned to late Moundville II.

Dating

Unfortunately, no direct radiocarbon dates are available from well-defined Moundville II contexts. By bracketing with respect to dates on earlier and later material, a reasonable guess would be that this phase lasted from about A.D. 1250 to about A.D. 1400.

Moundville III Phase

The Moundville III ceramic complex is most easily defined within the seriated sequence of gravelots. Segments 3A and 3B, corresponding respectively to the early and late portions of the phase (Tables 12-17), contain well over half of all the gravelots in the seriation, and so provide us with a very large sample of whole vessels in secure context. Moundville III material also appears in the uppermost levels of the stratigraphic tests, but the relevant deposits were somewhat mixed, and are not at all conducive to making fine chronological distinctions. Pottery of this phase predominates in AU.3 from 8N2E, also in AU.3A and AU.3B from 6N2W (Tables 18-21). At best, the distinction between AU.3A and AU.3B in 6N2W presents a rather fuzzy reflection of the early-to-late trends within the phase which stand out much more clearly in the seriation.

Types and Varieties (Tables 12, 18)

Plainwares again make up more than 90% of the assemblage in stratigraphic context. The most abundant varieties are Mississippi Plain, *var.* *Warrior* (65%) (Figs. 56n-p; 57a-m), and Bell Plain, *var.* *Hale* (27%) (Figs. 56j-m; 58a-g). Mississippi Plain, *var.* *Hull Lake*, is found in trace amounts (0.2%) (Fig. 57n-o).

Moundville Engraved, *vars.* *Havana* (Figs. 53o, 55e-f), *Taylorville* (Figs. 52f, 39c), and *Tuscaloosa* (Figs. 52e, 55a-b) seriate to the early part of the phase only. Lasting throughout the phase are *vars.* *Hemphill* (Figs. 52c-d,g,o; 53a-d,k-n,p; 55i-l), *Wiggins* (Figs. 52c-d,g,o; 53f; 55g; Moore 1905:Fig. 124), and *Englewood* (Figs. 52b, 62f;Moore 1905:Fig. 80). A single sherd of *var.* *Maxwells Crossing* occurs in AU.3A/6N2W (Fig. 55d); based on this slender stratigraphic evidence, and judging from the bottle forms on which *Maxwells Crossing* is found (Fig. 27), it seems quite possible that this variety persists into early Moundville III. Exactly the same argument can be made for *var.* *Cypress* (Figs. 55h, 62d), which is also probably best assigned to early Moundville III (see Table 18, Fig. 27).

Within the type Carthage Incised, varieties present early in the phase include Akron (Figs. 51a, 56a), Moon Lake (Fig. 53g), and perhaps a minor sprinkling of Carthage (Fig. 52k) and Fosters. Late in the phase, Akron seems to drop out, and Carthage (Figs. 51n; 52l; 53h; 56d-e; 62b,e) and Fosters (Figs. 51l,o; 56b) rise to greater prominence. Also present in late Moundville III are vars. Moon Lake (Fig. 51p) and Poole (Figs. 51m, 56c), both of which occur on the highly diagnostic short neck bowl form (Fig. 27).

Moundville Incised is probably no longer present as a type during this phase, and its moderate showing in the upper levels of our stratigraphic tests is best attributed to mixture with earlier material (Fig. 60). As evidence we can cite the fact that of 29 unburnished jars found in secure Moundville III gravelots, not one shows this kind of decoration. Also supporting this conclusion is the observation that handles on Moundville Incised jars are consistently unlike the kind most commonly made during Moundville III, a matter which will be taken up in much more detail later on. (In light of my contention that the Moundville Incised in the upper levels is due to mixture, it is of some interest to note that the one sherd of Carrollton found in AU.3/8N2E undoubtedly comes from the same vessel as another found on a house floor in L.20/6N2W!)

Finally, in AU.3A/6N2W occur traces of two varieties which were made during the proto-historic Alabama River phase: One sherd each was found of Barton Incised, *var. Demopolis* (Fig. 56i), and Alabama River Incised, *var. unspecified* (Fig. 56h). Their presence 20-30 cm below the surface rather than at the very top of the deposit is probably the result of an intrusive feature undetected during excavation -- not at all surprising given how pocked the midden was with postholes and pits.

Representational Motifs (Table 13)

Representational motifs are common in the Moundville III complex, being found on vessels of Moundville Engraved, *var. Hemphill*, and Carthage Incised, *var. Fosters*. Within *var. Hemphill*, the following motifs seem to occur only during the early part of the phase: Crested Bird (Figs. 52r, 62g; Moore 1907:Fig. 37), Raptor (Figs. 52n, 62c), Paired Wings (Moore 1905:Fig. 156), Windmill, Skull and Forearm Bones (Fig. 62h). Those which seem to occur both early and late are Hand and Eye (Figs. 52j,t; 53d,l,n; Moore 1905:Figs. 123,153), Paired Tails (Figs. 52q, 53m; Moore 1905:Fig. 56), Radial Fingers (Figs. 53c, 55l; Moore 1907:Fig. 4), Scalp (Figs. 52t, 53p, 55i-j), and Winged Serpent (Figs. 52m,p; 53b; Moore 1907:Figs. 51,57,63) (Table 13, Fig. 28). The one Turtle representation in our sample of *Hemphill* vessels belongs to a gravelot containing good diagnostics of late Moundville III (Fig. 52i). The one occurrence of the Insect motif is on a subglobular bottle with a simple base (Fig. 53a), which judging from its overall shape probably dates to Moundville III or late

Moundville II. The Feather motif is found on subglobular bottles with slab bases (Fig. 62a), some of which could date to early Moundville III (Fig. 28).

Mention should also be made of a peculiar depiction of a bird with a serpent head which appears on a var. Hemphill vessel in Segment 3B (Fig. 52h). The vessel in question is a subglobular bottle with a slab base, a predominantly earlier form which got seriated late in the sequence because of its association with a deep flaring rim bowl. The bowl, however, is a borderline case which could almost as easily been classified shallow -- in which case the gravelot would fit most comfortably in late Moundville II or early Moundville III. The reason for raising this point is that it may have some relevance to understanding the development of the "Southern Cult" style on Moundville pottery -- if and when someone actually does a thorough study of it. In general, the more unusual depictions of serpent-bird composites tend to occur on early vessel forms or in early contexts -- giving one the impression that the style may have undergone progressive standardization through time. The bird with serpent head in Segment 3B seems to be an exception to this rule, but in fact it may not be one at all.

The range of representational motifs found in Carthage Incised is considerably smaller than in Moundville Engraved. Var. Fosters, which tends to occur late in the phase, exhibits only the Hand and Forearm Bones (Figs. 51l,o; 56b;

62p).

Painted Decoration (Tables 14, 19)

Both black filming and white filming continued to be practiced during Moundville III. Seventy-three percent of the burnished sherds from the uppermost levels in our excavations are smudged (e.g., Figs. 55c-e,g-p,r; 56a-g; 58a-i,l-p), and 1.8% are white filmed (Fig. 56j-k).

Red filming also persists as an element of the ceramic complex (Fig. 56m-p). A significant contrast with earlier complexes is the great majority of sherds exhibiting this treatment are filmed on the interior surface only; most of these sherds are unburnished on the exterior and probably come from jars. Of the 45 red-filmed sherds in our Moundville III levels, 30 are red on the interior only, 10 on both the interior and exterior, and 5 on the exterior only. Also, one Mississippi Plain, _var. Warrior_ jar in Segment 3B has a red filmed interior (SWG7, bu. 1718/SWG).

The red-and-white treatment appears to be an excellent diagnostic for late Moundville III, as it occurs on four vessels in Segment 3B. Usually the red paint is confined to the area of the lip (Figs. 51g,o; 62q), but a few deviations from this standard treatment also exist in the collections. On one flaring rim bowl, the interior is divided radially into quarters, alternately red and white in color (Fig. 62p). Another vessel, a white-slipped bowl of the type Carthage Incised, _var. Poole_, has red paint added to the broad incisions that make up the design (SWG9).

Basic Shapes (Tables 15, 20)

The principal bottle form in this phase is the subglogular bottle with a simple base (Figs. 52a-d,f-g,i-k,m-t; 53a-d; 62b-g). Subglobular bottles with slab bases continue to be made as well (Figs. 52e-h, 62a), but decrease in frequency through time, so that by late Moundville III they are virtually nonexistent. Cylindrical bottles (early) and narrow-neck bottles (late?) are also minor elements within the complex (Figs. 52l, 62h).

Simple bowls (Figs. 51a,d,f-j; 53e; 59g-j), restricted bowls (Figs. 51c, 53k-l), and shallow flaring rim bowls (Figs. 53j, 62p) are found throughout the phase. Pedestalled bowls (Fig. 53f) and cylindrical bowls (Fig. 53n-p) are confined mainly to early Moundville III, although rare examples of the cylindrical form may turn up later as well (Fig. 53m). Late in the phase, the short neck bowl first appears (Figs. 51m-p, 56c, 58a, 59b-d), and some flaring rim bowls become deeper, more curving in profile (Figs. 51m-p, 56c, 58a, 59b-d). That these two shapes should rise to prominence at the very end of the Moundville sequence is significant, because they appear to be direct stylistic predecessors for the "carinated" and "wide rimmed" bowls so common during the subsequent Alabama River phase (see Sheldon 1974:Fig. 7). Also worthy of mention is a wide, straight-sided bowl which seriated very late (SD682, bu. (bu. 1515/SD), and is unique in the Moundville sample (Fig. 51l). Sherds very similar to this specimen in both shape and decoration have been found at protohistoric-historic sites along the Alabama River in the south-central part of the state (Jenkins, personal communication). Whether the Moundville example is locally made or an import from this more southerly region is at present unclear.

All unburnished jars in Moundville III contexts are of the standard type (Fig. 59p-s). Most unburnished jars have four handles (Fig. 54b-c,e-h,k; Moore 1905:Figs. 55,154), although two-handle jars continue to be found with declining frequency throughout the phase (Fig. 54d,j,l). Jars with eight or even more handles become common late in the phase (Fig. 54a,i,n,o). Thus, direct stylistic continuity is once again evident with the subsequent Alabama River complex, in which the applique fillets and vertical ridges placed on jar rims can be regarded as outgrowths of the late Moundville III multiple handle forms.

Burnished jars are mainly found in the early part of the phase. The one example which occurs in Segment 3B is a rather marginal specimen, hardly burnished at all (Fig. 51e-e'). Invariably these jars have two handles, and often they are endowed with frog effigy features (Fig. 54m; Moore 1905:Figs. 78,155).

Double bowls occur in likely Moundville III gravelots (bu. 2390/SW, bu. 3001/SI), one of which fell in Segment 3A of the seriation (Fig. 51k). Though there are no composite vessels in contexts which can be securely dated to this phase, it seems rather likely that some, if not all, of the composite shapes found in late Moundville II continued into early Moundville III. This suspicion is upheld by the fact that one composite bowl in our sample (Fig. 62k) has fish effigy features -- a characteristic generally assigned to Moundville III.

<u>Secondary Shape Features</u> (Tables 16, 21)

Beaded rims are very common during this phase on simple bowls and burnished jars. This feature may encircle the entire circumference of the rim (Figs. 51f-k, 58f-j), or it may be found only along part of the rim, representing the dorsal fin of a fish effigy.

The beaded shoulder may turn up in early Moundville III contexts, since it is used on restricted bowls to depict parts of various effigies, for example, the carapace edge of a turtle (Fig. 46h-h'), and the dorsal fin of a fish (Figs. 51c, 62k).

A notched lip occurs rarely on flaring rim bowls (Fig. 58l). Pedestalled bowls, made early in the phase, inevitably have a notched everted lip (Fig. 53f).

Indentations continue to be found on early Moundville III bottles. In contrast to Moundville II examples, which usually have eight or more indentations per vessel, a number of the early Moundville III bottles have only four indentations, spaced equidistantly around the circumference of the vessel at its widest point (e.g., Fig. 52e,c; Moore 1905:Fig. 80).

A single lug, projecting horizontally from the lip, is an added feature of most cylindrical bowls which date to this phase (Fig. 53m,n,p).

Two, four, or six widely spaced nodes are sometimes found on early Moundville III simple bowls and burnished jars (Figs. 53e, 54m, 58d; Moore 1905:Fig. 155). This feature often occurs in combination with a beaded rim, especially on burnished jars. Inasmuch as the band of nodes sometimes occurs on bowls of Moundville Engraved, _var._ _Havana_, the feature may date to early Moundville III (Rho48, EI2). However, in the absence of better contextual information, this temporal assignment is quite uncertain.

Vertical lugs are found on a single bowl of Carthage Incised, _var._ _Carthage_ (NE461), implying that the feature belongs to the Moundville III complex.

One flaring rim bowl sherd from AU.3/6N2W exhibits a scalloped rim (Fig. 58n). Whether this feature is indeed an element of the Moundville III complex, or its presence is the unfortunate result of mixture with earlier material, cannot be firmly decided with the data at hand. However, the rim does have a late look to it, in that the flaring part is wide and curving in profile, rather than fairly short and/or straight as in most Moundville I examples.

Downturned lugs are sometimes added to standard jars with two or four handles (Fig. 54c,h,j). Such lugs are often embellished with nodes, similar to the kind found on the handles.

Folded rims from standard jars also show up in the counts from the upper levels of our excavations, but their presence is undoubtedly the result of mixture with earlier midden (Fig. 60a). Not a single one of the 29 jars found in Moundville III gravelots exhibits this mode, nor does one ever see a folded rim on any jar with the kind of handles characteristic of this phase.

Handle measurements taken on our (for once) respectable sample of unburnished jars are presented in Tables 25 and 26, for Segments 3A and 3B separately. It can be seen that, in contrast to earlier phases, handles tend to be strongly tapered at the bottom. Their top-width:bottom-width ratio averages 1.9 in early Moundville III, and 2.0 in late Moundville III. Moreover, the handles are generally more strap-like than in the previous phases, with a middle-width:thickness ratio averaging 3.1 in the early part, and 2.7 in the late part. One reason that the average ratio drops somewhat at the late end is that jars with eight or more handles become common, and these handles tend to be narrower, more loop-like, than the handles on two- and four-handled jars.

In fact, by plotting the middle-width:thickness ratio against the top-width:bottom-width ratio for all our specimens combined, we can clearly see not only the trends in handle shape through time, but also the distinctions among the handles from different phases (Fig. 29). Early handles, more loop-like and parallel-sided, tend to fall in the lower left portion of the scatter, and late handles,

TABLE 25
Handle Measurements, Early Moundville III Unburnished Jars (Segment 3A)

F.S. Number	Type, Variety	Burial Number	# Han-dles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thick ness (mm)	Vert. Ht. (mm)	Clear ance (mm)	T.W./ B.W.	M.W./ Th.
SD744	Mississippi Pl., Warrior	1525/SD	2	22	18	16	5	35	7	1.4	3.6
SD746	Mississippi Pl., Warrior	1525/SD	4	20	12	15	5	42	7	1.3	2.4
NE585	Mississippi Pl., Warrior	1651/NE	4	22	10	13	3	25	7	1.7	3.3
SWG1	Mississippi Pl., Warrior	1717/SWG	4	33	19	16	5	38	3	2.1	3.8
SWG4	Mississippi Pl., Warrior	1717/SWG	4	26	17	12	4	36	8	2.2	4.3
SWG5	Mississippi Pl., Warrior	1717/SWG	8	33	13	13	5	29	8	2.5	2.6
SWG25	Mississippi Pl., Warrior	1751/SWG	4	29	12	10	4	29	11	2.9	3.0
EI27	Mississippi Pl., Warrior	824/EI	2	13	12	11	8	28	6	1.6	1.5
NN'39	Mississippi Pl., Warrior	2136/NN'	4	50	27	22	5	45	9	2.3	5.4
WP228	Mississippi Pl., Warrior	2496/WP	2	16	13	12	8	30	6	1.3	1.6
NEC10/M5	Mississippi Pl., Warrior	20/NEC/M5	4	--	--	--	-	--	-	---	---
										x=1.9	x=3.1

TABLE 26
Handle Measurements, Late Moundville III Unburnished Jars (Segment 3B)

F.S. Number	Type, Variety	Burial Number	# Han-dles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thick ness (mm)	Vert. Ht. (mm)	Clear ance (mm)	T.W./ B.W.	M.W./ Th.
SD29	Mississippi Pl., Warrior	1423/SD	4	27	12	13	6	28	4	2.1	2.0
SD31	Mississippi Pl., Warrior	1423/SD	4	25	9	7	5	23	6	3.6	1.8
SD32	Mississippi Pl., Warrior	1423/SD	2	15	10	12	5	25	4	1.3	2.0
SD680	Mississippi Pl., Warrior	1515/SD	4	45	20	15	5	38	10	3.0	4.0
SD681	Mississippi Pl., Warrior	1515/SD	8	23	15	16	5	32	9	1.4	3.0
SD837	Mississippi Pl., Warrior	1563-64/SD	2	28	15	15	5	35	8	1.9	3.0
SD838	Mississippi Pl., Warrior	1563-64/SD	4	21	14	17	5	31	8	1.2	2.8
EE83	Mississippi Pl., Warrior	1234-37/EE	2	--	--	6	4	--	--	---	---
EE124	Mississippi Pl., Warrior	1261/EE	4	31	15	15	5	28	6	2.1	3.0
NG32	Mississippi Pl., Warrior	1008/NG	4	23	17	18	4	30	4	1.3	4.3
SWG7	Mississippi Pl., Warrior	1718/SWG	17	13	7	7	6	30	5	2.4	1.2
EI40	Mississippi Pl., Warrior	843/EI	24	13	9	7	5	23	4	1.9	1.8
NR27	Mississippi Pl., Warrior	1089/NR	4	--	--	--	-	--	--	---	---
NR28	Mississippi Pl., Warrior	1089/NR	5	27	12	14	4	24	7	1.9	3.0
RW139	Mississippi Pl., Warrior	2733/RW	8	--	--	--	-	--	--	---	---
NR20/M5	Mississippi Pl., Warrior	10/NR/M5	4	--	--	--	-	--	--	---	---
										x=2.0	x=2.7
						excluding SWG7, EI40				x=2.0	x=2.9

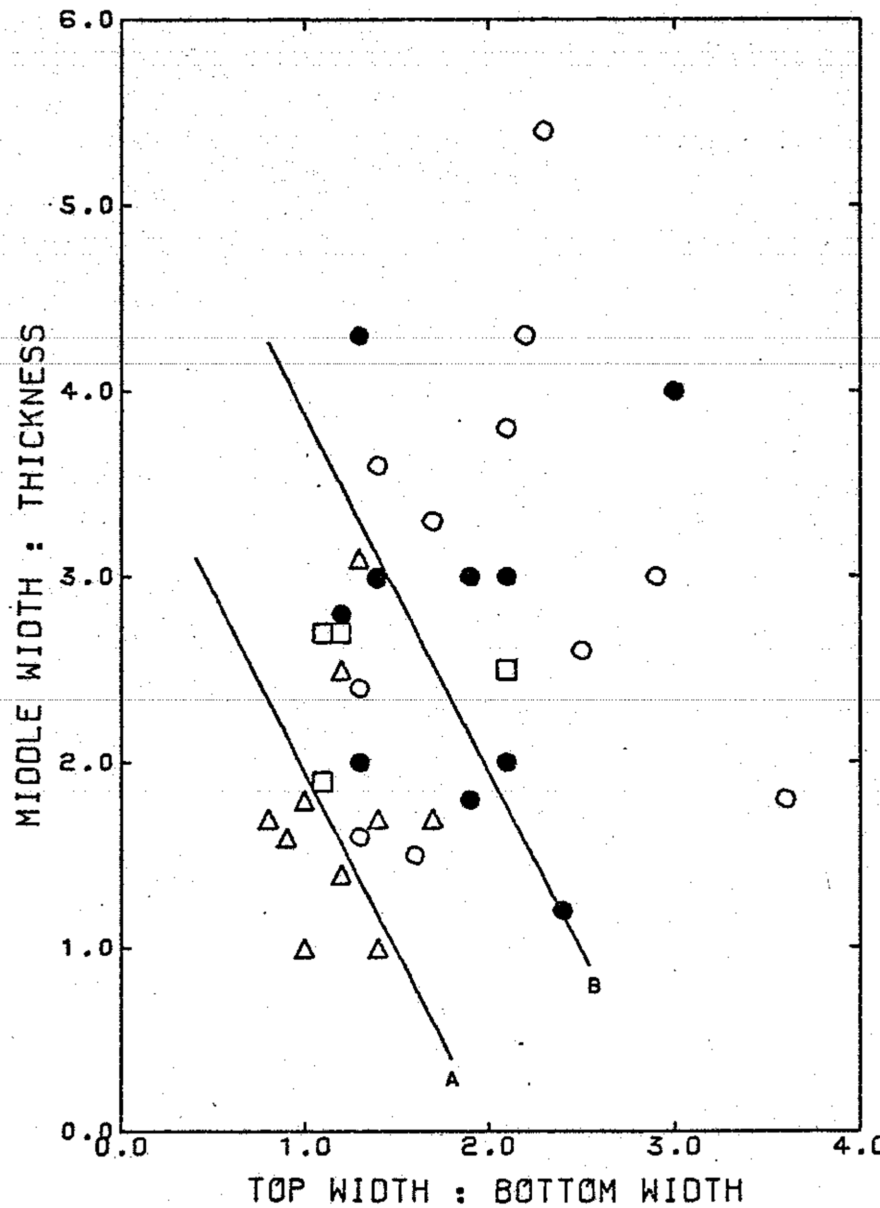

Figure 29. Handle shape ratios, unburnished jars from various phases (triangles = Moundville I phase; squares = Segment 2B, late Moundville II phase; open circles = Segment 3A, early Moundville III phase; filled circles = Segment 3B, late Moundville III phase).

more strap-like and tapered, tend to fall in the upper right. Differences attributable to time can be highlighted by dividing the scatter into three parts (a move which, some would say, takes a bit of gaul). In the zone to the left of line A, one finds only jars dating to Moundville I; between lines A and B, we have most of the jars from Moundville II, mixed with some from Moundville I and III; finally, to the right of line B, one finds only Moundville III jars, along with a single specimen from late Moundville II. It is worthwhile to note that of the seven Moundville III examples which fall to the left of line B, two are very late jars with eight or more handles -- in general, such handles tend to be more loop-like or parallel-sided -- and three are two-handle jars which look very much like earlier forms, and probably are either heirlooms, or appear in gravelots which are in fact earlier than the seriation has them placed.

Looking at handle measurements in this way also gives us an opportunity to check our ideas on the chronological assignment of the type Moundville Incised. Table 27 presents all the handle measurements we have from Moundville Incised jars found at Moundville; most of these jars come from gravelots where they are not associated with other temporally diagnostic vessels. When we plot the two ratios on the same kind of diagram (Fig. 30), we find that all the points fall to the left of line B, consistent with our suspicion that Moundville Incised was not locally produced in Moundville III times.

TABLE 27
Handle Measurements, Moundville Incised Jars

F.S. Number	Type, Variety	Burial Number	# Han-dles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thick ness (mm)	Vert. Ht. (mm)	Clear ance (mm)	T.W./ B.W.	M.W./ Th.
ED54	Moundville Inc., Carrollton	2607/ED	2	22	--	13	5	37	-	1.7	---
ED71	Moundville Inc., Carrollton	2614/ED	..	19	15	16	7	30	7	1.2	2.1
SD155	Moundville Inc., Carrollton	1437/SD	4	15	13	13	5	30	8	1.2	2.6
SD265	Moundville Inc., Carrollton	1455/SD	2	10	9	10	5	25	6	1.0	1.8
SEH76	Moundville Inc., Carrollton	870/SEH	2	14	10	11	6	23	5	1.3	1.7
WP21	Moundville Inc., Moundville	2179-80/WP	4	11	9	11	4	31	9	1.0	2.3
NW9	Moundville Inc., Snows Bend	1837/NW	4	19	16	19	5	37	6	1.0	3.2
<I>Rho163	Moundville Inc., Moundville	----	-	15	11	10	4	22	7	1.5	2.8
										x=1.2	x=2.4

TABLE 28
Handle Measurements, Moundville III Burnished Jars (Segments 3A, 3B)

F.S. Number	Type, Variety	Burial Number	# Han-dles	Top Width (mm)	Mid. Width (mm)	Bot. Width (mm)	Thick ness (mm)	Vert. Ht. (mm)	Clear ance (mm)	T.W./ B.W.	M.W./ Th.
RW138	Bell Plain, Hale	2733/RW	2	--	--	--	-	--	--	---	---
SD2/M5	Bell Plain, Hale	1/SD/M5	2	--	--	--	-	--	--	---	---
SEH10	Bell Plain, Hale	18/SEH	2	33	18	17	5	31	9	1.9	3.6
WP'29	Bell Plain, Hale	2166/WP'	2	21	19	19	5	22	7	1.1	3.8
NR23/M5	Bell Plain, Hale	38/NR/M5	2	--	--	--	-	--	--	---	---
WR58	Bell Plain, Hale	1045/WR	2	19	15	16	4	32	10	1.2	3.8
										x=1.4	x=3.7

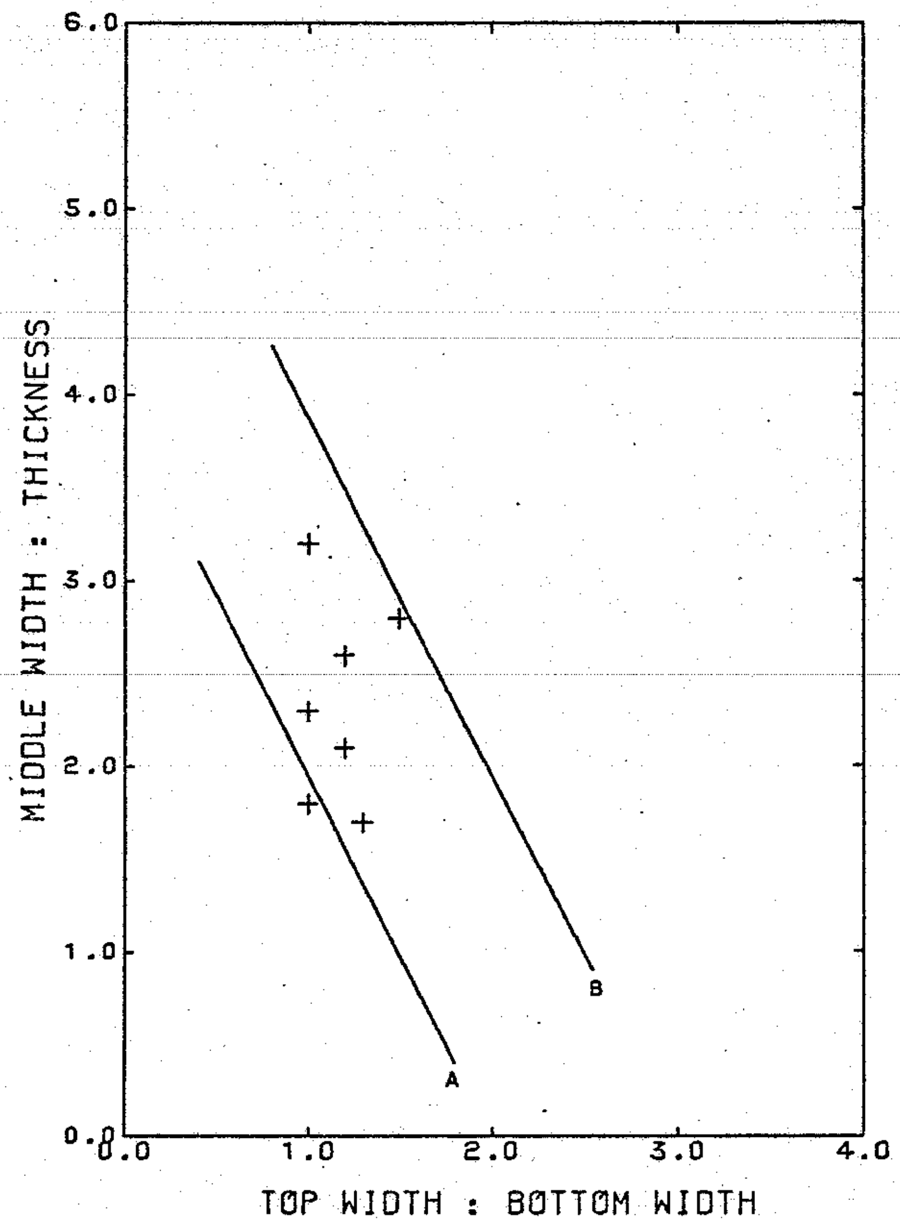

Figure 30. Handle shape ratios, Moundville Incised jars.

Nodes are a common accoutrement of handles on unburnished jars (Fig. 54). Typical patterns include two or three nodes arranged vertically, a single node centered on the front of the handle, and three nodes in a triangular configuration. Handles are luted, not riveted, to the exterior of the vessel, and the top of the handle is often slightly below the level of the lip (e.g., Figs. 57b,d; 59g). Also, the handles tend to be straighter, almost vertical in profile, not curving outward nearly as much as the typical early form.

Handles on burnished jars are always strap-like, and tend to be more parallel-sided than those on unburnished jars of this phase. The mean middle-width:thickness ratio of the three handles that were measured is 3.7, and the mean top-width:bottom-width ratio is 1.4 (Table 28).

Effigy Features (Table 17)

Lug and rim effigy bowls continue to be made in Moundville III. In contrast to earlier examples, particularly those in Moundville I, bird effigy heads tend to be more gracile and naturalistically executed (Figs. 51a; 62l; also see DeJarnette and Peebles 1970:111). Also contrasting is the fact that the heads invariably face outward rather than inward, and the lug opposite the head often exhibits a series of parallel incisions on top, perpendicular to the lip, which are probably intended to represent tail feathers.

Another lug and rim effigy form dating to this phase is the feline. The one such effigy in our sample (Fig. 62g) is painted red and white, implying it was made in late Moundville III. If and when more data become available, however, I would not at all be surprised to find this form turning up earlier in the phase as well.

One of the most common effigy forms throughout Moundville III is the fish effigy bowl (Figs. 51c, 62k). In addition to various applique features which represent the head, tail, and ventral fins, these effigies almost always have a notched applique band as a dorsal fin -- which in sherd collections might be sorted as a beaded rim or a beaded shoulder.

Frog effigies modeled on burnished jars are the second most common effigy form in our Moundville III gravelots, their greatest concentration being early in the phase (Figs. 51b, 58q; Moore 1905:Fig. 78).

Another contemporary effigy form consists of a simple bowl with a beaded rim, to which have been added four human head medallions spaced equidistantly around the rim (Fig. 51f). The one late example in Segment 3B is painted red and white, while the two in Segment 3A are simply black filmed.

Three less common effigies which can probably be assigned to early Moundville III are the beaver depicted on a simple bowl (Fig. 51d), the turtle depicted on a restricted bowl (Fig. 46h-h'), and the alligator (see p. 200).

Dating

Two radiocarbon dates are available from Moundville III contexts. A sample of charcoal from a hearth-like feature in Level 4, unit 6N2W, yielded an uncorrected date of A.D. 1840±50 (DIC-1242), obviously a spurious determination. The only reasonable date comes from Structure I at Lubbub (1Pi33), the uncorrected estimate being A.D. 1410±45 (DIC-1233; Jenkins 1979:277, Table 12). Based on the latter date, and the knowledge that Alabama River phase materials have recently been dated to the mid-16th and 17th centuries (Curren, personal communication), I would estimate that Moundville III lasted from about 1400 to about 1550 A.D.

Summary and Discussion

Having just described the ceramic complexes associated with our newly-defined phases in minute detail, it is useful to briefly recapitulate the late prehistoric ceramic sequence in the Warrior Valley as it now stands. The five phases with which we are concerned will here be reviewed in chronological order, pointing out the salient characteristics of the ceramics in each. Afterwards, a few general points regarding the continuity evident in the sequence as a whole will be discussed.

The West Jefferson phase (A.D. 900-1050) exhibits a ceramic complex that is almost entirely grog-tempered. The predominant vessel forms are simple bowls and jars, the latter often having two parallel-sided handles. The vast majority of vessels are undecorated, and fall into the type

Baytown Plain, *var. Roper*. Rarer in the complex are the types Mulberry Creek Cord-Marked, *var. Aliceville*, Alligator Incised, *var. Geiger*, and Benson Punctate, *var. unspecified*. Shell-tempered ceramics also make an appearance, especially late in the phase, but never in quantities of more than a few percent. The shell-tempered types identified include Mississippi Plain, *var. Warrior*, and Moundville Incised, *var. Carrollton*.

It is not until the subsequent Moundville I phase (A.D. 1050-1250) that virtually all vessels become shell-tempered. Simple bowls and two-handle jars similar to those in the West Jefferson complex continue to be made, and a number of new shapes are added. Among these new forms are the restricted bowl, the flaring rim bowl, the slender ovoid bottle, and (late in the phase) the subglobular bottle with pedestal base. Most of the pottery again is undecorated, falling into the categories Mississippi Plain, *var. Warrior*, and Bell Plain, *var. Hale* -- the two varieties which remain numerically predominant throughout the rest of the sequence. Decorated bowls and bottles are represented in Carthage Incised, *vars. Akron*, *Moon Lake*, and *Summerville*, and in Moundville Engraved, *vars. Elliots Creek*, *Havana*, and *Stewart*. Unburnished jars, when decorated, usually exhibit the arch motif characteristic of the type Moundville Incised, the most common variety being Moundville.

In the Moundville II phase (A.D. 1250-1400), the slender ovoid bottle disappears and is replaced by the subglobular form with a pedestal base; late in the phase, slab-base bottles become common as well. The various bowl shapes found in the previous phase continue into Moundville II, and a cylindrical bowl form (often with a single lug) is added to the complex. Jars are generally similar to those in the previous phase, except that most of them have four handles instead of only two. Common secondary shape features include indentations and, late in the phase, beaded rims. The decorated type Moundville Engraved is mainly represented by the varieties Havana, Northport, Taylorville, Hemphill, and Tuscaloosa, the latter two appearing late. Carthage Incised is present as var. Akron. The type Moundville Incised also continues into this phase but with sharply declining popularity as time goes on.

With the start of the Moundville III phase (A.D. 1400-1550) the pedestalled bottle disappears, the slab base bottle declines in popularity, and the dominant form becomes the subglobular bottle with a simple base. The restricted, simple, cylindrical and flaring rim bowl shapes continue to be found; late in the phase, the flaring rim bowls tend to get deeper and the short neck bowl first appears. Unburnished jars usually have four handles, but as time goes on jars with eight or even more handles become commonplace. Moundville III handles, in contrast to most earlier examples, tend to be strap-like and tapered near the bottom. Beaded rims on bowls, which first appeared in Moundville II, attain their greatest frequency in Moundville III. The decorated type Moundville Engraved is most often represented in the varieties _Wiggins_ and _Hemphill_, although _Taylorville_, _Tuscaloosa_, and _Havana_ appear as well, mainly in the early part of the phase. Carthage Incised experiences a bit of a resurgence in the varieties _Akron_, _Carthage_, _Moon Lake_, and _Poole_. Unburnished jars from this phase are typically undecorated. Late in the phase, red-and-white painted vessels begin to be made.

The Alabama River phase (A.D. 1550-1700), last in the prehistoric sequence, is marked by a ceramic complex which is stylistically a direct outgrowth of the one in late Moundville III. Many of the same vessel forms continue, including the short neck bowl, the flaring rim bowl, and the subglobular bottle with a simple base. Standard jars may have four, eight, or more than ten handles; but in many cases the handles are replaced either by applique neck fillets or vertical pinched-up ridges of clay. The predominant undecorated varieties continue to be Bell Plain, _var._ _Hale_, and Mississippi Plain, _var._ _Warrior_. Decorated categories include Alabama River Incised, _var._ _unspecified_, Barton Incised, _var._ _Demopolis_, Carthage Incised, _vars._ _Carthage_ and _Fosters_, and certain varieties of Moundville Engraved which have not as yet been formally named. As in late Moundville III, red-and-white painting continues to be used, especially on flaring rim bowls.

Discussion

The ceramic sequence just presented evidences a great deal of stylistic continuity, especially from Moundville I onward, indicating an uninterrupted local development. This continuity can be traced in the persistence, across phase boundaries, of particular decorative techniques, specific designs, modes of temper, and vessel shapes. Even when the features present in each phase fall into different formal categories, these categories can often be seen as arbitrary divisions along a continuum marked by a gradual set of transformations. For example, the chronological sequence of bottle shapes (slender ovoid bottle; subglobular bottle, pedestal base; subglobular bottle, slab base; subglobular bottle, simple base) clearly respresents a stylistic series marked by a gradual increase in the width of the body, followed by a gradual decrease in the prominence of the basal pedestal.

The only transition in the sequence which appears to be abrupt is that between West Jefferson and Moundville I. a number of major changes took place in this transition, including (1) the wholesale adoption of shell tempering at the expense of grog-tempering, (2) the appearance of bottle forms, and (3) the appearance of certain decorative techniques such as engraving and black filming. However striking or rapid these changes might have been, it is important to stress that the West Jefferson-Moundville I transition does not repesent a total break in the ceramic tradition, whether stylistic or technological. For example, the bowl and two-handle jar shapes made throughout West

Jefferson times persist unchanged into Moundville I. Moreover, the shift in tempering practices, though rapid, is by no means absolute or instantaneous. There is clear-cut evidence for the use of shell temper in West Jefferson times; not only do the types Mississippi Plain and Moundville Incised form a consistent minority in late West Jefferson assemblages, but a grog-tempered sherd with shell inclusions has been found in a West Jefferson context dated to A.D. 900 -- suggesting that West Jefferson potters may have been experimenting with shell temper some 150 years before it came to dominance (see p. 145). Nor does the practice of grog-tempering completely stop after Moundville I begins. Grog continues to be used throughout the sequence, mixed with shell, in paste compositions characteristic of the varieties Mississippi Plain, _var. Hull Lake_, and (sometimes) Bell Plain, _var. Hale_.

The apparent abruptness of the change between West Jefferson and Moundville I has prompted some workers to express the view that the transition was brought about by the in-migration of people bearing a foreign ceramic tradition (Jenkins 1976). Given the continuities just discussed, however, it seems to me just as plausible, considerably simpler, and therefore preferable to view this transition as being essentially an indigenous process. Undoubtedly, interaction with other regions and other ceramic traditions conditioned the content, and perhaps the rapidity of the ceramic changes that led to Moundville I, but I see no compelling evidence to believe that shell-tempered ceramics necessarily had to be "brought in" by an outside group.

In the same vein, it is important to point out that the abruptness of the ceramic changes between West Jefferson and Moundville I may, at least to some extent, be an illusion created by the nature of the data we have at our disposal. The West Jefferson phase, it will be recalled, was originally defined on the basis of a ceramic assemblage whose latest dates seemed to fall around A.D. 1050. The current definition of the Moundville I phase, on the other hand, rests primarily on the material excavated from the lower levels of 8N2E and 6N2W. Although the Moundville I deposits encountered in these levels were thick, no ceramic change could be detected stratigraphically within them, suggesting that they may not represent a very long span of time. Given that the top of those Moundville I deposits was dated to about A.D. 1250, it may be that the assemblage from these deposits is more representative of late Moundville I than of the phase as a whole. Thus, our present conception of the differences between West Jefferson and Moundville I may well rest not on a comparison of two assemblages adjacent in time, but rather of two assemblages separated by a gap, thereby artificially accentuating the differences between them. If and when an early Moundville I component is isolated -- there is undoubtedly one at Bessemer -- I suspect it will contain considerably less engraved ware than late Moundville I, perhaps none at all, and therefore will be stylistically much closer to West Jefferson.

To close this chapter, and to set the stage for the next one, the ceramic chronology for our three newly-defined phases is summarized in Tables 29-34.

TABLE 29
Summary Chronology of Types and Varieties

Type, Variety	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late
Bell Plain, *Hale*	x	x	x	x	x
Mississippi Pl., *Hull Lake*	x	x	x	x	x
" " *Warrior*	x	x	x	x	x
Carthage Inc., *Akron*	x	x	x	x	
" " *Carthage*				x	x
" " *Fosters*				x	x
" " *Moon Lake*	x	?	?	x	x
" " *Poole*					x
" " *Summerville*	x	?			
Moundville Eng., *Cypress*				x	
" " *Elliots Cr.*	x				
" " *Englewood*				x	x
" " *Havana*	x	x	x	x	
" " *Hemphill*		-	x	x	x
" " *Maxwells Cr.*		(x)	x	x	
" " *Northport*	x	x	x		
" " *Prince Pl.*		(x)	(x)		
" " *Stewart*	x	?			
" " *Taylorville*		x	x	x	
" " *Tuscaloosa*			x	x	
" " *Wiggins*			x	x	x
Moundville Inc., *Carrollton*	x	x	-		
" " *Moundville*	x	x	-		
" " *Snows Bend*	x	x	-		
Barton Inc., *unspecified*	x	?	?	?	?

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

TABLE 30
Summary Chronology of Representational Motifs

Representational Motif	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late
Bilobed Arrow		(x)	x		
Bird with Serpent Head			?	?	?
Crested Bird			?	x	
Feather			(x)	(x)	
Feathered Arrow		(x)	(x)	?	
Forearm Bones				x	x
Forked Eye Surround		x	(x)		
Greek Cross		(x)	(x)	?	
Hand and Eye		(-)	x	x	x
Human Head		?	?	?	?
Insect			(x)	(x)	(x)
Ogee		(x)	x		
Paired Tails			x	x	x
Paired Wings				x	
Radial Fingers		?	x	x	x
Raptor		(-)	(-)	x	
Rayed Circle		(x)	(x)	?	
Scalp			(-)	x	x
Skull				x	
Turtle					x
Windmill		?	x	x	
Winged Serpent				x	x

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

TABLE 31
Summary Chronology of Painted Decoration

Painted Decoration	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late
black film	x	x	x	x	x
red film	x	x	x	x	x
white film	x	x	x	x	x
red and black	x	(x)	(x)		
red and white					x
black on white	x				
red and black on white	?	x	?		
red engraved	x				
white engraved	x				

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

TABLE 32
Summary Chronology of Basic Shapes

Basic Shape	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late
cylindrical bottle		x	(x)	x	
narrow neck bottle				?	x
slender ovoid bottle	x				
subglob. bottle, ped. base	x	x	x		
subglob. bottle, slab base			x	x	-
subglob. bottle, simple base	-	?	x	x	x
cylindrical bowl		x	x	x	-
flaring rim bowl (deep)				(x)	x
flaring rim bowl (shallow)	x	x	x	x	x
outslanting bowl	?	(x)	(x)	?	
pedestalled bowl	x	(x)	x	x	
restricted bowl	x	(x)	x	x	x
short neck bowl					x
simple bowl	x	x	x	x	x
terraced rectanguloid bowl	?	x	?		
burnished jar	x	(x)	x	x	-
neckless jar (unburnished)	x	-			
stand. jar (unb., 2 hand.)	x	(x)	x	x	-
stand. jar (unb., 4 hand.)	?	(x)	x	x	x
stand. jar (unb., 8 hand.)				x	x
stand. jar (unb., 10+ hand.)					x
composite bowl			x	(x)	
composite bowl/jar			x	(x)	
composite jar/bowl			(x)	(x)	
double bowl	?	?	(x)	x	?

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

TABLE 33
Summary Chronology of Secondary Shape Features

Secondary Shape Feature	Mv. I	Mv. II		Mv. III	
		early	late	early	late
band of nodes	(x)	(x)	x	(x)	
beaded rim			x	x	x
beaded shoulder	x	(x)	x	x	
cutout rim	x	?			
downturned lugs				x	x
folded rim	x				
folded-flattened rim	x				
gadrooning	x	(x)	(x)		
grouped nodes	x	(x)	x		
indentations		x	x	x	
lowered lip	x	x	?		
notched everted lip		(x)	x	x	
notched lip		(x)	(x)	x	
opposing lugs		?	?	?	?
scalloped rim	x	?	?	(x)	(x)
single lug		x	x	x	-
spouts			x		
vertical lugs				(x)	(x)
widely spaced nodes:					
(bowl or burn. jar)....			x	x	
(unburnished jar)......	(x)	(x)	(x)		

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

TABLE 34
Summary Chronology of Effigy Features

Effigy Features	Mv. I	Mv. II		Mv. III	
		early	late	early	late
alligator			(x)	(x)	
beaver			?	x	
bird (flat head, i.f.)	x	(x)	?		
bird (flat head, o.f.)	?	(x)	(x)		
bird (gracile head, o.f.)		?	(x)	x	(x)
conch shell	x	(x)	(x)		
feline				?	x
fish				x	x
frog				x	x
frog heads	?	?	?	?	?
human head medallions			?	x	x
mammal, unidentified	x	(x)	?	?	?
mussel shell	?	x	x		
shell spoon	?	?	?	?	?
turtle			(x)	(x)	
turtle, inverted			x		

Key: x = present; (x) = very likely present; - = present, but in greatly reduced frequency; (-) = very likely present, but in greatly reduced frequency; ? = possibly present.

CHAPTER V

COMMUNITY PATTERNS AT MOUNDVILLE

With the ceramic chronology now established, let us turn to the subject of how the size and configuration of the Moundville site changed through time. All the evidence we have suggests that people at Moundville were usually buried in close proximity to residential areas -- in the floors of dwellings, just outside the dwellings' walls, or in cemeteries nearby (Jones and DeJarnette n.d.:3; Peebles 1978:375-381; 1979:*passim*). Burials also occur in many of the mounds. Therefore, by plotting the distribution of dated burials and vessels for each time period separately, it should be possible to get at least a rough idea of when different parts of the site were occupied, and when various mounds were built.

The plan of this chapter is as follows: First, I will give a brief account of how the ceramic chronology was used to assign relative dates to vessels and the burials with which they were associated. Second, I will discuss what is known about the spatial context of these features, and consider some of the limitations in the kinds of spatial interpretations that can be drawn. Finally, the chronological and spatial information will be brought together in reconstructing community patterns at Moundville as they existed at various points in time.

Relative Dating of Vessels and Burials

The process of assigning dates to vessels and burials took place in two steps. All the whole vessels in the sample were first dated individually, and these dated vessels were then used to chronologically place the burials in which they were found. The actual procedures by which the dates were assigned are described more fully below.

To begin with, each vessel was described in terms of the six classificatory dimensions to which the ceramic chronology refers (see Chapter III). Each vessel might exhibit features characteristic of a particular type and variety, a particular kind of painted decoration, a basic shape category, certain secondary shape features, and so on. The chronological range of each of these features was usually known (Tables 29-34); logically, therefore, a vessel which exhibited a certain set of features must have been made when the ranges of all these features overlapped. For example, if a vessel had a design which was known to date from Moundville I to late Moundville II, and a basic shape that was diagnostic of the time from late Moundville II to early Moundville III, then the vessel itself which combined these features could only have been manufactured during late Moundville II.

Once all the vessels had been assigned dates in this manner, these vessels were grouped into gravelots, which could then be used to date the associated burials. A burial containing a single vessel was assigned a date (or date-range) identical to that of the vessel. A burial containing more than one vessel was assigned a date corresponding to the span of time in which the date-ranges of the individual vessels overlapped. In carrying out this procedure, only local vessels were taken into account, since the chronological positions of nonlocal vessels usually could not be as reliably established.

The resulting temporal assignments for all burials from which ceramic data were available are presented in Table 35. Inasmuch as the spatial distribution of "unassociated" vessels -- those which cannot be reliably tied to grave proveniences -- may also be of interest, their relative dates are given individually in Table 36 (both tables appear at the end of this chapter).

It is readily apparent from these tables that the above procedures, whether applied to vessels or gravelots, often result in chronological assignments which span more than one phase or phase-segment. That is, most vessels/gravelots are dated to a plausible range, rather than to a "point" in time. At first glance this might seem a bit retrogressive, for had we not already dated many gravelots more precisely by seriating them? The answer is unequivocally no. The seriation did indeed assign each gravelot a best-fit position, but this best-fit is by no means the only possible position, nor even the only plausible one. Looking back at

Figure 25, let us take gravelot 20/NEC/M5 as an example (28th from the top). This gravelot contained attributes 21 (paired tails) and 7 (subglobular bottle, simple base), and on this basis it was assigned a best-fit position in Segment 3A (early Moundville III). Yet taking the full chronological range of these two attributes into account (Fig. 26), we see that this burial could actually date anywhere from Segment 2B (late Moundville II) to Segment 3B (late Moundville III). This seeming paradox merely points up the long-recognized (and oft-ignored) fact that formulating a ceramic chronology is distinct, both logically and methodologically, from the procedure of assigning dates once the chronology is established. When building a chronology by means of seriation, it is a formal requirement of the method that each provenience be assigned a single position within the overall sequence. Given this constraint, a provenience is usually placed somewhere near the midpoint of its plausible range, since this is often the best heuristic approximation. But once the ceramic chronology is established, and attention turns from doing a seriation *per se* to assigning dates for the purposes of interpretation, then it becomes preferable, and in many cases more realistic given the state of our knowledge, to make chronological assignments which take the entire span of possible dates into account. The resulting chronological estimates may well be conservative in terms of their breadth, but for present purposes little harm can be done if we err on the side of caution.

Spatial Context of Vessels and Burials

Obviously, community structure cannot be studied without certain kinds of spatial information. So it is worthwhile to briefly review the kinds and quality of spatial information available for the the features that can be dated.

Virtually every Moundville vessel and gravelot comes from a provenience whose general location within the site is known. During the earlier excavations, including those of C.B. Moore, the location of finds was recorded only in rather vague terms, such as "Mound F" or "field north of Mound C." This practice gradually changed, and by the middle-to-late 1930s the boundaries of each excavated area, and the location of finds within each area, were being recorded with considerably more precision. The important thing to note for present purposes is that, even when descriptions are vague, vessels/gravelots can almost always be reliably located to within 50 m (and usually less) of where they were originally found (Peebles 1979:Fig. I-1 and *passim*). In reconstructing spatial patterns that are fairly coarse-grained, such errors are hardly noticeable given the large extent of the site as a whole. Thus, this sort of locational information can readily be used to infer the overall size and configuration of the Moundville community at any point in time.

In addition to looking at coarse-grained distributions, one ideally would like to learn something about the finer-grained patterning on the site as well. Obviously this would require knowing a great deal more about spatial context than merely the general location of finds; one would also have to know precisely where artifacts and features were found relative to one another within an excavated locality. Given that our chronological attributions apply mainly to whole vessels and burials, it would be particularly valuable to learn in detail how these artifacts and features relate spatially to contemporary mounds, structures, and other activity loci. Unfortunately, patterning at this level is considerably more difficult to approach with the available data from Moundville. Spatial information at this level of detail was often not recorded in the field, and even when it was, its present interpretation is often quite difficult.

To begin with, virtually all the mound excavations were conducted by C.B. Moore, who failed to keep any record of horizontal or vertical relationships within the areas he opened. This lack of information makes detailed depositional reconstructions impossible. Our only recourse lies in the fact that dating vessels/gravelots within a mound is tantamount to dating the mound itself: Barring heirlooms, the earliest vessel/gravelot within a mound provides an unequivocal _terminus ante quem_ for the onset of constructional activity, even if one does not know precisely where within the mound the vessel/gravelot was found.

With regard to the relationship between burials and other features in off-mound areas, the available data are considerably more variable. In earlier excavations, the presence of off-mound structural features was never recorded, and so the information one would want is simply unavailable. In later excavations, wall trenches, post molds, fire basins, pits and other features were recognized and mapped in relation to burials. Although many of these maps are now published (Peebles 1978; 1979), they still present interpretive problems. Judging from the burials which can be dated by their inclusive vessels, it is clear that many of these maps represent palimpsests of features from several different time periods. If every single feature on such maps could be dated independently, then the palimpsests could be easily sorted out. However, the fact is that less than a third of the burials, and virtually none of the structures, are directly associated with temporally diagnostic vessels. Thus, a typical map might show three structures and twenty burials, but only five of these burials are likely to contain ceramics which can be unequivocally dated. If the ceramically-dated burials fall into different phases (as they often do), then it becomes extremely difficult to infer the chronological positions of the structures and other burials. Except in the relatively infrequent cases of direct superposition, the only avenue of interpretation is to rely on spatial proximity and spatial alignments -- lines of evidence which, needless to say, tend to be inconclusive. All one can say for now is that burials quite often do seem to be spatially associated with structures; more detailed interpretations may well be possible in the future, but not until the sherds from these localities are more fully analyzed.

Changes in Community Patterns through Time

The present discussion of community patterns is based principally on a series of maps, each showing the distribution of burials and unassociated vessels belonging to a particular phase of occupation (Figs. 31,32,35,36, 38). To assure reliability, only the most narrowly-dated vessels and burials were plotted -- those which could be securely assigned to a range that spanned no more than two adjacent time segments (e.g., Moundville I/early Moundville II, early Moundville II/late Moundville II, late Moundville II/ early Moundville III, etc.). Thus, one should keep in mind that the number of vessels/burials plotted on these maps actually represents a minimum, since numerous vessels and burials which lacked sufficiently diagnostic features were excluded. For reasons already stated, maps showing the spatial relationships of features within excavated localities will hardly be brought into the discussion, except in the few cases where the features they show can be reliably dated and plausibly interpreted. Given these considerations, let us now present the evidence for each phase in turn.

West Jefferson Phase

This component, unlike the others, cannot be defined by plotting the spatial distribution of burials, since West Jefferson gravelots have never been found to contain pottery (see Ensor 1979:12-15). There are literally thousands of burials without ceramics reported at Moundville. but for now it is impossible to tell which ones are West Jefferson and which ones are later.

The principal evidence for a West Jefferson component at Moundville exists in the form of sherds, mostly from the excavations which took place in the 1930s. Although these collections have never been fully analyzed, a number of preliminary reports indicate that most of the grog-tempered pottery was recovered from the western periphery of the site, in the area to the west of Mounds O and P (Wimberly 1956:18-19; Walthall and Wimberly 1978:122-123). Walthall and Wimberly (1978:123) recently estimated that the West Jefferson occupation was a village of approximately 0.5-1.5 ha in size; judging from the position of the excavations which produced the greatest number of grog-tempered sherds, this village was located within the area shown on Figure 31.

Moundville I Phase

The greatest concentration of Moundville I burials and vessels occurs in the western part of the site, showing considerable continuity in location from the previous phase (Fig. 32). The core of the site at this time appears to have consisted of at least a single mound, an early stage of

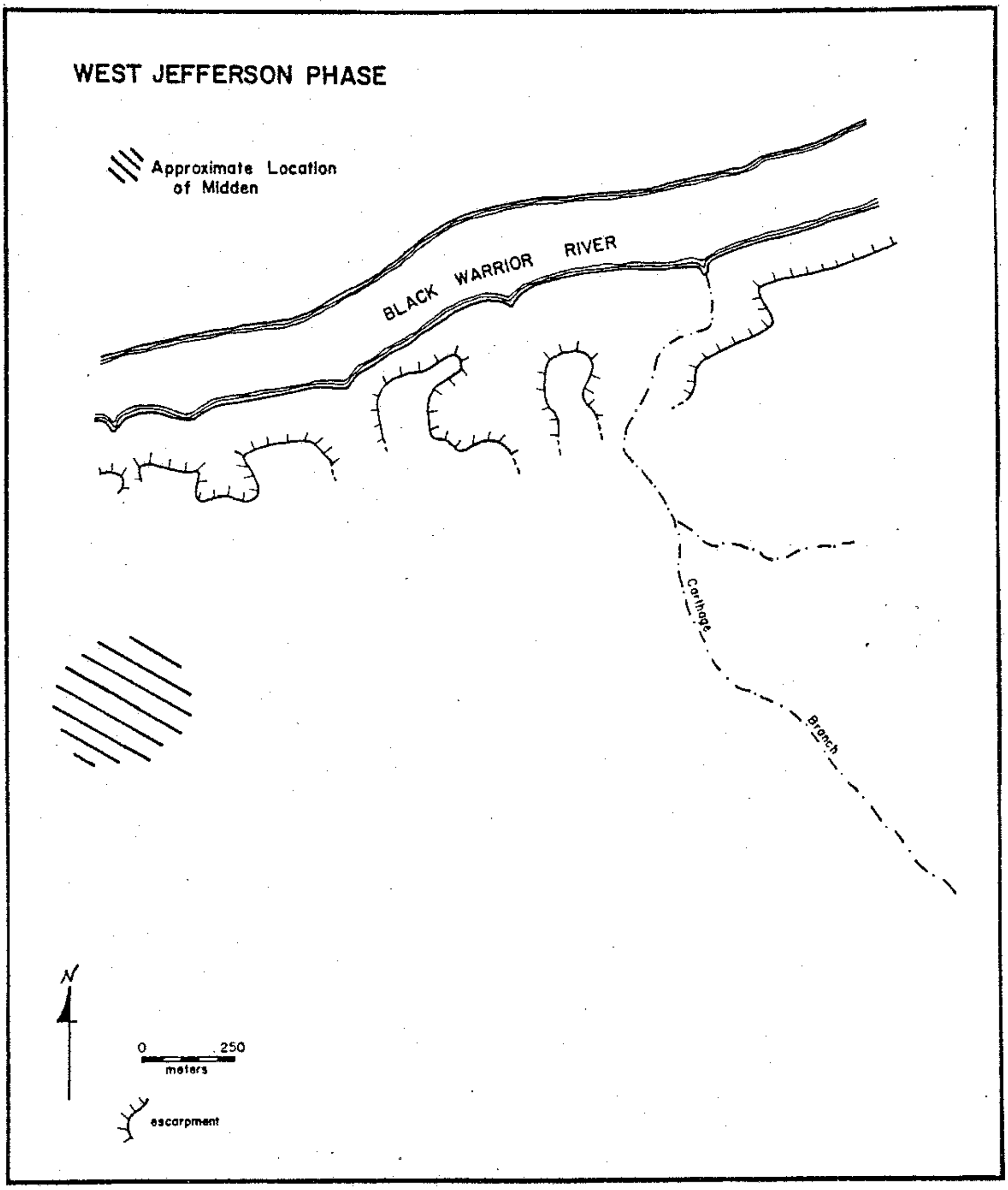

Figure 31. Approximate location of West Jefferson phase component.

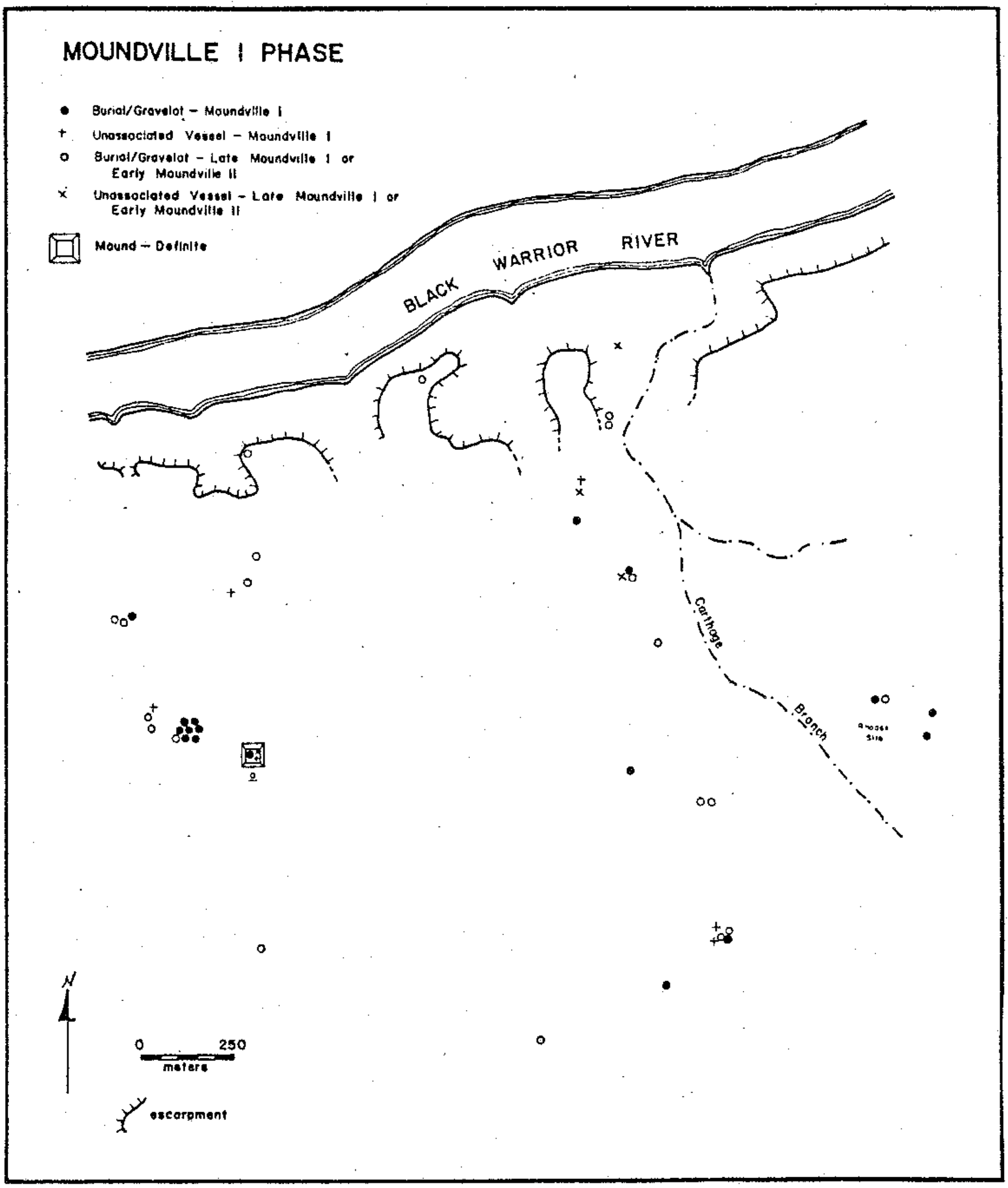

Figure 32. Spatial distribution of burials and unassociated vessels, Moundville I phase (some possibly early Moundville II).

Mound O. Immediately to the west of this mound was a cluster of burials -- probably a small cemetery (Fig. 33) -- along with some evidence of residential architecture (Fig. 34). The overall distribution of burials also suggests scattered occupation to the north, south, and east of the mound, especially in the areas along Carthage Branch. It is difficult to tell whether the absence of burials and vessels in the central portion of the map represents an actual lack of occupation, or merely the paucity of excavations in the area that was later to become the plaza.

The pattern evident in Figure 32 is quite intriguing, for it seems to be consistent with patterns found elsewhere in the Warrior valley at the same time. Recent surveys have indicated that during this phase, Moundville was one of a series of small, more or less equivalent political centers, each with a single mound, and a number of small hamlets or farmsteads scattered in its immediate vicinity (see Chapter VI). The elaborate three-level settlement hierarchy, which many of our previous models took for granted (e.g., Steponaitis 1978), clearly had not developed by this time.

Moundville II Phase

In Moundville II times, the situation changed dramatically as Moundville grew to become a major political center (Fig. 35). There were considerably more burials dating to this phase at the site, probably indicating a much larger population. Moreover, the evidence suggests that this was a time when a considerable amount of public labor

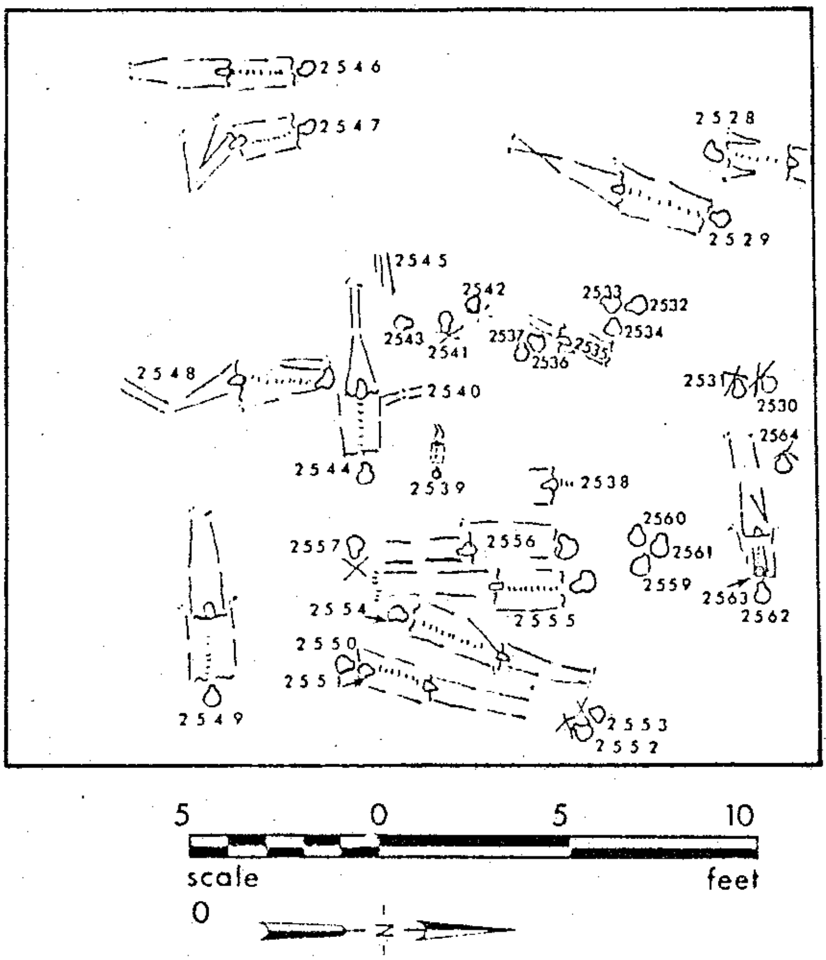

Figure 33. Burial concentration west of Mound O, Moundville I to early Moundville II phase (Excavation WP; after Peebles 1979:Fig. VI-3.)

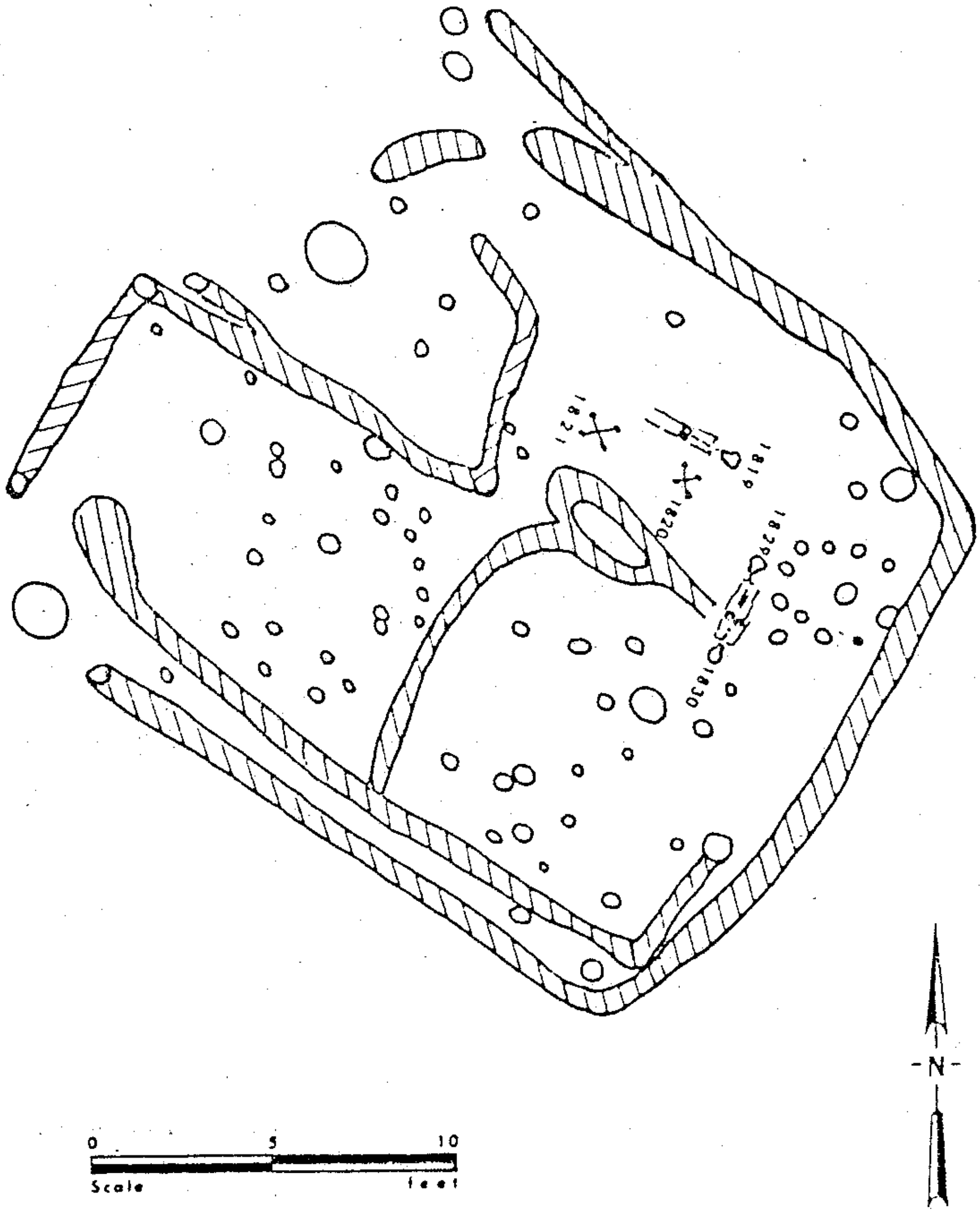

Figure 34. Structure with burials, Moundville I or early Moundville II phase (excavation NWW; after Peebles 1979:Fig. VIII-3).

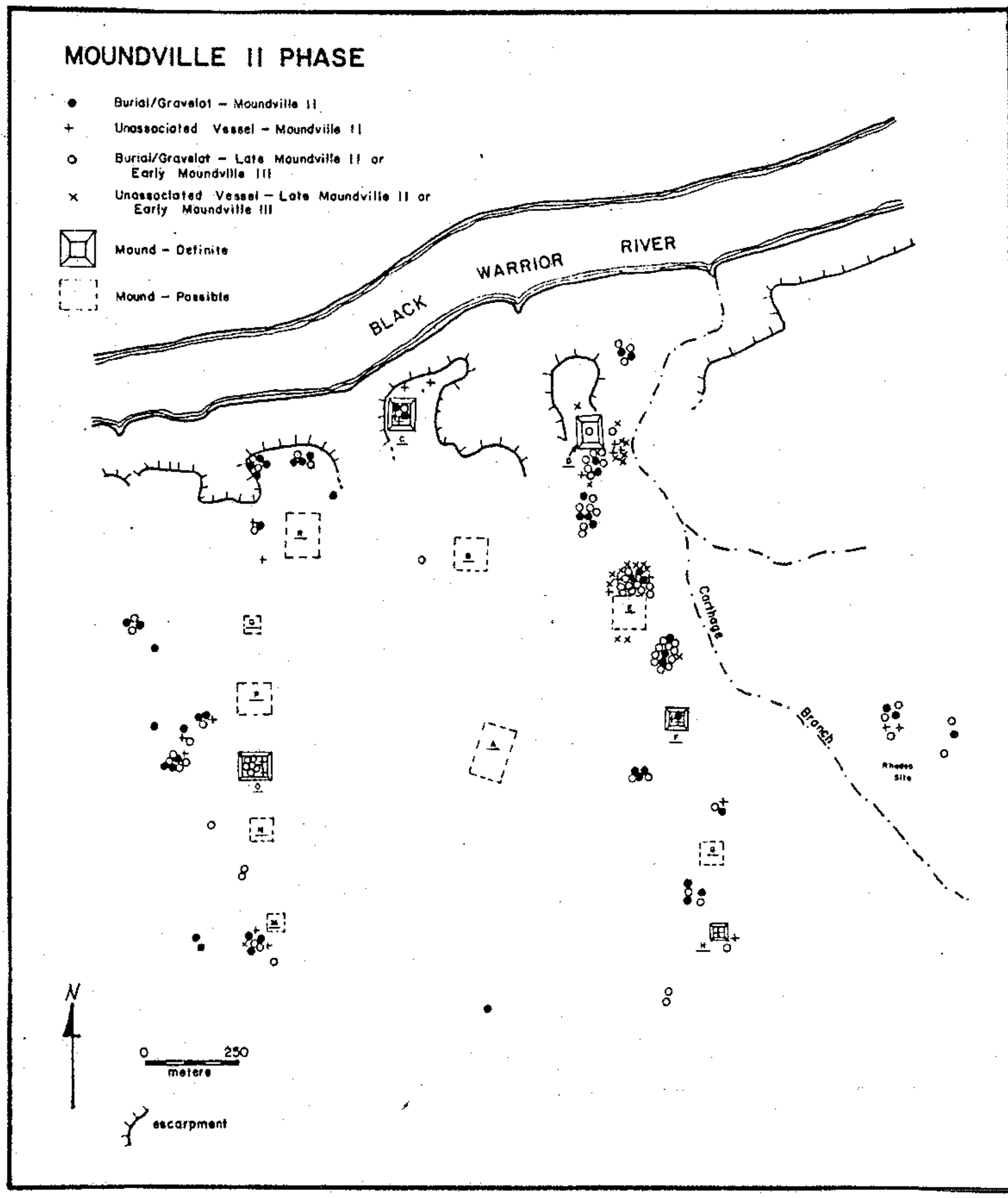

Figure 35. Spatial distribution of burials and unassociated vessels, Moundville II phase (some possibly early Moundville III).

was mobilized to build mounds. There is definite evidence in the form of inclusive pottery vessels that at least five mounds (C, D, F, H, O) were standing by the end of this phase. Moreover, given that the securely-dated mounds occur at both the northern and southern extremities of the site, it seems likely that many of the intervening mounds, from which we have no datable artifacts, were standing as well.

Mortuary activity during this phase continued in the area west of Mound O, and large burial concentrations also began appearing elsewhere on the site, mainly to the east and north. Especially prominent were burial concentrations north of Mound R, southwest of Mound M, and (late in Moundville II) the large cemetery areas near Mounds D and E.

<u>Moundville III Phase</u>

Most of the patterns established in Moundville II times continued into Moundville III (Fig. 36). Judging from the distribution of burials, the area of settlement may have expanded somewhat farther to the west. Again, the largest concentrations of dated burials occurred in the vicinities of Mounds D and E (Fig. 37), with smaller concentrations southwest of Mound G, southwest of Mound M, west of Mounds O and P, west and north of Mound R, and on the Rhodes site east of Carthage Branch. Mound building must have continued apace, with vessels definitely of this phase occurring in Mounds B, D, and O. Without a doubt, all the mounds reached their final configuration by the end of Moundville III, because by the succeeding Alabama River phase, the site had

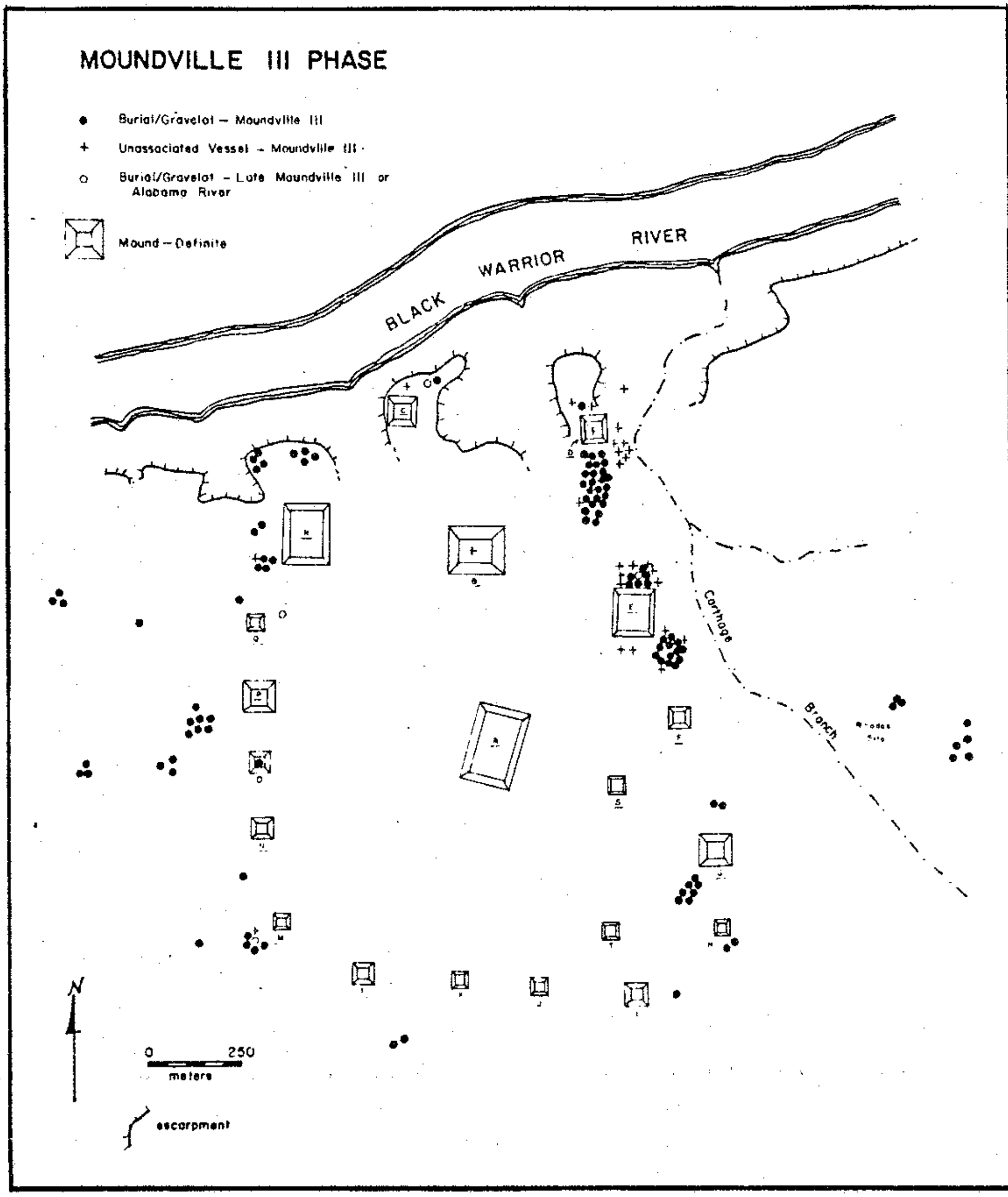

Figure 36. Spatial distribution of burials and unassociated vessels, Moundville III phase (some possibly early Alabama River).

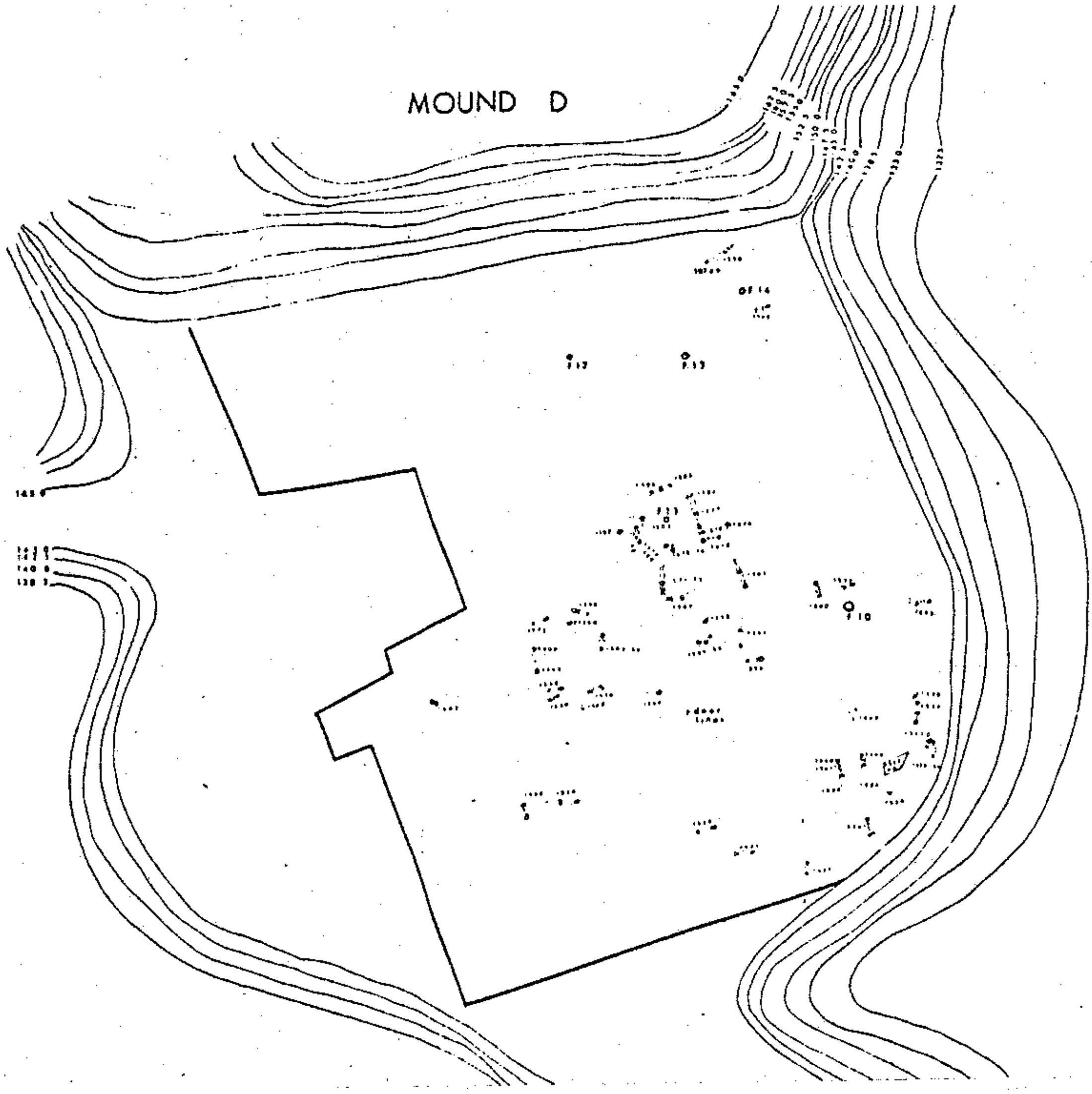

Figure 37. Portion of the large burial concentration south of Mound D, late Moundville II to early Moundville III phase (excavation SD; after Peebles 1980:Fig. III-11).

been virtually abandoned.

Alabama River Phase

That a proto-historic component did exist at Moundville is indicated by the presence of diagnostic vessels and sherds; yet it is abundantly clear that the component was miniscule compared to those which preceded it (Fig. 38). Evidence of mortuary activity is minimal, with one burial southwest of Mound G, another north of Mound R, and two unassociated vessels (which probably came from burials) north of Mound B. Also possibly dating to this phase are two "urn-burials of infants," which Moore reported finding south of Mound D (1907:342-343). All in all, this sparse representation is suggestive of nothing more than a few farmsteads or hamlets, scattered over what was once an enormous site.

Summary and Discussion

Summing up the evidence just presented, it appears that Moundville underwent a gradual development through time. The site began as a small nucleated village in the West Jefferson phase, then became a small local center with a single mound in Moundville I, and finally evolved into a large regional center during Moundville II and Moundville III. Decline became evident only in the Alabama River phase, by which time the site had lost its political importance, and was left with only a trace of its former population.

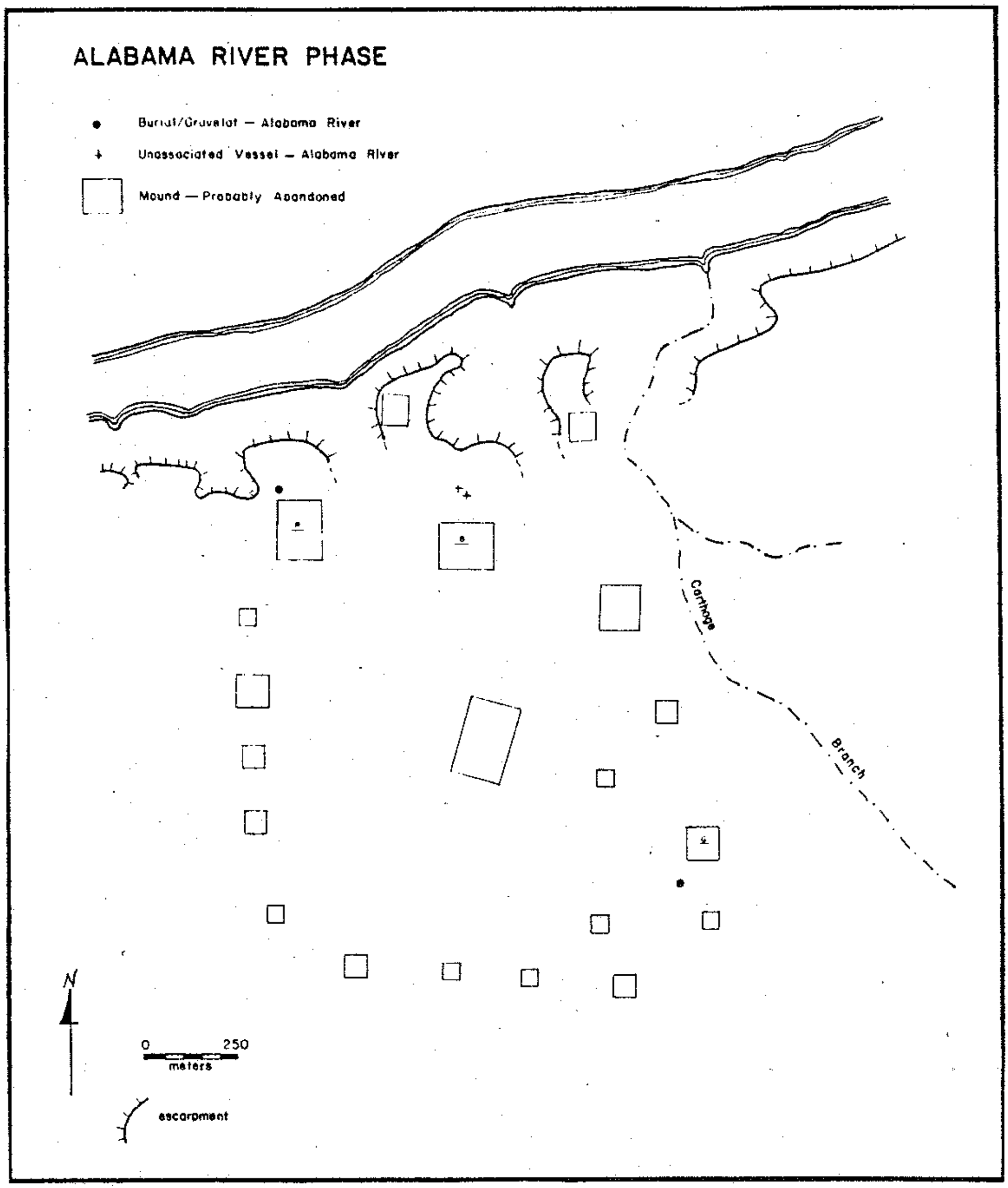

Figure 38. Spatial distribution of burials and unassociated vessels, Alabama River phase.

Overall, the sequence is marked by strong continuities in settlement location from one phase to the next, especially notable in the transition from West Jefferson to Moundville I. These continuities, together with the continuities in ceramic style (see p. 222), are fully consistent with the notion that the Moundville phases I-III -- and the socio-political complexity they represent -- evolved locally from the indigenous West Jefferson base, and were not the result of any migrations into the valley from outside.

Although the present attempt at reconstructing community patterns from the distributions of whole vessels has been somewhat informative, it can only be viewed as a beginning. The vast sherd collections now in the Alabama Museum of Natural History are an invaluable resource with which the interpretations offered here may someday be tested and refined. Hopefully, this resource will not remain untapped much longer.

TABLE 35
Temporal Placement of Burials

Burial Number(s)*	Sample Size**	Mv. I	Mv. II		Mv. III		Ala. Riv.
			early	late	early	late	
2914/AdB	1/1			X	X	X	
1894/Rho	1/3	X	X	X	X	X	X
1895/Rho	1/2			X	X		
1896/Rho	1/1	X	X	X	X	X	X
1901/Rho	1/1	X	X	X	X		
1909/Rho	1/1	X	X	X	X		
1923/Rho	2/3			X	X		
1924/Rho	1/1	X	X	X	X	X	X
1931/Rho	2/2			X	X	X	
1934/Rho	3/4	X	X	X	X	X	X
1936/Rho	1/1				X		
1937/Rho	1/1	X	X	X	X	X	X
1939/Rho	1/1			X	X		
1940/Rho	1/2	X	X	X	X	X	X
1943-44/Rho	1/1	X	X	X	X	X	X
1947/Rho	1/1				X	X	
1949/Rho	2/4	X	X	X	X	X	X
1950/Rho	2/3	X	X				
1955/Rho	1/3	X	X	X	X	X	X
1956-57/Rho	2/3					X	
1958/Rho	1/1	X	X	X	X	X	X
1960/Rho	1/1	X	X	X	X	X	X
1964/Rho	1/1	X	X	X	X	X	X
1968/Rho	6/6			X			
1969/Rho	1/3				X	X	
1977/Rho	2/2	X	X				
1978/Rho	7/8	X					
1979/Rho	2/3			X	X	X	
2001/Rho	2/2			X	X	X	
2004/Rho	1/1				X	X	
2008-9/Rho	1/1				X	X	
2011/Rho	1/1	X	X	X	X		
2021/Rho	1/1				X	X	
2025/Rho	1/1			X	X	X	
2042/Rho	2/2	X					
2045/Rho	1/1			X	X	X	
2047/Rho	2/2	X					
2062/Rho	1/2	X	X	X	X	X	X
2068/Rho	4/7					X	
2069-71/Rho	1/2		X	X	X	X	
2079/Rho	1/1	X	X	X	X		
2082/Rho	1/1	X	X	X	X		
2087/Rho	1/3			X	X	X	
2094/Rho	1/1	X	X	X	X	X	X

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II		Mv. III		Ala. Riv.
			early	late	early	late	
2096/Rho	1/1			X	X		
2102/Rho	2/2				X		
2110/Rho	2/2			X	X		
2115/Rho	2/3			X			
3/RPB	1/1			X	X	X	
5/RPB	1/1			X	X	X	
8/RPB	1/1			X	X	X	
2664-65/Rw	2/2				X	X	
2673/Rw	1/1	X	X	X			
2687/Rw	1/1		X				
2722/Rw	2/3			X	X		
2725/Rw	2/4			X	X	X	
2726,27,36/Rw	1/1			X	X		
2728-29/Rw	1/1			X	X	X	
2733/Rw	3/3				X	X	
2734/Rw	1/1				X		
2743/Rw	1/3	X	X	X	X	X	X
2747/Rw	1/2	X	X	X	X	X	X
2749/Rw	1/1		X	X	X		
2751/Rw	1/1	X	X	X			
2760/Rw	2/2		X	X	X		
2768/Rw	1/1					X	X
2772/Rw	2/2			X			
2773/Rw	1/1	X	X	X	X	X	X
2774/Rw	1/2	X	X	X	X	X	X
2788/Rw	1/1	X	X	X	X	X	X
2790/Rw	1/1			X	X	X	
2808/Rw	1/1	X	X				
2820/Rw	1/1	X	X	X	X	X	X
2854/Rw	1/1		X	X			
2857/Rw	1/1			X	X		
2859/Rw	1/1		X				
2880/Rw	2/2			X	X		
2882.Rw	1/2		X	X			
2884/Rw	1/1	X					
F.1/WB/M5	1/2	X	X	X	X	X	X
F.1/WB/M5	1/1			X	X		
5,6/C/M5	3/3			X			
F.1/C/M5	2/2			X	X		
F.2/C/M5	2/3			X			
F.3/C/M5	1/2	X	X	X			
2/NEC/M5	1/2					X	X
3/NEC/M5	1/1	X	X	X	X	X	X
11/NEC/M5	1/2	X	X				
20/NEC/M5	2/2				X	X	

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
F.3/D/M5	1/1			X	X		
F.4/D/M5	1/1			X	X	X	
17/ND	1/1	X	X	X	X		
2172/ND	1/1	X	X	X	X	X	X
2173/ND	1/1				X	X	
F.1/ND/M5	1/2	X	X	X	X	X	X
F.3/ND/M5	1/1			X	X		
F.5/ND/M5	1/1		X	X			
F.6/ND/M5	1/1	X	X	X	X	X	X
F.7/ND/M5	2/2		X	X			
F.8/ND/M5	1/2			X	X		
F.9/ND/M5	1/1			X	X		
13/NED	1/2	X	X	X	X		
18/NED	1/1	X	X	X	X	X	X
20/NED	1/1	X	X	X	X		
26/NED	1/1	X	X	X	X	X	X
8/ED	2/2			X	X		
2598/ED	1/3	X	X	X			
2607/ED	1/2	X	X				
2614/ED	1/2	X	X				
1/SED	1/1	X	X	X	X		
7/SED	1/1			X	X	X	
1/SD	1/1		X				
1423/SD	4/5			X	X	X	
1437/SD	2/2		X	X			
1442/SD	1/1	X	X	X	X	X	X
1443/SD	1/1	X	X	X	X		
1444/SD	2/2	X	X				
1446/SD	1/2	X	X	X	X	X	X
1453/SD	1/2	X	X	X	X		
1455/SD	3/3	X					
1457/SD	2/4	X	X	X	X	X	X
1459/SD	1/1				X		
1462/SD	1/1			X	X	X	
1464/SD	1/1		X	X	X	X	
1468/SD	1/1				X		
1479/SD	1/1		X	X	X	X	
1491/SD	1/1				X		
1495/SD	1/1		X	X	X	X	
1496/SD	4/4			X	X		
1504/SD	3/3			X	X		
1505/SD	2/3			X	X	X	
1514/SD	1/1	X	X	X	X	X	X
1515/SD	5/5				X	X	
1516/SD	3/6			X			

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
1519/SD	1/1	X	X	X	X	X	X
1520/SD	2/2			X			
1521/SD	1/1	X	X	X	X	X	X
1522/SD	1/1			X	X	X	
1525/SD	6/6				X	X	
1526/SD	2/2	X	X	X	X	X	X
1534/SD	2/5				X	X	
1536/SD	1/1	X	X	X	X	X	X
1537/SD	1/1	X	X	X	X	X	X
1539/SD	5/5				X		
1542-44/SD	5/5			X			
1546/SD	1/1				X	X	
1553/SD	1/1			X	X		
1563-64/SD	3/3				X	X	
1566/SD	1/1			X	X	X	
1567/SD	1/1			X	X		
1569/SD	1/2		X	X	X	X	
1570/SD	1/1				X		
1573/SD	3/3			X	X		
1579-80/SD	1/1			X	X	X	
1582/SD	1/4			X	X		
1,2,5/SD/M5	3/5				X		
23/SD/M5	1/3				X	X	
24/SD/M5	1/2			X	X		
2/SD/M7	1/1				X	X	
8,9/SD/M7	3/5				X	X	
12/SD/M7	1/1			X	X		
13/SD/M7	3/6		X	X			
14/SD/M7	1/1			X	X		
22/SD/M7	1/3				X	X	
27/SD/M7	2/2	X	X	X			
40-41/SD/M7	1/1			X	X		
55/SD/M7	1/1				X	X	
66/SD/M7	1/1				X	X	
71/SD/M7	2/2				X	X	
84/SD/M7	1/1				X	X	
94/SD/M7	1/1	X	X	X	X	X	X
101/SD/M7	1/2			X			
108/SD/M7	1/3				X		
114/SD/M7	1/1				X		
128/SD/M7	1/1				X		
140/SD/M7	1/2				X	X	
150/SD/M7	2/2				X		
151/SD/M7	1/3			X	X	X	
153/SD/M7	1/2			X	X		

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
156/SD/M7	1/2			X	X	X	
166/SD/M7	1/2	X	X	X			
173/SD/M7	1/5				X	X	
F. 1/SD/M7	1/2		X	X	X		
1/NE	1/1	X	X	X	X	X	X
2/NE	3/3			X	X		
15/NE	1/1	X	X	X	X	X	X
17/NE	1/1			X	X	X	
23/NE	1/1		X	X	X	X	
41/NE	1/1		X				
44/NE	1/1	X	X	X	X		
48/NE	1/1			X	X	X	
50/NE	1/1		X	X	X		
53/NE	2/2					X	X
54/NE	2/4			X	X		
55/NE	1/1	X	X	X	X	X	X
59/NE	1/1		X	X			
76/NE	1/1				X	X	
78/NE	1/1				X	X	
79/NE	2/2			X	X	X	
92/NE	1/1	X	X	X	X	X	X
94/NE	1/1	X					
1587/NE	2/2			X	X		
1596/NE	2/2	X	X	X	X	X	X
1600/NE	1/1			X	X	X	
1611/NE	1/1					X	
1620-21/NE	10/12			X	X		
1624/NE	1/1			X	X		
1625/NE	1/1	X	X	X	X	X	X
1628/NE	1/2				X	X	
1631/NE	1/1			X	X	X	
1636/NE	1/1			X	X		
1638/NE	2/2			X	X		
1639/NE	3/4			X	X		
1647-48/NE	3/3			X	X		
1649/NE	1/2			X	X	X	
1651/NE	4/5				X		
1655/NE	1/1			X	X	X	
1655/NE	1/1				X	X	
1668/NE	1/1	X	X				
1673/NE	1/1			X	X		
1674/NE	1/2			X	X	X	
1676/NE	1/1			X	X		
1181-84/EE	6/6					X	
1185/EE	6/6				X	X	

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
1192/EE	1/1	X	X	X	X	X	X
1198/EE	1/1			X	X	X	
1199-201/EE	1/1			X	X	X	
1202/EE	1/2			X	X	X	
1213/EE	2/3			X	X	X	
1216/EE	1/1	X	X	X	X	X	X
1220/EE	1/1		X	X	X		
1222-23/EE	1/1				X	X	
1225/EE	3/3				X	X	
1227/EE	3/4				X	X	
1228/EE	1/1			X	X		
1229-31/EE	1/2		X	X			
1232/EE	1/1	X	X	X	X	X	X
1234-37/EE	5/9					X	
1238/EE	1/1			X	X		
1243/EE	1/1		X	X	X		
1254/EE	1/1	X	X	X	X	X	X
1255/EE	1/1	X	X	X	X	X	X
1256/EE	1/1		X	X	X		
1261/EE	3/3					X	
1262,65/EE	2/3			X	X		
1263/EE	1/1			X	X	X	
1264/EE	2/2	X	X	X	X		
1267/EE	1/1			X	X	X	
1268/EE	1/1			X	X	X	
1272/EE	1/1			X	X	X	
1275/EE	2/2				X	X	
1276/EE	1/1	X	X	X	X	X	X
1277-78/EE	4/4				X		
1281-82/EE	2/3			X	X		
1283/EE	1/1				X	X	
1284/EE	2/2				X		
1291/EE	2/2					X	
1293,299-301/EE	2/5		X	X	X		
1316/NE	1/1			X	X		
1321/EE	3/3			X	X		
1326-28/EE	1/1			X	X		
1331/EE	1/1				X	X	
1343-44/EE	2/2			X	X	X	
1346/EE	1/1		X	X	X		
1371-72/EE	1/1		X	X	X		
1373-74/EE	4/5			X			
1380/EE	1/1		X	X	X		
1385/EE	1/1	X	X	X			
1387/EE	3/3		X	X	X		

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II		Mv. III		Ala. Riv.
			early	late	early	late	
1388/EE	1/1	X	X				
1389-91/EE	1/1			X	X		
1392/EE	2/2		X	X	X		
1394/EE	2/2			X	X		
1399/EE	2/2			X			
1400/EE	1/1	X	X	X	X	X	X
1406/EE	1/1				X		
1407/EE	2/2			X	X		
1409/EE	1/1			X	X	X	
1411/EE	1/1	X	X	X	X	X	X
1412/EE	1/1			X	X	X	
1413/EE	1/1			X	X	X	
1415/EE	1/1				X		
1680/EE	1/1			X	X	X	
1682/EE	1/1			X	X	X	
1380/SE	1/1	X	X	X			
1342/SE	2/2			X	X	X	
2/F/M5	1/1	X	X	X	X	X	X
6/F/M5	1/1		X	X			
11/F/M5	1/1	X	X	X	X	X	X
16/F/M5	1/2	X	X	X			
17/F/M5	1/1	X	X	X	X	X	X
18/F/M5	1/1	X	X	X	X	X	X
1692/EF	2/2	X	X	X			
1693/EF	1/1			X	X	X	
3/NG	4/4	X	X				
8/NG	2/2			X			
9/NG	1/1			X	X		
18/NG	2/2				X	X	
20/NG	1/1			X	X	X	
21/NG	2/2	X	X				
1007-08/NG	3/3				X	X	
1016/NG	1/1		X	X	X		
1017/NG	1/2	X	X	X	X	X	X
1707/SG	1/1	X	X	X	X	X	X
1708/SG	1/1	X	X	X	X	X	X
1732/SG	1/1	X	X	X	X	X	X
1735/SG	2/3			X	X		
1786/SG	2/2		X	X			
1717/SWG	5/5				X		
1718/SWG	2/2					X	
1720/SWG	1/1					X	
1725/SWG	1/2					X	
1728/SWG	2/2	X	X	X	X	X	X
1748-49/SWG	2/2			X			

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
1751/SWG..........	2/2...			X	X	X	
1754/SWG..........	1/1...			X	X	X	
1758/SWG..........	1/1...						X
1784/SWG..........	2/2...	X	X	X	X	X	X
1788-89/SWG......	2/3...				X		
1791/SWG..........	1/1...			X	X	X	
1795/SWG..........	1/1...			X	X		
1800/SWG..........	3/4...				X	X	
1801/SWG..........	1/2...				X	X	
1802/SWG..........	1/3...			X	X	X	
1803/SWG..........	1/1...	X	X	X	X	X	X
1805/SWG..........	2/2...			X			
2617/EH...........	1/2...	X	X	X	X		
10/SEH............	1/1...			X	X	X	
18/SEH............	2/2...				X		
19/SEH............	2/2...			X	X	X	
26/SEH............	1/1...		X	X	X	X	
803/SEH...........	1/1...	X	X				
866/SEH...........	1/1...	X					
869/SEH...........	3/3...				X		
870/SEH...........	2/2...	X	X				
872/SEH...........	2/2...	X	X	X	X	X	X
873/SEH...........	1/1...			X	X		
817/EI............	2/3...			X	X		
823/EI............	1/1...			X	X	X	
824/EI............	2/3...			X	X		
831/EI............	1/1...	X	X	X	X	X	
839/EI............	2/2...	X					
843/EI............	3/3...					X	
851/EI............	1/1...			X	X	X	
3001/SL...........	3/4...			X	X	X	
3012/SL...........	1/2...			X	X	X	
3014/SL...........	3/4...				X		
3015/SL...........	1/2...	X	X	X	X	X	X
3016/SL...........	1/1...	X	X	X	X		
3020/SL...........	1/2...			X	X	X	
3026/SL...........	2/4...				X	X	
1033/SM...........	3/3...			X	X		
895/SWM...........	1/1...					X	X
907/SWM...........	1/1...	X	X	X	X	X	X
921/SWM...........	1/1...	X	X	X	X	X	X
947/SWM...........	1/1...					X	
950/SWM...........	1/1...			X	X		
952/SWM...........	2/2...	X	X				
961/SWM...........	2/2...		X	X			

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
964/SWM	1/1		X	X			
965/SWM	2/2		X	X			
966b/SWM	1/1	X	X	X	X	X	X
967/SWM	1/1		X	X	X		
969-70/SWM	1/1	X	X	X	X		
978/SWM	1/1		X	X	X		
979/SWM	1/1	X	X	X	X	X	X
981/SWM	1/1			X	X		
983/SWM	2/2				X	X	
1005/SWM	1/1	X	X	X			
1024/SWM	1/1			X	X	X	
1147/SWM	2/2	X	X	X	X	X	X
1149/SWM	1/1		X	X	X		
1151/SWM	1/1				X	X	
1160/SWM	1/1					X	
9/SWM/M7	3/3		X	X			
14/SWM/M7	1/2			X			
22/SWM/M7	1/1				X	X	
1888/NN'	3/6				X	X	
2125/NN'	3/5	X	X	X	X	X	X
2134/NN'	2/2				X	X	
2136/NN'	4/5				X		
1683/WN	1/1			X	X		
1/WN/M7	1/2	X	X	X	X	X	X
7/O/M5	1/2	X	X	X	X	X	X
9/O/M5	1/1			X	X		
14/O/M5	1/1			X	X		
19/O/M5	1/1				X		
21/O/M5	1/2			X	X		
29/O/M5	1/1	X	X	X	X	X	X
39/O/M5	2/3			X	X		
F.1/O/M5	2/2			X	X		
F.2/O/M5	2/3			X	X		
F.3/O/M5	1/2	X					
1/EO/M5	1/1	X	X	X	X	X	X
2179-80/WP	5/5		X				
2185/WP	2/2			X	X	X	
2187/WP	1/1		X				
2208/WP	1/1	X	X	X	X	X	X
2211/WP	1/1				X		
2223/WP	1/1	X	X	X	X		
2258/WP	1/1				X		
2282/WP	1/2	X					
2289/WP	1/1			X	X		
2314/WP	1/2				X	X	

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
2317/WP	1/1				X	X	
2326/WP	1/1			X			
2354/WP	1/1	X	X	X	X	X	X
2417/WP	1/1					X	
2421/WP	1/1	X	X	X			
2436/WP	1/1	X	X	X	X	X	X
2447/WP	1/1			X	X	X	
2471/WP	1/1	X	X	X	X		
2476/WP	1/1	X	X	X	X		
2496/WP	3/4			X	X		
2530/WP	1/1	X					
2532/WP	3/4	X					
2538/WP	1/1	X	X	X			
2540/WP	1/1	X	X	X	X	X	X
2544/WP	2/2	X					
2545/WP	1/1	X	X				
2550-51/WP	3/3	X	X	X			
2552-53/WP	2/2	X	X	X			
2555/WP	1/1		X	X	X	X	
2558/WP	1/1			X	X	X	
2559/WP	2/2	X					
2560/WP	2/2	X					
2562-63/WP	3/4	X					
2635/WP	1/1	X	X	X	X	X	X
2636/WP	2/2				X	X	
2640-41/WP	1/2				X	X	
2137/WP'	2/7				X	X	
2152-54/WP'	1/3				X	X	
2165-66/WP'	2/2				X		
2171/WP'	1/1			X	X	X	
1/NQ/M5	1/1	X	X				
12/NR	1/1						X
1083/NR	1/1		X	X	X		
1086/NR	2/2				X	X	
1087,1100/NR	4/5			X	X		
1088/NR	2/2				X		
1089,94-96/NR	3/3			X	X	X	
1098/NR	2/2	X	X	X	X		
1099/NR	1/1		X	X			
1101/NR	2/3			X	X	X	
1102/NR	2/3				X	X	
1103/NR	1/1			X	X	X	
1104-05/NR	3/3		X	X			
1109/NR	5/5			X	X		
1110/NR	2/2				X	X	

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
1111/NR	1/2	X	X	X	X	X	X
1113/NR	1/1	X	X				
1116/NR	1/2	X	X	X	X	X	X
1117/NR	2/2			X			
1118/NR	1/1		X	X			
1124/NR	2/2	X	X	X	X	X	X
1125-26/NR	2/4			X			
1128/NR	1/1	X	X	X	X	X	X
5/NR/M5	1/1	X	X	X			
8/NR/M5	1/1			X	X		
10/NR/M5	2/3			X	X	X	
11/NR/M5	1/1				X		
14/NR/M5	1/2		X	X			
21/NR/M5	1/2		X	X			
33/NR/M5	1/2				X	X	
38/NR/M5	2/2				X		
48/NR/M5	2/2		X	X			
58/NR/M5	1/1				X	X	
F. 1/NR/M5	1/3		X	X			
1/WR	1/1	X	X	X	X	X	X
6/WR	1/1	X	X	X	X	X	X
10/WR	1/1			X	X	X	
15/WR	1/1				X	X	
17/WR	1/1			X	X	X	
1045/WR	5/5				X		
1048/WR	1/1	X	X				
1049-50/WR	3/3	X	X	X	X		
1054/WR	1/1	X	X	X	X	X	X
1057/WR	1/1	X	X	X	X		
1060/WR	1/1	X	X	X	X	X	X
1065/WR	4/6				X	X	
1068/WR	1/1				X	X	
1/WR/M5	2/2			X	X		
4,5/WR/M7	1/1				X	X	
6/WR/M7					X	X	
8,9/WR/M7	1/4			X			
20/WR/M7	1/2	X	X	X	X	X	X
2942/W	1/1	X	X				
2947/W	1/1			X	X	X	
2957/W	1/1	X	X	X	X		
2962/W	1/2			X			
2984/W	1/1	X	X				
1833/NW	1/1	X	X	X	X	X	X
1836/NW	2/2			X	X		
1837/NW	2/2		X				

TABLE 35, continued

Burial Number(s)*	Sample Size**	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
1838/NW	1/1	X	X	X	X		
1840/NW	2/2				X	X	
1841/NW	2/2			X	X		
1842/NW	2/2	X	X	X			
1845/NW	2/2	X	X	X	X	X	X
1846/NW	1/1	X	X	X	X		
1848/NW	1/1	X	X	X	X		
1849/NW	1/1		X	X			
1850/NW	1/2	X					
1853/NW	1/1	X	X	X	X	X	X
1854/NW	3/3	X	X	X			
1856/NW	2/3	X	X	X	X	X	X
1861/NW	1/2	X	X	X	X	X	X
1865/NW	2/2	X	X	X	X		
1869/NW	1/1	X	X	X	X	X	X
2199/SW	3/4			X	X	X	
2022/SW	1/1	X	X	X	X	X	X
2203/SW	1/1			X	X		
2346/SW	1/1	X	X	X	X	X	X
2384/SW	1/1	X	X	X	X	X	X
2386/SW	2/2	X	X	X	X		
2387/SW	1/1	X	X	X	X	X	X
2388/SW	2/2			X	X		
2390/SW	2/2				X	X	
2392/SW	1/2		X	X			
2393/SW	2/5		X	X			
2397/SW	2/2				X	X	
2398/SW	2/2				X	X	
2500/SW	1/1	X	X	X	X		
2501/SW	2/2			X	X		
2504/SW	3/4			X			
2506/SW	2/2	X	X	X	X	X	X
2508/SW	2/2	X	X	X	X	X	X
2509/SW	1/2			X	X		
2513/SW	1/1	X	X	X	X	X	X
2517/SW	1/1			X	X	X	
1821/NWW	1/2	X	X				
1830/NWW	1/2	X	X				

* Multiple burials are listed as single gravelots.

** number of vessels in present sample/number of vessels originally found in gravelot

TABLE 36
Temporal Placement
of Unassociated Vessels (Local)

F.S. Number	Mv. I	Mv. II		Mv. III		Ala. Riv.
		early	late	early	late	
Rho1			X			
Rho46	X	X	X	X		
Rho136		X	X			
Rho190	X	X	X	X	X	X
Rho253	X	X	X	X		
Rho302	X	X	X	X	X	X
Rho374	X	X	X	X	X	X
Rw43	X					
Rw182	X	X				
Rw572			X	X		
Rw580			X	X		
Rw878				X	X	
B1				X	X	
B2			X	X	X	
B6		X	X	X		
NB2						X
NB6						X
C6/M5	X	X	X	X	X	X
C12/M5			X			
C13/M5			X			
C21/M5		X	X	X		
NC1			X	X		
NC2			X	X	X	
NC3			X	X	X	
NC5				X	X	
NEC9/M5			X			
D1					X	
ND3				X		
ND4				X	X	
ND5		X	X	X	X	X
ND7			X	X	X	
ND10		X	X	X	X	X
ND11		X	X	X	X	X
ND28	X	X	X	X	X	X
ND6/M5			X	X		
ND20/M5	X	X				
NED10				X	X	
ED2				X	X	
ED3		X	X	X		
ED4	X	X	X	X	X	X
ED6			X	X		
SED1			X	X		
SED2	X	X	X	X	X	X

TABLE 36, continued

F.S. Number	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
SED3.....	X	X	X	X	X	X
SED4.....				X	X	
SED6.....			X	X	X	
SED7.....	X	X	X	X	X	X
SED8.....			X	X		
SED9.....			X	X		
SED10....			X	X		
SED11....		X	X	X		
SED13....		X	X			
SED14....				X	X	
SED15....	X	X	X	X	X	X
SED17....			X	X	X	
SED18....		X	X			
SED19....				X	X	
SED27....				X		
SED28....				X	X	
SED30....			X			
SED32....	X	X	X	X	X	X
SED33....	X	X	X	X	X	X
SED35....			X	X		
SED43....				X	X	
SD1......		X	X			
SD6......				X	X	
SD10.....			X	X	X	
SD27.....	X	X				
SD3/M5...	X	X	X	X	X	X
SD28/M7..			X	X		
SD95/M7..		X	X	X		
SD103/M7.	X	X	X			
SD109/M7.		X				
NE1......		X				
NE2......				X	X	
NE4......				X	X	
NE5......			X	X		
NE7......			X			
NE8......			X	X		
NE11.....			X	X		
NE12.....			X			
NE17.....	X	X	X	X	X	X
NE18.....		X	X	X	X	X
NE19.....			X	X		
NE25.....	X	X	X	X		
NE26.....	X	X	X	X	X	X
NE27.....	X	X	X	X	X	X
NE30.....	X	X	X	X	X	X

TABLE 36, continued

F.S. Number	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
NE33.....	X	X	X	X	X	X
NE36.....	X	X	X	X	X	X
NE37.....		X	X	X		
NE44.....	X	X				
NE68.....				X	X	
NE79.....			X	X		
NE80.....				X		
NE85.....			X	X	X	
NE86.....				X	X	
NE88.....				X	X	
NE89.....				X	X	
NE92.....	X	X	X	X	X	X
NE93.....	X	X	X	X	X	X
NE95.....			X	X	X	
NE127....				X	X	
NE128....			X	X		
NE132....	X	X	X	X	X	X
NE133....			X	X		
NE134....	X	X	X			
NE135....	X	X	X	X		
NE136....				X	X	
NE138....	X	X	X	X	X	X
NE140....			X	X	X	
NE145....			X	X	X	
NE147....			X	X	X	
NE160....			X	X	X	
NE192....	X	X	X	X	X	X
NE603....	X	X	X	X	X	X
EE22.....			X	X	X	
EE25.....				X	X	
EE111....		X	X	X		
EE112....			X	X		
EE166....			X	X	X	
EE343....				X		
EE377....				X	X	
EE383....			X	X	X	
EE387....	X	X	X	X	X	X
EE446....	X	X	X	X		
SE3......			X	X		
SE8......				X		
SE9......		X	X	X	X	X
SE11.....			X	X	X	
SE12.....		X	X	X	X	X
SE13.....			X	X		
SE14.....			X	X	X	

TABLE 36, continued

F.S. Number	Mv. I	Mv. II early	Mv. II late	Mv. III early	Mv. III late	Ala. Riv.
SE37......				X	X	
F4/M5....		X	X			
F10/M5...		X	X			
NG1.......		X	X			
NG56......			X	X	X	
NG76......	X	X	X	X	X	X
SG23......	X	X	X	X	X	X
H3/M5....		X	X			
SEH18....			X	X	X	
SEH19....			X	X	X	
SEH20....			X	X	X	
SEH22....		X	X	X	X	X
SEH82....		X	X			
SEH83....	X					
SEH85....	X					
EI2.......	X	X	X	X		
EI95......			X	X	X	
SWM178...		X	X			
SWM188...			X	X		
SWM189...		X	X			
SWM190...				X	X	
SWM260...	X	X	X	X	X	X
SWM15A/M7			X	X	X	
O16/M5...		X	X			
O20/M5...			X	X		
O27/M5...	X					
O37/M5...	X	X				
WP16......	X	X	X			
WP30......		X				
WP32......	X	X	X	X		
WP71......		X	X	X		
WP73......		X				
WP269.....		X	X			
NR5.......	X	X	X	X	X	X
NR117.....	X	X	X	X	X	X
NR31/M5..			X	X	X	
WR2.......			X	X	X	
WR3.......		X	X	X		
WR9.......		X	X	X		
WR21......					X	
WR46......		x	X	X	X	X
WR50......	X	X	X	X		
WR51......			X			
WR28/M7..			X			
W81.......	X					
W220......	X	X	X	X		

CHAPTER VI

CONCLUSION: A REGIONAL PERSPECTIVE

Earlier chapters in this volume examined ceramic technology, classification, chronology, and community patterns, but all this was done from the restricted vantage of a single site. It now remains to expand this perspective by considering the data in a regional framework.

The region I will be concerned with includes the entire Black Warrior drainage, from its headwaters near Birmingham to its confluence with the Tombigbee River near Demopolis. The chapter begins by briefly sketching the region's late prehistory, outlining the major trends in subsistence, settlement and organization. The chapter then concludes with a consideration of factors which may have helped cause some of the changes observed.

The Late Prehistory of the Black Warrior Drainage

Until recently, our knowledge of sites in this region other than Moundville and Bessemer was highly limited. Most of the information available consisted of site descriptions compiled in the 1930's (Peebles 1978:381-388; Sheldon 1974:140-151), supplemented by a 1972 surface reconnaissance which located some sites in the southernmost end of the drainage (Nielsen, O'Hear, and Moorehead 1973). Although useful in many ways, the information available from these sources was generally not sufficient to date the sites in light of the new chronology.

Recent work in the Black Warrior valley has begun to change this situation, however. In the years between 1975 and 1979, several field projects were carried out by the University of Alabama and the University of Michigan which investigated numerous sites south of the fall line at Tuscaloosa. Intensive surveys relocated most of the previously recorded sites, found a number of new sites, and obtained controlled surface collections from each. Also, test excavations were placed in some of the outlying mounds, to provide a basis for dating episodes of construction. Sketchy preliminary reports on these settlement data have already begun to appear (Walthall and Coblentz 1977; Peebles et al. 1979; Welch 1979), and a thorough analysis is now being prepared by Tandy Bozeman of the University of California at Santa Barbara.

The foregoing, then, provides background not only for the presentation to follow, but also for a disclaimer: Given the recency of the fieldwork, much of the information available remains fragmentary and imprecise -- especially that gleaned from preliminary reports, my own (sometimes casual) observations in the field, and "personal communications" with colleagues. Thus many of the interpretations which follow should be regarded as first approximations, subject to considerable refinement when the syntheses of Bozeman and others are completed.

West Jefferson phase (A.D. 900-1050)

Components of this phase occur throughout the Warrior drainage, from Locust Fork (near Birmingham) south to the vicinity of Moundville. Components have also been identified on the upper Cahaba River in Jefferson County (Ensor 1979), and on the Sipsey River in Fayette County (Jenkins, in press).

West Jefferson sites exhibit quite a bit of variation in size. At one extreme are small sites, generally covering an area of less than 0.03 ha. Several of these small sites have been excavated, and have been shown to be seasonal, short-term occupations (O'Hear 1975; Ensor 1979). Such an occupation typically consists of a single (usually circular) dwelling, surrounded by features used for storage, food preparation, and sometimes burial. At the other end of the size scale are a number of larger sites, most covering 0.09 to 0.50 ha, of which the West Jefferson component at Moundville seems to be an example. Although none of these larger sites is well enough excavated to be sure, it is likely that many of them represent agglomerations of multiple dwellings -- communities that could reasonably be called villages (Welch 1979; Walthall and Coblentz 1977). Not a single West Jefferson site shows evidence of contemporary mounds.

Subsistence remains indicate that West Jefferson peoples relied mainly on wild foods, and engaged in agriculture only to a very limited extent. Plant foods found in West Jefferson contexts typically include hickory nuts, acorns, walnuts, persimmons, and maize -- with the abundance of nuts and persimmons far outstripping that of maize (Jenkins and Nielsen 1974:159-161; Ensor 1979:8). Although bone preservation at West Jefferson sites has been consistently poor, some idea of which animals were exploited can be gained by looking at evidence from contemporary sites along the central Tombigbee to the west. There, Late Woodland groups preyed on an extremely diverse group of species: principally deer, turkey, rabbit, squirrel, raccoon, drumfish, catfish, and mussels, not to mention a variety of other rodents, reptiles, and amphibians (Curren 1975).

Pulling all these lines of evidence together, Welch (1979) has proposed a plausible (and still tentative) interpretation of how the West Jefferson settlement system operated. He suggests that each village comprised a more-or-less permanent settlement, which served as a base from which a yearly cycle of economic activities was carried out. Given the importance of wild foods in the West Jefferson diet, some of these activities probably required a seasonal dispersal of population into smaller settlements, but this dispersal need not have entailed a complete abandonment of the village. A similar pattern of large "base camps" and small "transitory camps" has also been suggested for the

Late Woodland population on the central Tombigbee (Jenkins et al. 1975).

Finally, given the absence of mounds and elaborate burials, it is most reasonable to assume that West Jefferson groups were basically egalitarian in their social and political structure.

Moundville I phase (A.D. 1050-1250)

At some point after A.D. 1000, a number of far-reaching changes in the Late Woodland lifeway began to take place. These changes manifested themselves in the subsequent Moundville I phase, components of which occur throughout the Warrior drainage and also on the central Tombigbee (Jenkins 1979:273-277).

One set of innovations at this time had to do with subsistence, as the inhabitants of the region greatly intensified their reliance on cultivated plants. The Moundville I levels in the 1978-79 excavations north of Mound R provide the best evidence of diet. Although quantified data are not yet available, preliminary examinations have revealed that maize was extremely abundant relative to other plant species within these deposits (Scarry 1980; personal communication). This abundance of maize, as compared to its rarity in West Jefferson contexts, stongly implies that the focus of subsistence pursuits had shifted to agriculture. Wild nuts, seeds, and fruits continued to be eaten, but not to the extent that they had been previously. Faunal evidence suggests that hunting remained important, with the emphasis again on deer, squirrel, rabbit, and turkey. Aquatic resources utilized may have included drumfish, catfish, and turtle (Scarry 1980:14).

Paralleling the changes in subsistence were also some changes in settlement. Despite considerable efforts in the field, not a single village-sized community dating to this phase has been found, either in the Warrior drainage (Bozeman and Welch, personal communication) or on the Tombigbee (Jenkins et al. 1975; Jenkins 1975; Nielsen et al. 1973). Most of the population probably lived in dispersed farmsteads or small hamlets, sites which show up on the surface as small scatters of shell-tempered pottery. Given the importance that cultigens had achieved in the diet, it seems likely that most of these farmsteads and hamlets would have been permanent, year-round settlements.

Also during the Moundville I phase, the first civic-ceremonial centers appeared, marked by the presence of artifically constructed pyramidal mounds. Among the centers so far identified as dating to this time are 1Tu50 (Peebles 1978:381), 1Tu56 (ibid.:388), Moundville (Fig. 31), and the Bessemer site on Valley Creek, a tributary southwest of Birmingham (DeJarnette and Wimberly 1941). Undoubtedly, more early centers will be recognized as analysis of the survey collections proceeds.

The fact that these mounds were built is significant, for it suggests that changes were taking place in social and political organization as well. In native Southeastern cultures, flat-topped mounds were generally used as platforms for structures associated with offices of political and religious importance. If the construction of these mounds can be taken to indicate the institution of such offices, then this was the time when the first centralized polities in the region were established.

Most Moundville I phase centers were of modest proportions, having only a single mound. So far as we know only one site, Bessemer, had as many as three. Bessemer was subjected to large-scale excavations in the 1930's (DeJarnette and Wimberly 1941), and thus provides the most complete picture of what a Moundville I phase center looked like. Each of Bessemer's mounds had a different internal structure: the so-called "domiciliary mound" was rectangular in shape, lacked burials, and supported buildings atop each of its multiple stages; the "ceremonial mound" was oval, flat-topped, yet lacked any evidence of buildings; and the "burial mound" was low, conical in shape, and contained numerous human interments. Many of the buildings found on, beside, and underneath the mounds were rectangular and of wall trench construction. Many of these buildings were also accompanied by circular enclosures, clay "seats", and small platforms -- all architectural features suggestive of civic-ceremonial, rather than domestic, function (see, for example, Lewis and Kneberg 1946:60-72).

Moundville I mortuary practices are relatively well-documented at both Moundville and Bessemer. The most common form of burial appears to be the primary supine inhumation, although secondary inhumations of bone "bundles" and individual skulls also occur. Burials often seem to have been placed in or near domestic dwellings, and thus tend to be found spatially scattered along with the dwellings themselves (Fig. 34). There also exist some clusters of burials which may represent discrete mortuary areas or cemeteries. These mortuary areas tend to occur at centers, in close proximity to the pyramidal mounds. The clearest examples of such features are the burial mound at Bessemer, and the cemetery at Moundville west of Mound O (Fig. 33). Both of these mortuary areas contain at least some (apparently) high-status individuals, their burials accompanied by embossed copper plates (e.g., DeJarnette and Wimberly 1941:Fig. 58), shell beads, or carved stone discs. However, none of these burials suggests a mortuary ritual as a complex as some of those which were to appear in subsequent phases.

In brief, the Moundville I phase was a time when a number of small local centers were established in the Black Warrior drainage. The typical center had at least one pyramidal mound with an associated mortuary area, and probably served a number of dispersed farmsteads and small hamlets in its immediate vicinity. Each of these centers and its surrounding population probably constituted a somewhat centralized, autonomous polity, analogous to a simple chiefdom (Steponaitis 1978:420).

It is interesting to note that all the known Moundville I centers were built on, or immediately adjacent to, the locations of earlier West Jefferson phase villages. Thus, certain village locations appear to have persisted as focal points of community life, even after most of the former village inhabitants had dispersed into scattered farmsteads and hamlets. This continuity in location through time is thoroughly consistent with the notion that the West Jefferson - Moundville I transition took place in the context of a stable, indigenous population.

Moundville II and Moundville III phases (A.D. 1250-1550)

Components of the Moundville II and Moundville III phases are known from the lower reaches of the Warriour river south of the fall line at Tuscaloosa. It is difficult to say whether the absence of sites above the fall line is due to an actual abandonment of the area, or simply to the lack of adequate survey. Sites with ceramics pertaining to these two phases have also been identified on the central Tombigbee (Jenkins 1979:273-277).

Most aspects of subsistence and settlement established during Moundville I continued into these subsequent phases, with one major exception: Moundville, formerly a small local center, grew tremendously in size and importance. By the end of the Moundville II phase, at least five, and probably as many as 14 mounds were standing, and the overall size and shape of the plaza had been laid out. At some point during the Moundville III phase, the site achieved its final form, with all 20 mounds complete.

Although Bessemer (above the fall line) had been abandoned by the start of this time period, some of the other small centers (below the fall line) continued to be used. For example, based on a radiocarbon date of A.D. 1340±80, it is likely that the uppermost stages of the mound at 1Tu56 were built during Moundville II. Also, test excavations have revealed that stages were being added to the mounds at 1Tu2 (Snows Bend) and 1Tu46 even as late as Moundville III (Bozeman, personal communication).

With the possible exception of Moundville itself, no village-sized communities are known from these phases (Bozeman and Welch, personal communication). It therefore seems reasonable to assume that much of the population remained dispersed in farmsteads and small hamlets.

The degree of social ranking probably reached its zenith during this time, as indicated by the complexity and richness of of the mortuary rituals accorded Moundville's elite. Virtually all of the highly elaborate mound burials, which constitute the uppermost tier of Peebles' (1974; et al. 1977) "superordinate dimension", took place in Moundville II and early Moundville III. Most of the less elaborate burials at Moundville probably date to this time period as well. Outside of Moundville, it seems that some people were buried in small cemeteries, generally located near the outlying local centers. Examples of such cemeteries have been found at 1Tu3 (DeJarnette and Peebles 1970) and 1Ha8 (Peebles 1978:368), both of which date to Moundville III.

All in all, the data suggest a three level settlement hierarchy was in effect: Moundville stood alone as a regional center, unique in both its size and architectural complexity; next came a stratum of local centers, each with only one mound; and lowest were the subordinate farmsteads and hamlets. The fact, that only one regional center existed and all the local centers were of equivalent size, strongly suggests that the Warrior Valley was politically unified under Moundville's hegemony.

Alabama River phase (A.D. 1550-1700)

As currently defined, this protohistoric phase extends over much of central, southern, and western Alabama. Major concentrations of sites have been identified along the Black Warrior River south of the fall line, along the lower Tombigbee river, and along the Alabama River between the fall line (at Montgomery) and the confluence with the Tombigbee (Sheldon 1974:Fig. 1).

Within the Black Warrior Valley itself, this phase was marked by a considerable decline in social and political complexity, a decline which probably had begun during late Moundville. By the start of the Alabama River phase, Moundville and all the local centers had been abandoned, their mounds no longer being used. Gone, too, were the lavish mortuary rituals which had served to distinguish society's elite. Most adults were interred quite simply: either as primary, extended burials accompanied by a few grave goods, or as disarticulated "bone burials" placed in large ceramic vessels. Thus, both settlement and mortuary data suggest that the society's organization had reverted once again to an egalitarian form.

Subsistence continued to depend heavily on maize, and a similar range of wild foods -- both plant and animal -- were exploited as previously (Sheldon 1974:241-246). A major change did occur, however, in the configuration of local communities. For the first time since the West Jefferson phase, large sites -- villages -- appeared as people moved into larger aggregations. A number of these villages in the Warrior Valley were 1-2 ha in size, and could well have accommodated populations reaching into the hundreds (Sheldon 1974:140-151). Although evidence of small, scattered settlements also exists during this phase (see p. 250), it is likely that most people lived in the larger communities.

In brief, the late prehistoric sequence in the Black Warrior drainage was marked by several major transformations in social and political organization. Beginning with relatively simple, egalitarian societies in West Jefferson times, these transformations apparently took place in three stages. First came the emergence of small hierarchical polities, as evidenced by the appearance of local centers at about A.D. 1050. Later, a number of these small polities were consolidated into a single larger polity, as yet another level in the settlement heirarchy emerged. this change was manifested in the building of a large regional center at Moundville, at around A.D. 1250. The resulting political structure persisted for some 250 years, but eventually the system collapsed. Shortly after A.D. 1500, the regional center and the various local centers fell out of use, and the societies in the area once again took on an egalitarian structure.

The nature of the causal processes which underlay these transformations is in many ways still obscure. It is, nevertheless, worthwhile to conclude with a discussion of certain factors which may help explain, at least in part, why some of these changes occurred.

Some Speculations on the Causes of Change

Following the work of Rappaport (1968; 1971) and Wright (1977), Peebles and Kus (1977) point out that a fundamental distinction between egalitarian and ranked societies (chiefdoms) lies in the mechanisms of social control and regulation, processes essential to a society's continued existence. These differences in the structure of regulation have important consequences, in that they determine the ability of societies to deal with uncertainties in the environment.

In egalitarian societies, community decisions are arrived at by consensus, and many aspects of economy and external relations are regulated by mechanisms embedded in community ritual. Because achieving community-wide consensus takes time, and because rituals tend to be inflexible, such mechanisms are intrinsically slow in their operation, and limited in their range of response.

Chiefdoms, on the other hand, are characterized by formal offices of leadership, filled by individuals whose authority allows them to make certain decisions for the community as a whole. Not only can directives be issued and carried out more quickly, but individuals in a position of authority can exercise judgement in a way that ritual cycles cannot. Thus, the reaction to any situation can be more rapid, and the range of responses more varied and better suited to the problems at hand.

In short, the transition from egalitaran society to chiefdom entails the emergence of a superordinate level of offices which have important functions in social regulation and control. Peebles and Kus (1977) suggest that such a transition might well occur under conditions where the limited capabilities of the regulatory mechanisms in egalitarian systems are transcended, and hierarchical controls become necessary for continued social reproduction. Such conditions could involve an increase in the uncertainty or unpredictability of certain critical environmental variables. As Rappaport (1968:234) puts it,

> In a stable environment, slow and inflexible regulation may not produce serious problems, but the novel circumstances that are continually presented by rapidly changing environments may require more rapid and flexible regulation.

The establishment of higher-order controls does have certain costs, since office holders and their retinues are often divorced from subsistence production (especially in the more complex chiefdoms), and therefore must be supported by food extracted from the primary producers. Yet as Sahlins (1972: 101-148) argues, such costs tend to be offset by a variety of economic benefits that the existence of a chief can bring. Because of his exalted authority, a chief is able to channel economic activities, accumulate surplus, and distribute surplus in a way that transcends the self-interest of individual households.

> ... by thus supporting community welfare and organizing activities, the chief creates a collective good beyond the conception and capacity of the society's domestic groups taken separately. He institutes a public economy greater than the sum of its household parts [Sahlins 1972:140].

With these theoretical considerations in mind, let us now turn to some of the specific factors which may help explain the archaeologically observed changes in the late prehistoric societies of the Black Warrior drainage.

One factor which was probably important in the emergence of the earliest local centers (at about A.D. 1050) was the shift to intensive corn agriculture (Ford 1974). West Jefferson groups hunted and gathered a broad spectrum of wild species, and grew relatively little corn. Such a subsistence regime, based on a high diversity of resources, would have been inherently stable, since an unexpected deficit in any one resource could always be made up for by others (i.e., it was extremely unlikely that in a given year all resources will fail at once). By the start of the Moundville I phase, however, agriculture had increased tremendously in importance as maize became the principal crop. This change in subsistence would have had two immediate consequences. First, it would have increased productivity, allowing considerably more people to be supported per unit land. Second, this increase in productivity would have brought about a decrease in the proportional contribution of other dietary resources, which also implied certain risks. Whereas previously the failure of any one resource could be compensated for, now the failure of a crop could mean disaster. These circumstances may have selected for the emergence of leaders who could mobilize a certain portion of each household's surplus production, and thereby build up communal stores which could be used to buffer against unexpected losses. These stores could be distributed as needed to correct not only imbalances in production between one year and the next, but also imbalances between different households or communities within the same political unit.

Another factor that may have been important in the emergence of political complexity was the need to regulate inter-community conflict. As Peebles notes, this factor and the intensification of agriculture were probably interdependent:

> On the one hand as the dependence on agriculture increased, the risk of catastrophic crop failure increased, and the risk of local hostilities increased. On the other hand, as local units were integrated into larger political units, the risk of hostility from equally large neighboring polities increased and insecurity again increased. This left either alliance or large-scale preemptive raids as one strategy to eliminate the unpredictable element in a society's environment. Therefore, the regulatory functions of the chief were to make alliances, or war, as well as to prevent or buffer against the possibility of crop failure.
>
> Such a view might explain the fact that a part of the iconography of the Southern Cult is related to warfare (Brown 1976), and that it served as well as a common set of symbols among several societies. It symbolized the equality of the leaders among allies, equals among enemies, and it emphasized rank within a single polity. Such a view also goes far toward the understanding of warfare among chiefdoms. Such societies engaged in massive raids, but they generally did not take and hold the territory of the group over which they were victorious. Instead they contented themselves with uprooting crops, destroying stored food, taking captives, and generally disrupting their enemies. If warfare was the least predictable element in a chiefdom's environment, and if it could not be rendered predictable by an alliance, then complete disruption of the enemy group would remove it from the contention for at least one seasonal cycle. It seems from the ethnohistoric record of the Southeast that warfare was of this nature and not the result of the territorial ambitions of one group for another's land [Peebles, in press:59-60].

In support of this line of reasoning, a few more observations can be added. First of all, it is interesting to note that there seems to be a negative correlation between aggregated settlments and evidence for hierarchical organization. During the West Jefferson and Alabama River phases, when political centralization was absent, nucleated villages were present. Conversely, from Moundville I to

Moundville III, when evidence of political centralization was present, aggregated settlements (possibly except for Moundville) were absent, and most of the population lived in dispersed farmsteads. Ethnographic studies have shown that a dispersed pattern is more efficient and often preferred by primitive agriculturalists, since it minimizes the effort expended in walking to and from fields (Chisolm 1968). One reason for aggregation, superceding efficiency and preference, is the need for defense. Thus, the settlement data from the Warrior drainage are consistent with the notion that inter-community conflict reached a peak at those times when centralized leadership was lacking. This is not to say, of course, that warfare and raiding were ever totally absent -- the bastioned palisade and other evidence for warfare at Moundville clearly indicate otherwise (Peebles and Kus 1977:444). However, it may be that chiefly officials, by means of alliances and preemptive raids, could have rendered warfare more _predictable_. With uncertainty thereby lessened, the population could remain dispersed most of the time, retreating to palisaded enclosures only when the threat of attack was greatest (Smith 1978:488-491).

Indeed, there are artifacts at Moundville and elsewhere which can be interpreted as objects which played an important role in rituals of inter-polity alliance. Hall (1977) has pointed out that in the aboriginal cultures of the eastern United States, rituals of peace-making and alliance typically involved exchanges of weapons, either symbolic or real. The most common object of this sort at the time of European contact was the calumet, which Hall argues had symbolic connotations of an arrow or spear-thrower (1977:503-505). Rituals associated with the calumet cross-cut cultural boundaries, and were recognized throughout the eastern Woodlands and the Great Plains; in effect, these rituals were a <u>lingua franca</u> for establishing friendly relations between autonomous political units. In this light, it is rather intriguing that many of the distinctive artifacts found with high-status burials at Moundville are ceremonial weapons -- copper axes, embossed sheet-copper arrowheads, monolithic axes, chipped stone "swords", maces, and the like. Most of these artifacts seem to date between A.D. 1200 and 1500, and similar artifacts are found in elite burials throughout the southeastern U.S., suggesting that these ceremonial weapons were widely exchanged. Given their context and wide geographic distribution, these artifacts could well have been prehistoric analogs of the calumet, functioning in rituals of diplomacy which, for the most part, would have been engaged in by community leaders. And just as calumets were placed on the bier of a dead Natchez chief in commemoration of ceremonies he had participated in while alive (Swanton 1911:144), so too were ritual weapons included with the mortuary accompaniments of chiefly personages at Moundville and elsewhere.

Thus, it can be argued that two factors -- the risks associated with agriculture and the need to regulate inter-polity conflicts -- contributed to the emergence of socio-political complexity in the Black Warrior region. Yet it is also worthwhile to consider what the arguments presented thus far do not explain.

To begin with, we have not dealt with why agriculture was intensified in the first place. On the central Tombigbee, Jenkins et al. (1975) have documented a pattern of population increase leading up to the Mississippi period. If such a pattern of growth also occurred along the Warrior, then an increase in population density from West Jefferson to Moundville I times could be invoked as a sufficient cause for the change in subsistence. However, the demographic data with which to support such an argument are as yet not available.

A second shortcoming in the explanatory sketch is that it does not deal adequately with why the socio-political complexity at Moundville advanced to the point that it did. Presumably, a single level of hierarchical offices could have mitigated subsistence risks and carried out alliances. Why, then, did the hierarchy develop even further, as evidenced by the emergence of a regional center which would have consolidated a number of local centers under its hegemony? Here I suspect the answer will not be found in any purely functional explanations that invoke "stresses" in the environment. Rather, it is conceivable that the development resulted from an interaction of social and ideational processes which, in large part, progressed with a momentum that was generated internally. As examples of the sorts of models which may ultimately prove applicable in this regard, one can cite the works of Friedman (1975) and Bloch (1978).

Finally, we must address the question of why the elaborate hierarchy which characterized the Moundville system ultimately collapsed. Two hypotheses have been proposed so far. One, perhaps the most commonly alluded to (e.g., Ford 1974:408), is that the collapse was engendered by a massive depopulation in the sixteenth century, brought on by the introduction of Old World diseases. Another is that the collapse was due to internal causes, notably that the costs of maintaining the hierarchy eventually proved to be more than the local productive forces could bear (Peebles, in press:61). Once again, the data crucial to deciding between the two hypotheses are lacking. One important line of evidence would have to be demographic: If no depopulation preceded the decrease in complexity, then the first hypothesis would obviously be false. Other lines of evidence, involving changes in the quality of diet and the intensity of agriculture, would also be relevant, and are now in the process of being examined (Peebles et al. 1979).